SINUMERIK

**Intelligent solutions
for machine tools**

siemens.com/sinumerik

Increased productivity with SINUMERIK

Highly productive automation solutions are demanded for workshops, jobshops and large series production – that accompany and support users along the path to digitalization. SINUMERIK CNC solutions always provide companies, operating machine tools, with the optimum solution to address their specific requirements. Whether for individual parts or mass production – basic or complex workpieces.

Strong partner in the world of machine tools

From the idea of a new machine on the way to ongoing optimization in operation. The machine tool domain demands leading-edge solutions for digitalization and automation. Siemens Machine Tool Systems contain an integrated portfolio of software, automation solutions and technology know-how that supports machine builders and companies operating machines in the field. Siemens Machine Tool Systems stands for high quality, efficiency and maximum productivity.

Benchmark for productivity

A SINUMERIK CNC is the first choice when new, revolutionary machine concepts must be implemented – and if the absolute maximum productivity is demanded for a machine tool application. For more than 60 years, SINUMERIK CNCs have been setting standards in the machine tool market. Siemens Machine Tool Systems has an innovative, unique, and experienced development team to ensure highly productive machine concepts, based on SINUMERIK CNCs, can be implemented presently and in the future.

Constantly striving for quality

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

Global partner

With a tightly meshed global network of sales, service and training centers as well as international production facilities, Siemens Machine Tool Systems is optimally 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 in our global Digital Experience Centers (DEX) have a wealth of application know-how. Our DEX ensure that our solutions and systems always address what is required in the field.

SINUMERIK –

the CNC portfolio for the global machine tool market

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 optimum cost position, represent the perfect basis for equipping entry-level CNC machines.

SINUMERIK 828

The compact CNC for standardized machines

SINUMERIK 828 control systems are optimally suited for standard machines that are produced in high unit quantities with a low degree of modularity. SINUMERIK 828D: This powerhouse in the compact class is the ideal solution for cost-sensitive markets, where high CNC performance and easy commissioning are demanded.

SINUMERIK 808

- Panel-based compact CNC
- Up to 6 axes/spindles
- 1 machining channel
- 8.4" color display
- SIMATIC S7-200-based PLC

SINUMERIK 828

- Panel-based compact CNC
- Up to 10 axes/spindles and 2 auxiliary axes
- Up to 2 machining channels T, M, G
- 15.6"-Touch-Display
- SIMATIC S7-200-based PLC

SINAMICS V70
SIMOTICS S-1FL6

SINUMERIK 808D ADVANCED

SINAMICS S120/S120 Combi
SIMOTICS

SINUMERIK 828D

From basic, standard CNC machines through standard machine tools up to modular, high-end machine concepts – SINUMERIK CNCs offer the optimum solution for each and every machine concept. Whether individual part or mass production, basic or complex workpieces – SINUMERIK is the highly productive automation solution across all production domains. These extend from prototype and tool building through moldmaking up to large series production.

SINUMERIK 840

The open CNC for modular 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 should be individually adapted to address the requirements of individual users.

www.siemens.com/sinumerik

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 Booksize/Combi/Chassis
SIMOTICS**

SINUMERIK 840D sl

SINUMERIK 808 –

outstanding performance, simply intelligent

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

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 turning and milling applications
As a result of its technology-specific versions, the SINUMERIK 808D ADVANCED control is perfectly preconfigured 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 on its hardware and software expansions, SINUMERIK 808D ADVANCED offers sufficient performance for moldmaking and toolmaking for basic milling functions.

Ideal for entry-level machine operators
Based on the innovative, integrated startGUIDE and the standard SINUMERIK operating and programming philosophy, the SINUMERIK 808D ADVANCED is the ideal partner when entering the world of CNC. Commissioning is also explained interactively in a graphical form.

SINUMERIK 828 –

the powerhouse in the compact class

With its unique CNC performance, our SINUMERIK 828D control sets productivity benchmarks when it comes to milling and turning on standard machines as well as functions to simply automate grinding machines.

