



SIEMENS



Machine modernization directly from the CNC manufacturer

Increasing efficiency and economic feasibility – with retrofits for machine tools

Industry Services

Answers for industry.



Ever since its retrofit, this Ravensburg PKZ facing lathe has once again delivered state-of-the-art performance – at half the cost of buying a new machine – and with a much faster delivery time. What's even better is that Siemens delivered a complete solution consisting of both mechanical and electrical modernization.

Greater productivity – at half the cost



Keeping productivity efficient with machine retrofits

After ten or more years of operation, the mechanical components of machine tools are usually still in good condition. But control and drive technology has continued to advance steadily during this time – introducing new functions that make production more precise, more energy-efficient and more economical. Retrofits are one way to give older machines access to these innovations by replacing old functions with new ones. The challenge lies not only in replacing a technical component but in exploiting the varied capabilities of modern control and drive systems, which offer manufacturers new business opportunities. The main goal is to smoothly integrate the advantages of drive and/or controller upgrades into the existing machine concept so that the operator works with a proven machine – one which is now state of the art – without having to purchase a brand new one.

Creating planning reliability

The main concern of operators of machine tools, however, is not the use of new capabilities of modern controllers but rather the certainty that by modernizing or upgrading their investment will ensure their productivity in the long term. This especially applies to spare parts availability, which is of course much longer for modern components than for older ones. Electronic components are a good example of this, as their integrated circuitry continues to undergo rapid development and they are replaced by the next generation every few years.

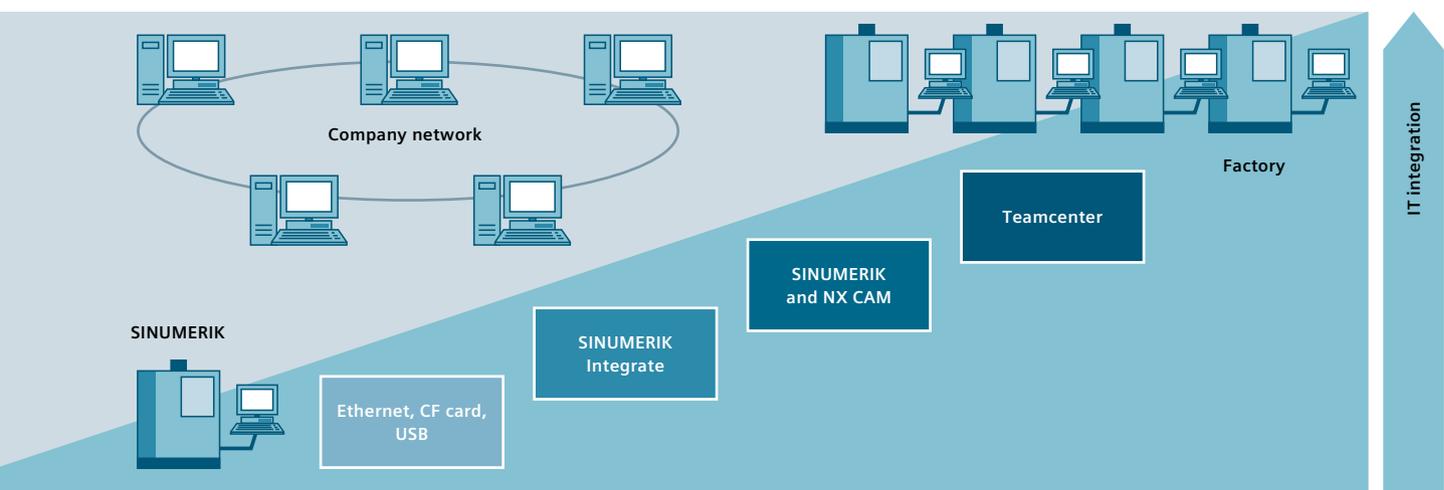
Customized retrofits – for better performance

Modernization made to measure

Each retrofit begins with a thorough assessment of the requirements to be met, along with an in-depth customer consultation. On this basis, Siemens develops the best possible solution concept with scalable system components, depending on the CNC machine's technology, functionality and performance requirements. The Siemens specialists examine all of the machine's components: the CNC controller, drives, motors, measuring systems, the switchgear cabinet and, if necessary, the machine integration into the production network. If needed, Siemens can also perform mechanical reconditioning or partial modernization by replacing CNC technology and reusing the machine's existing analog drive system. The goal is to always optimize machine productivity – in keeping with the range of applications and the customer's goals.

Greater performance and flexibility

The retrofit service is in no way limited to the use of cutting-edge SINUMERIK controllers, SINAMICS drive systems and SIMOTICS motors but can also include other services that ensure the full benefits of the modernization work. This includes a significant amount of added quality and flexibility thanks to the performance of cutting-edge components supported by geometric measurement and compensation of dimensional deviations in large machines. Production planning is also more transparent through the use of Siemens' PLM software, such as NX-CAD/CAM and Teamcenter, as well as SINUMERIK Integrate with Manage MyTools and Manage MyPrograms, which allows tools and NC programs to be managed and optimally integrated into the production process. Training courses, repair or service agreements, and existing NC subprogram implementations also help quickly apply the advantages, including precise planning and careful preparation of the retrofit by Siemens expert service technicians.



Siemens offers its customers a comprehensive portfolio of controller and drive solutions for a wide range of requirements – from standard lathes and milling machines to systems in the upper performance range.



The professional: SINUMERIK 840D sl

- Optimum for machines in the medium and upper performance range as well as for a wide range of technological requirements – thanks to maximum flexibility and openness
- Scalable CNC performance
- Highly modular operator control components
- Integration of existing analog drive systems with the ADI4 analog drive interface

Powerful drive: SINAMICS S120

- Wide range of drive components for a large number of axes and a wide range of spindles and performance requirements
- Connect all system components, including motors and sensors, with cable sets using the powerful DRIVE-CliQ interface
- Sensor modules for connecting motors and sensors with the DRIVE-CliQ interface
- Connect SINAMICS and SINUMERIK via PROFINET or PROFIBUS DP

The all-around system: SINUMERIK 828D

- Ideal controller for standard lathes and milling machines for small and medium-sized applications
- Robust and maintenance-free, thanks to compact control panel CNC, small number of interfaces, high protection class as well as a fanless design without a hard drive

Versatile motors: SIMOTICS

- SIMOTICS S feed motors
 - Servomotors with high stall torque, high maximum speed and perfect eccentricity performance
 - Highly compact motor dimensions, thanks to high power density and high quality magnet materials, allow the motors to be installed in locations where space is at a premium
- SIMOTICS M built-in spindle motors with outstanding performance regarding speed, standard of eccentricity, oscillating quantities, and ramp-up times
- Connection to SINAMICS with cutting-edge sensors and DRIVE-CliQ interface

Efficient operation – safety at work



Practice-oriented operation: SINUMERIK Operate

Machine tool retrofits are more than just a way to replace existing hardware. SINUMERIK Operate is a technology-independent, multichannel operating software package for machine operation, programming, diagnosis and commissioning – easy to use and practice-oriented from production to the shop floor.

Important standard functions

- Modern text editor with many helpful functions
- ProgramGUIDE with Animated Elements – perfect support for integrating cycles into subprograms with simulation of processing operations

- Shop-specific technological cycles for turning, milling and drilling
- Powerful contour calculator for entering simple to complex contours
- Integrated tool management for connecting tool magazines
- Support for the entire workflow: Tool and workpiece setup, programming, simulation and positioning as well as monitoring of the machining process

Optional functions

- Residual material recognition and processing for contour pockets and stock removal
- Extensive measurement cycles
- Detailed work step programming with ShopMill and ShopTurn instead of complex code programming

All-around safety: SINUMERIK Safety Integrated

SINUMERIK Safety Integrated is our comprehensive safety package for controllers and drives. It combines protection of people and machine with high efficiency and profitability – all functions can be integrated into the control and drive technology and ensure safe and practice-oriented operation under all operating conditions.