Rugged and maintenance free

Their die-cast magnesium operator panel fronts, the panel-based CNC design with just a few interfaces, as well as a high degree of protection, make SINUMERIK 828 controls a dependable partner even in harsh production environments. SINUMERIK 828D has no fan, no hard disk, and an NV-RAM memory without a buffer battery, which makes it a completely maintenance-free CNC.
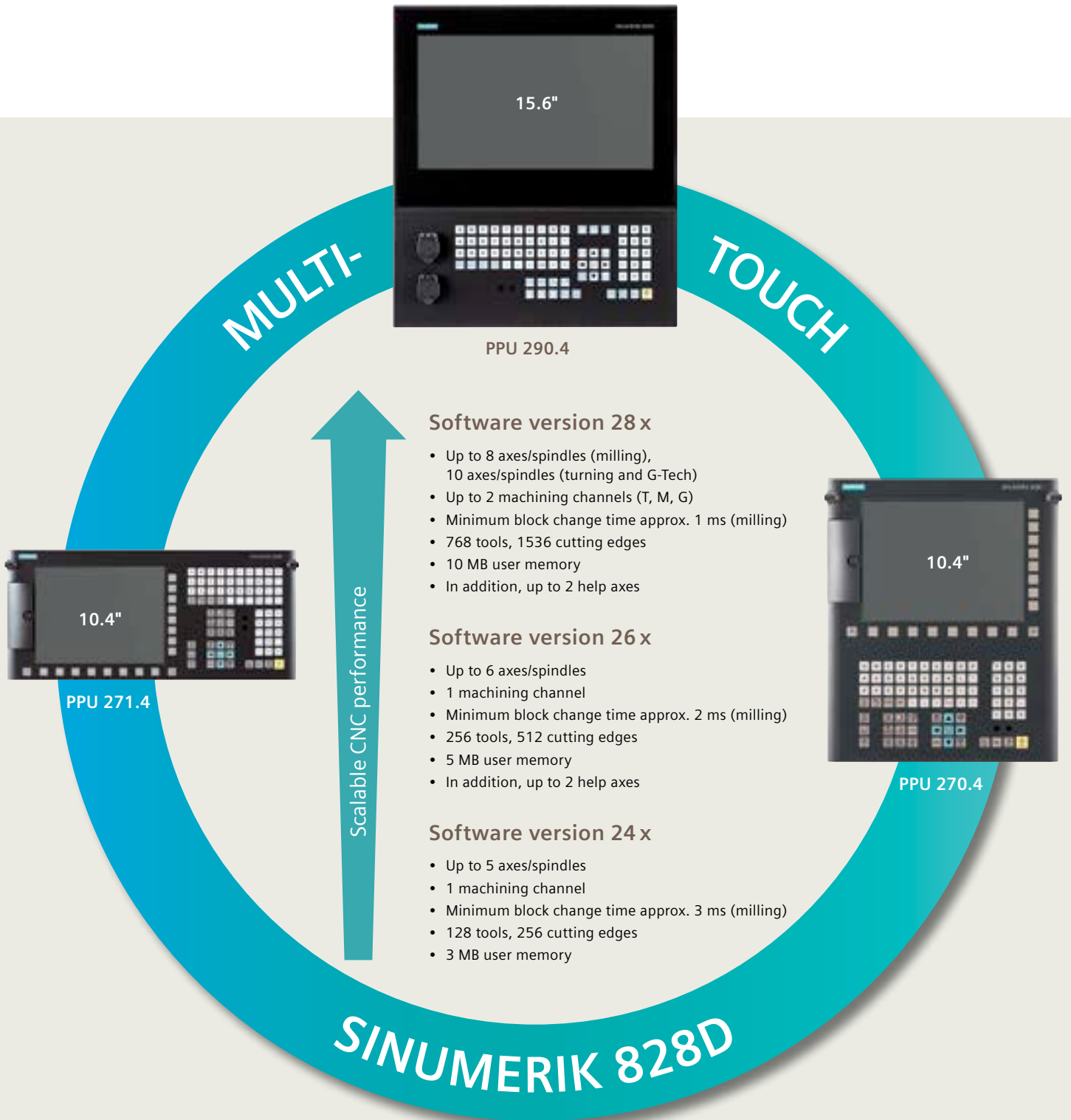
User-friendly

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

Based on the three CNC performance versions (SW24x, SW26x and SW28x) favorably-priced compact as well as more complex machines with additional axes/spindles and 2 machining channels can be implemented.

15.6"

PPU 290.4

MULTI-

TOUCH

Software version 28 x

- Up to 8 axes/spindles (milling),
  10 axes/spindles (turning and G-Tech)
- Up to 2 machining channels (T, M, G)
- 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 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

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

Scalable CNC performance

10.4"

PPU 271.4

10.4"

PPU 270.4

SINUMERIK 828D

SINUMERIK 840 –

ultimate 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 multicore 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 optimally adapted to the machine's technology. For instance, 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.

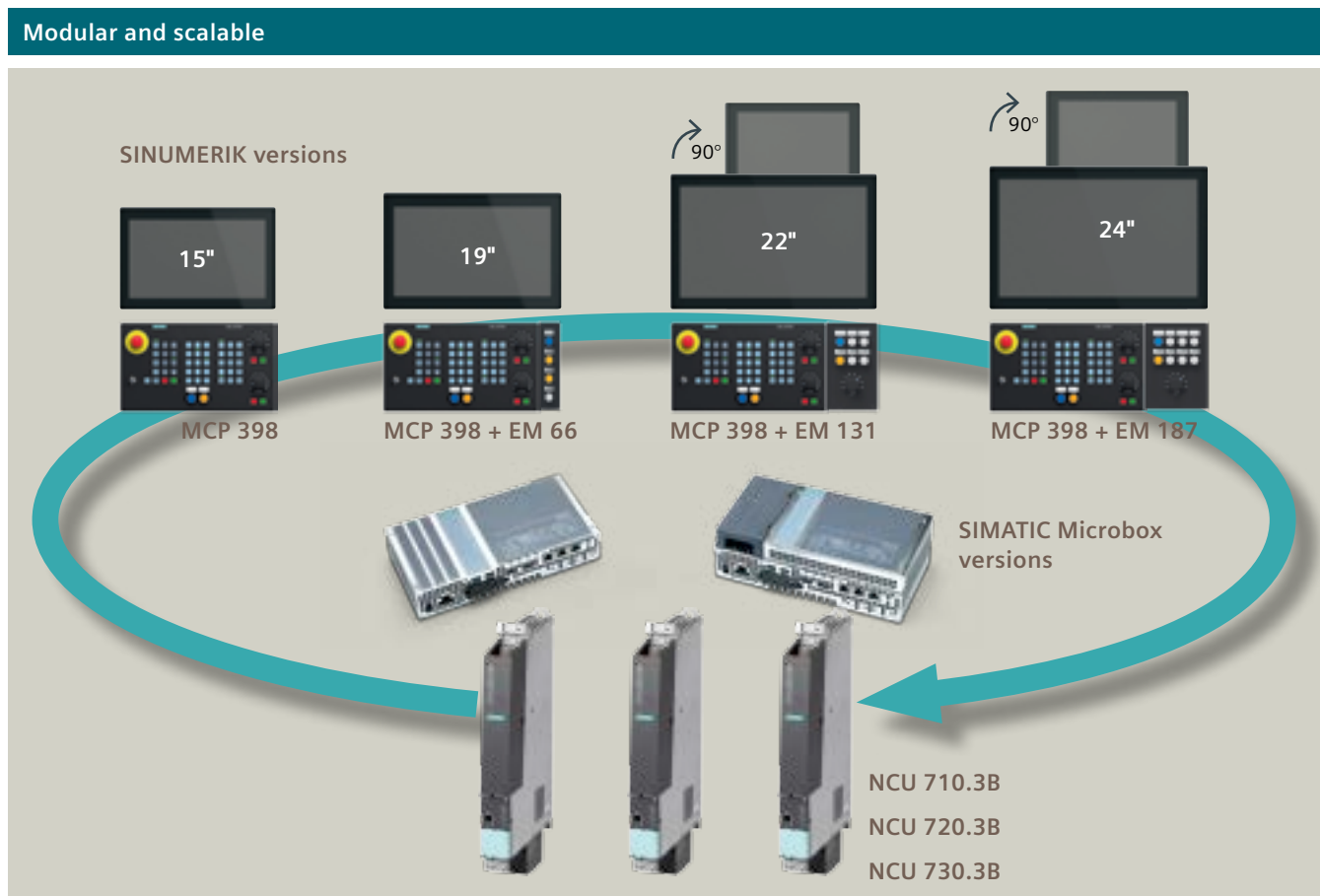### Communication at every level

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

Intuitive operation and monitoring

SINUMERIK panels make operation and visualization easier for machine operators. With their touch screens, they open up the way to create new and unique machine operating philosophies. In conjunction with the state-of-the-art SINUMERIK Operate user interface, touch and gesture operation are establishing themselves in the production domain. In addition, machine operators can choose from various mobile SINUMERIK handheld terminals, for example, the SINUMERIK HT 8 – which functionally combines operator panel and machine control panel to make operation even simpler.

Modular and scalable

In addition to scalable NCU performance, 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, the SINUMERIK 840D sl ideally fits the operating philosophy of compact machines through to state-of-the-art high-end machine concepts.

Modular and scalable

SINUMERIK versions

| 15" | 19" | 22" | 24" |

90° 90°

| 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

Drives and motors – everything from a single source

SINAMICS V70   SINAMICS S120 Combi   SINAMICS S120 Booksize   SINAMICS S120 Chassis

Drives

SINAMICS V70 – small and powerful

The SINAMICS V70 with SINUMERIK 808D concept is simply unbeatable when it comes to price-sensitive entry-level machines. The compact design of the single-axis, fanless 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 – providing 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, various infeed options are available with functions such as energy recovery and controlled DC link. This ensures the shortest spindle acceleration times and facilitates perfect reactive power compensation for the complete machine (cos φ = 1). The SINAMICS S120 allows the power unit and control module to be mounted separately, which means that this drive system can be perfectly adapted to address the widest range of drive applications.

SINAMICS S120 Combi – the ideal drive for compact machines

SINAMICS S120 Combi combines the performance of the modular SINAMICS 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 concepts with a spindle power of up to 15 kW and can control up to five feed axes.

SINAMICS S120 Booksize – minimal footprint for the control cabinet

The new SINAMICS S120 Booksize devices have a 300 percent overload capability and combine compactness with power density. The width can be reduced for applications that are dimensioned for maximum current with high acceleration levels – or for positioning axes demanding a high dynamic performance. The height required in a control cabinet has also been reduced as a result of a new motor connection/shield concept for the module.

SINAMICS S120 Chassis

The SINAMICS S120 converter in the chassis format has been expanded up to high power ratings of 300 kW and currents up to 490 A – allowing these devices to perfectly address applications with the highest demands relating to power and performance.

www.siemens.com/sinamics

SINUMERIK control systems, in conjunction with SINAMICS drives and SIMOTICS motors, are optimally designed to address the requirements of machine tools. The complete 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.
SIMOTICS motors for motion control applications and SINAMICS drives are the driving force for SINUMERIK CNCs, which sets the standard for maximum precision and speed.

SIMOTICS servomotors
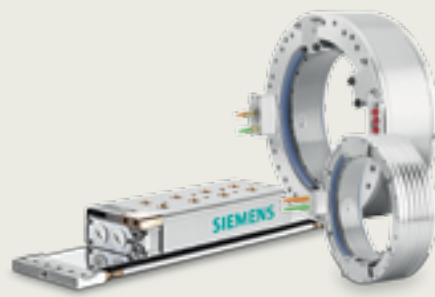
SIMOTICS linear and torque motors

SIMOTICS main spindle motors

SIMOTICS motion control motors

SIMOTICS servomotors
High stall torques, high encoder accuracy and perfect smooth-running operation make SIMOTICS servomotors the optimum feed drive for machine tools.

SIMOTICS S-1FL6 motors with enclosure and connectors in compliance with military standards (MIL standards) represent the highest degree of ruggedness when it comes to price-sensitive entry level machines.

SIMOTICS S-1FK7 motors are synonymous with flexibility when it comes to equipping machine tools, and are available with various rated speeds, encoder types and moments of inertia.

SIMOTICS S-1FT7 motors offer the highest performance with 400 percent overload capability. They are available as non-ventilated, force-ventilated and water-cooled versions.

Our portfolio of servomotors has been expanded to include compact SIMOTICS S-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. Using SIMOTICS L-1FN3 linear motors, elasticity, backlash and friction in the machine drive train can be almost completely eliminated – and along with mechanical transmission elements – allows the highest degree of precision to be achieved. Further, in addition to positioning tables requiring a high dynamic performance, SIMOTICS T-1FW6 built-in torque motors can also be used for round and swiveling tables used in precision 5-axis machining applications. Their innovative design also means that they can address completely new fields of technology, for example turning in milling machines.

www.siemens.com/motion-control-motors

SIMOTICS main spindle motors
An outstanding portfolio is obtained by teaming up the high level of competence in spindle design and construction of Weiss Spindeltechnologie GmbH with Siemens long tradition of building electric motors. This unique portfolio supports all types of spindle solutions – from classic mechanical spindles with SIMOTICS M-1PH8 and SIMOTICS M-1PH1 mounted spindle motors, through SIMOTICS M-1FE1, M-1FE2 as well as M-1PH2 built-in induction spindle motors – up to hybrid and high-performance motor spindles.

www.siemens.com/spindles

Solutions for every industry that are fit for the future

Every sector has its own specific requirements. Whether standardized automation concepts for the automotive sector or a holistic approach across all phases of the product and production lifecycle – all the way up to aerospace. Siemens Machine Tool Systems has been a partner to the machine tool industry for many years, and offers sector solutions that are deployed around the globe.

Many years of industry expertise is convincing

Based on our unique experience and the sector know-how that we have built up over the years, we can provide optimum solutions for cost-effective component production in the automotive, aerospace, power generation and electronics domains.

Partner for automating machine tools all the way up to complete production landscapes

Throughout decades of direct contact with end users in key sectors, we clearly understand the requirements that are placed on current generations of machines – and those in the future. This know-how flows directly into our product development. That ensures that SINUMERIK control systems are closely aligned to address market requirements. As full-line supplier, in addition to automating machine tools, Siemens can act as the general contractor for the manufacturing automation of your entire plant. Customers will also benefit from this as a result of integrated and seamless automation solutions from a single source – ultimately helping you to achieve a highly-productive manufacturing environment.

Setting trends in the production landscape

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

www.siemens.com/machinetools

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, grinding – as well as nibbling, laser machining and gear wheel machining. Further, it is open for new technological concepts, such as multitasking, Additive Manufacturing and machining composites.

Turning

Highest precision and productivity from cycle-controlled and standard CNC turning through milling on lathes up to multichannel and multitasking 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 multitasking machining.

Multitasking

Based on SINUMERIK Operate, multitasking machining is seamlessly supported across all technologies – whether in series production or in a workshop environment. For efficient and highly productive CNC machining.

Nibbling, laser, water jet and plasma machining

Going beyond standard technologies, the openness of our SINUMERIK 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 on 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 reprofiling 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 machine tools 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?
Fit for the future."

With SINUMERIK, you can use all machining technologies	SINUMERIK 808	SINUMERIK 828	SINUMERIK 840
Turning	✓	✓	✓
Milling	✓	✓	✓
Grinding	–	✓	✓
Multitasking	–	–	✓
Additive Manufacturing	–	–	✓
Gear machining	–	✓[1]	✓
Nibbling, laser, water jet and plasma machining	–	–	✓
Machining composites	–	–	✓
Automated cell	–	✓	✓

1) Option: CP-Comfort

Always achieve the maximum CNC performance

Productivity. Precision. Availability. Costs. These are the decisive drivers in the machine tool market. Packed with special functions, SINUMERIK controls precisely satisfy these requirements – helping to accomplish a high CNC performance.

Wide ranging possibilities to achieve high productivity

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

All the facets of robot integration
The demand for automation solutions for machine tools teamed up with high precision industrial robots is increasing at a rapid pace. This applies equally to handling – as well as high-precision and complex machining tasks. With SINUMERIK, Siemens has a CNC system for robot integration: From a simple connection via the user-friendly integration for handling tasks – up to the complete integration of robot kinematics in a system.

Intelligent motion control
With its intelligent Advanced Surface and Top Surface motion control functions, SINUMERIK can achieve optimum 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 automatically optimized. This simplifies commissioning the machine, and in operation, the machine can be regularly optimized using AST. This ensures maximum machine precision over the complete lifecycle.

Precision in the production landscape

The high degree of precision achieved using SINUMERIK also comes from functions such as its 80-bit NANO computation accuracy. This is supplemented by innovative software-based compensation of various mechanical effects.

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.

Nodding compensation
Nodding compensation is used to compensate dynamic position deviations that occur when machine axes accelerate. This improves machining quality, and at the same time, allows higher jerk and acceleration values to be reached.

Friction compensation
Friction-related path errors are even more effectively eliminated by compensating the effects of friction as a function of the velocity. This allows a consistently high contour accuracy and workpiece precision to be achieved.

Volumetric compensation (VCS)
VCS allows geometrical deviations of linear and rotary axes to be compensated regarding how they influence the tool center point – directly resulting in higher machining precision.

Increasing the availability

High machine tool availability levels are achieved based on condition monitoring and collision avoidance.

Collision Avoidance
Provides optimum collision protection: Collision Avoidance in SINUMERIK offers 3D collision monitoring in real time – for 1-channel machines with one NCU – and also for complex machining operations such as 5-axis simultaneous milling. Collision monitoring is available in all operating modes (JOG, MDA and automatic). The motion of machine elements with respect to one another and the tool is visualized in 3D in SINUMERIK Operate.

Condition monitoring
Using SINUMERIK Condition Monitoring, information about the machine condition is evaluated and the status captured using machine fingerprints. This allows valid statements to be made about the machine quality and possible hidden problems and issues.

Lower operating costs

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

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

Increasing security

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

Know-how protection

Using the SINUMERIK Lock MyCycles function, user cycles are saved to the control system so that they are protected. Password-protected SIMATIC STEP 7 program blocks safeguard intellectual property and know-how.

Security

PC-based systems and the control level must be protected against cyber attacks. Antivirus and whitelisting software protect against manipulation – preventing malware from influencing PC-based systems.

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 as well as the use of animated elements.

Touch and gesture operation

The SINUMERIK generation of touch panels with projected capacitive touch technology offers 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 with brilliant display it supports operation even in harsh ambient conditions.

Animated Elements

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

Sidescreen

The preconfigured sidescreen offers an additional display surface with more functionality in the HMI. Users have all the information they require at a glance in any operating situation on a foldable sidescreen. They can scroll horizontally as well as vertically through data displayed on this sidescreen.

Optimizing programs

When running in and testing a program, ShopTurn can interrupt machining after each program block that initiates motion or a help function at the machine. This means that the machining results can be checked when a program is run for the first time. When running in several channels, SINUMERIK Operate allows 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 SINUMERIK CNC does the rest. It goes without saying that the lifetime of each tool is monitored, and when required, the appropriate replacement tool is loaded. This reduces the amount of time required when setting up a machine tool.

Protection for personnel

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 instance, when setting up the machine with the protective door opened. Users have an integrated F-PLC at their disposal with SINUMERIK Safety Integrated plus. The safety relevant logic is programmed in the TIA Portal. When commissioning the SINUMERIK 840D sl, application engineers can use various innovative functions, for example, the ability to graphically configure safety functions and the transparent diagnostic screen forms. For Safety Integrated and Safety Integrated plus, once commissioning has been completed, a prompted, partially automated acceptance test can be performed in SINUMERIK Operate.

Setting-up

Based on 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 optimally 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.

Programming

SINUMERIK Operate offers the optimum programming for each and every task: DIN ISO for large series production and shortest cycle times – as well as graphic programming, so that 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 graphic 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 DXF reader is used to transfer data. DXF files can be directly opened on the CNC, and transferred to the CNC program with a simple mouse click. The DXF reader can be called up in the contour editor, and for positions, can also be called in programGUIDE as well as when programming machining steps in ShopMill/ShopTurn.

ProgramGUIDE

In programGUIDE, G-code programs can be combined with powerful SINUMERIK technology and measuring cycles in a user-friendly fashion. Even classic ISO codes can be programmed. As a result, SINUMERIK is especially attractive for machine operators who prefer this classic programming method.

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 directly entered and programmed at the machine. This results in maximum productivity when it comes to programming and operating.

SinuTrain for SINUMERIK Operate

SinuTrain is an NC programming station identical to the control itself, based on 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 profit from a higher machine availability, a higher degree of productivity and enhanced security as a result of the offline verification. Further, SinuTrain can be ideally used for training personnel on how to program and operate SINUMERIK – as well as for presenting and testing new SINUMERIK functions.

Diagnostics

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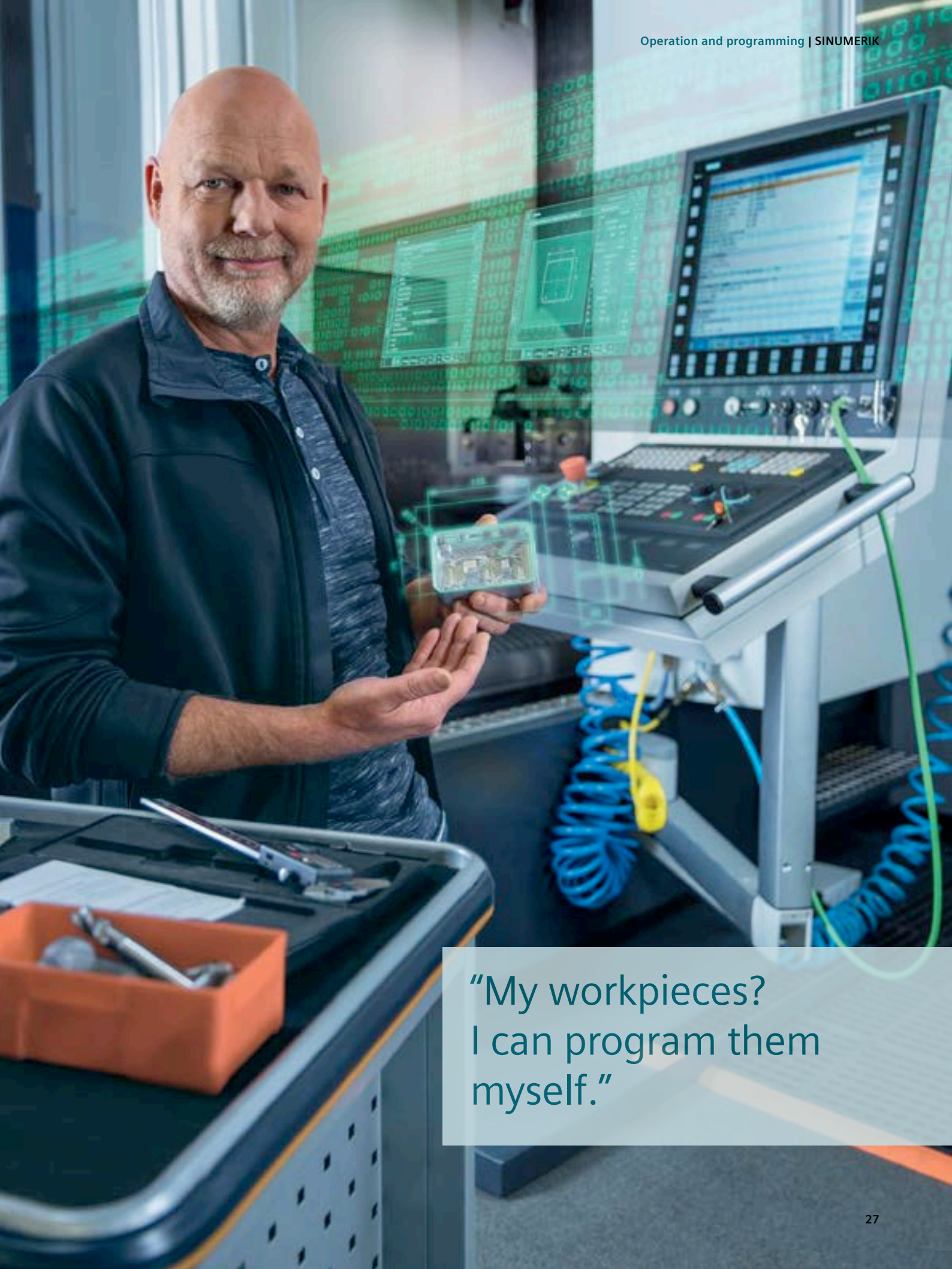
"My workpieces?
I can program them
myself."

"My machine? Highly productive thanks to the digital twin."

On track to achieve higher productivity with CNC Shopfloor Management Software

Through digitalization, machine builders and companies operating machines can respond more flexibly to market demands – and at the same time boost their productivity.
CNC Shopfloor Management Software specifically addresses the requirements in the machine tool domain. It facilitates the management, analysis and optimization of machine tools – independent of the manufacturer of the control system being used.

Higher engineering productivity

From the idea to the machine quickly and flexibly

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

Higher productivity in production

Optimizing performance in your production environment

Machine tools are intelligently integrated into production processes. The precondition is that production planning and production – along with the various machines – are all networked using the SINUMERIK Integrate platform. This allows 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. Programming and setup operations become virtual when using a digital twin – increasing the productivity of real machines.

## CNC Shopfloor Management Software – ecosystem

A leading-edge IT architecture is created based on the CNC Shopfloor Management Software – and more specifically – at three levels "In Cloud," "In Line" and "In Machine." These levels correspond to the three plat-forms – 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 the service domain, for instance. Leveraging digitalization, potential for optimization, unknown up 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**
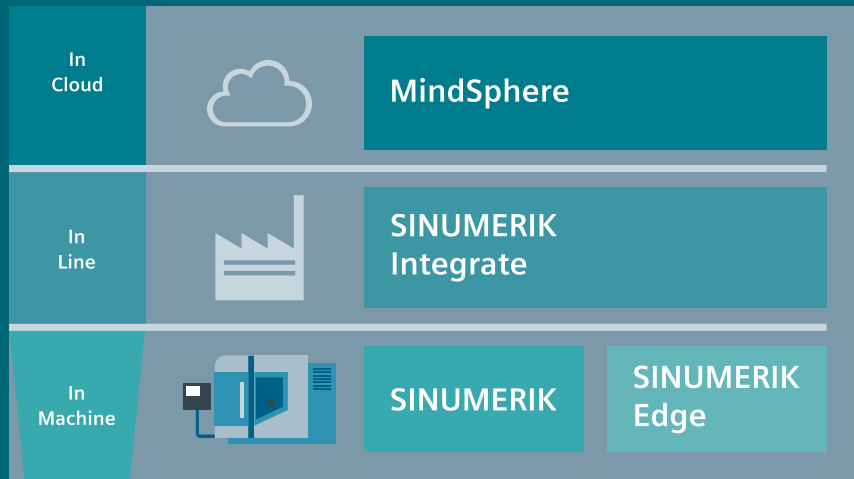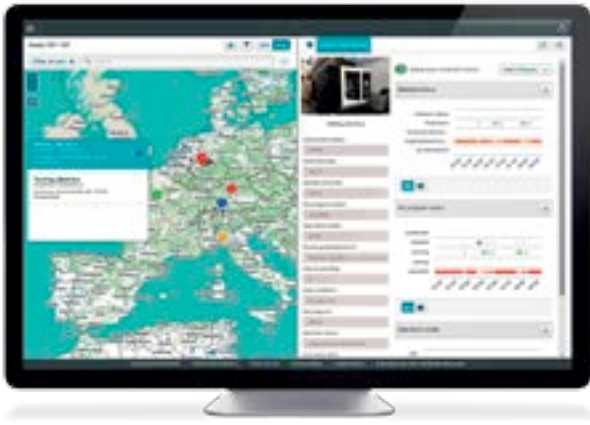
Manage MyMachines
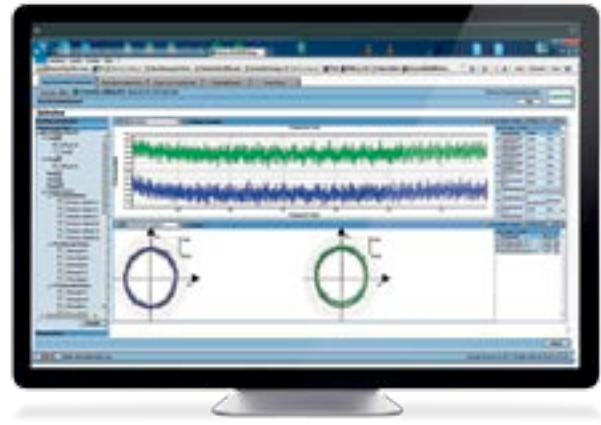
Analyze MyCondition local

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 effectiveness. Production and machines are continually analyzed. The captured data is evaluated, creating a high degree of transparency. This allows potential for optimization, unknown up until now, to be identified and fully utilized.

Manage MyMachines – more transparency and as entry for new business models in digital enterprises

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

SINUMERIK Integrate – wide-ranging applications to optimize availability and productivity

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

SINUMERIK Edge – process analysis and optimization based on 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 are monitored and optimized using customized EdgeApps, for example.

Motion Control Services – digitalization of tools and optimization of production land

Digital services – the path to a digital production environment

Based on the CNC Shopfloor Management Software, Manufacturing IT Services represents a partial or full digitalization of the mechanical production workflow. We can offer 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.

Consulting

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

Digitalization check as a service

This service supports customers as they digitalize their production landscape. The local service organization provides concrete recommendations when it comes to networking machines in production IT systems. Machine data are continuously captured and evaluated in a standardized way while the machines remain operational.

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 digitally integrated. Depending on the particular application, a hardware upgrade or retrofit may be required.

Implementation

Specialists from Motion Control Services support you when configuring and commissioning the various software modules. This makes your production more efficient, more profitable and increases your security of investment.

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
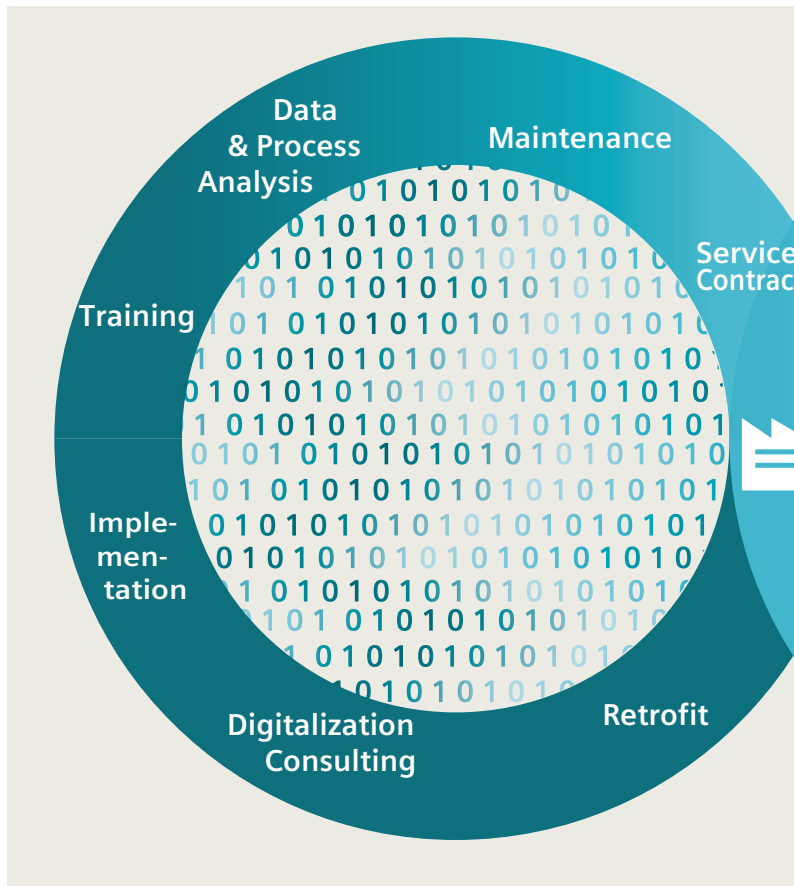
Data & Process Analysis

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

Maintenance

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

f machine
scapes

Motion Control Services provide support to dealers or machine operators over the complete lifecycle of production systems – for drives, motors, or controls. The emphasis is on increasing transparency so that all types of resources and machines can be used more efficiently, productively and flexibly – and of course to increase machine availability.
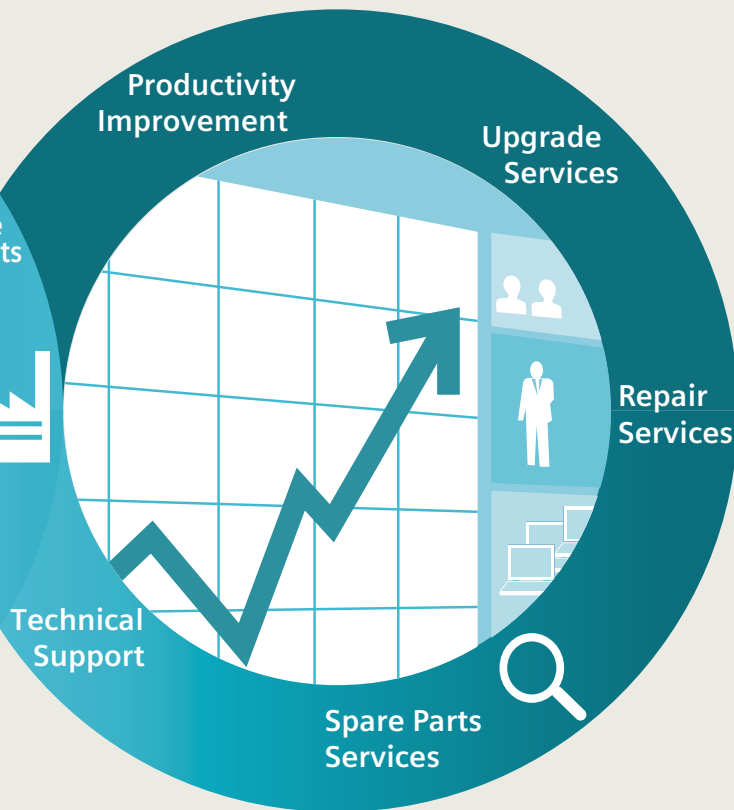
Classic services – the basis for continuous improvement

Service Contracts
Harmonized and aligned to specific requirements and business objectives, our service contracts are modular and allow companies operating machines to create a customized service concept to reduce their machine downtimes.

Technical Support
In more than 25 regions around the world, our hotline experts answer every question related to SINUMERIK CNCs – in your time zone and in your language!

Spare Parts & Repair Services
A closely meshed, flexible and accommodating spare parts and repair service network ensures that spare parts are quickly available at reasonable prices in more than 70 regions at over 150 service locations around the globe. Not only this, for selected components, the Long Life Repair option can extend service availability for up to 25 years.

Upgrade Services
Component upgrades extend system and machine 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, fully leveraging the machine capacity to its maximum has significant economic benefits. With Productivity Improvement we optimize the production potential for machine tools equipped with SINUMERIK 840D sl or SINUMERIK 840D pl.

Retrofit
A CNC retrofit is the cost-effective alternative when compared to purchasing a new machine. This is the case if the mechanical system of a machine tool is still in a 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 to reflect latest state-of-the-art technology. Cycle times can be significantly reduced and quality optimized by just upgrading the control system.

www.siemens.com/motioncontrolservices

	SINUMERIK 808	SINUMERIK 828	SINUMERIK 840
Configuration			
Mechanical design	Panel-based	Panel-based	Drive-based
CNC performance versions	PPU15X PPU16X	PPU27X PPU290	NCU710 NCU720 NCU730
Display size (TFT color displays)	8.4"	10.4"/15.6"	7.5"/10"/12"/15"/19"/22"/24"
Touch display	–	15.6"	15"/19"/22"/24"
Maximum number of axes/spindles	6	10 plus 2 auxiliary axes	93 + any number of PLC axes
PLC adaptation control	SIMATIC S7-200-based	SIMATIC S7-200-based	SIMATIC S7-300
Machine channels/mode groups, up to	1	2 (T, M, G)	30
CNC user memory, up to	1.25 Mbyte	10 Mbyte	22 Mbyte
Extended CNC user memory	–	100 Mbyte	100 Mbyte
Additional CNC user memory on SSD, up to	–	–	120 Gbyte
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 precontrol	✓	✓	✓
Dynamic Servo Control in the drive	✓	✓	✓
Advanced Position Control	–	✓ (ECO)	✓
Interpolation			
Simultaneously interpolating axes, up to	4	4	20
Straight line, circle, helix	✓	✓	✓
Splines	–	✓	✓
Advanced Surface	✓	✓	✓
Top Surface	–	✓	✓
Look Ahead	✓	✓	✓
Compressor	✓	✓	✓
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, STANDARD, ADVANCED)
Compensations			
Measuring system and spindle pitch compensation	✓	✓	✓
Temperature compensation	–	✓	✓
Nodding compensation	–	✓ (ECO, ADVANCED)	✓ (ECO, ADVANCED)
Friction compensation	✓	✓	✓
Other compensations (sag, volumetrics)	–	–	✓
Cogging torque compensation	–	✓	✓

	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	STO	✔	✔ (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 CNC option, please ask your machine tool manufacturer)

More about SINUMERIK CNCs can be found at:
siemens.com/sinumerik

To secure plants, systems and machines as well as networks against cyber attacks, a holistic industrial security concept must be implemented (and continuously updated) corresponding to current state-of-the-art technology. Products and solutions from Siemens are just one component of such a concept. You can find additional information about industrial security at siemens.com/industrialsecurity.