The safety functions meet DIN EN 61508 requirements for applications up to and including safety integrity level SIL2 and category 3 as well as performance level PL d according to DIN EN ISO 13849-1.

This makes it easy and economical to implement functional safety requirements, including:

- Functions for safe monitoring of speeds and down times
- Functions for safely separating working and protection space (SIDOOR automatic door controllers) and for detecting areas
- Direct connection of all safety-related signals and their internal logic operations.

The safety functions are available in all operating modes, can communicate with the process via safety-oriented input/output signals, and can be implemented for each individual axis and spindle.



Complete retrofit service package – from a single source

Efficient CNC program conversion

Siemens offers a special service for upgrading older NC programs to the latest versions – an invaluable benefit for any operator, since subprogram archives not only involve a great deal of work but recreating even parts of these programs would be extremely expensive. The NC program conversion service ensures that existing CNC subprograms can be used even after a controller retrofit.

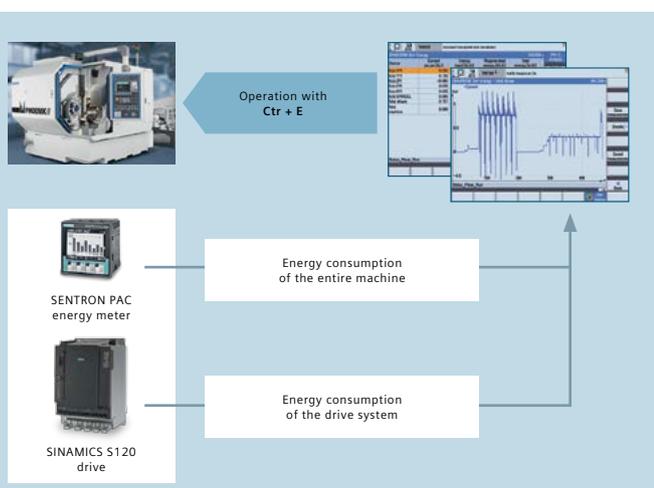
Ctrl-Energy gives you full control

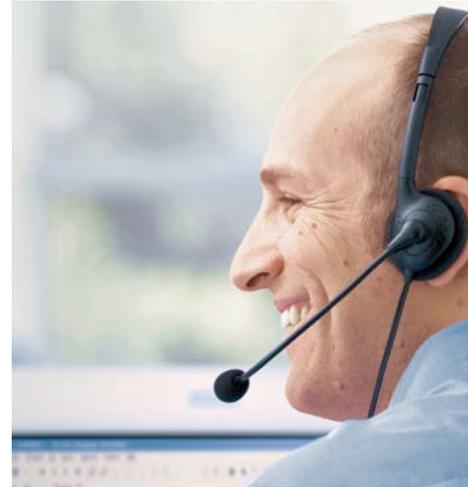
SINUMERIK Ctrl-Energy builds on an extensive portfolio of SINUMERIK CNC controllers, SINAMICS drive systems and motors. This allows you to optimize energy in your machining processes.

You also save energy, for example through power recovery, flow reduction during partial load operation and reactive power compensation. Targeted documentation and evaluation of your energy consumption enable you to make improvements in operations as well as retrofits.

Customized training

Siemens does not abandon operators once their modernized machines are in place. Instead, experienced trainers provide operators with the knowledge they need to operate and maintain their modernized equipment in customer-specific training courses. Siemens also provides technology training as well as courses in SINUMERIK and SINAMICS systems in its own training center. SinuTrain, Siemens CNC training software, also provides the option of training through self-study.





Failure tolerance and maximum availability

Regular maintenance is indispensable in order to maximize system availability. Siemens Industry Services offers customer-specific service agreements in addition to the retrofit. This modular approach allows operators to put together a package of all the services they need to ensure smooth equipment operation. The scope of services under the optional service agreements ranges from after-sales service availability and continuous monitoring of spare parts availability (life cycle checks) to maintenance and fault clearance, including fast spare parts service.

Financing advances

Customized solutions from Siemens also include attractive financing models from Siemens Financial Services. With this option, the customer is not only assured state-of-the-art technology but also remains well ahead of the competition.

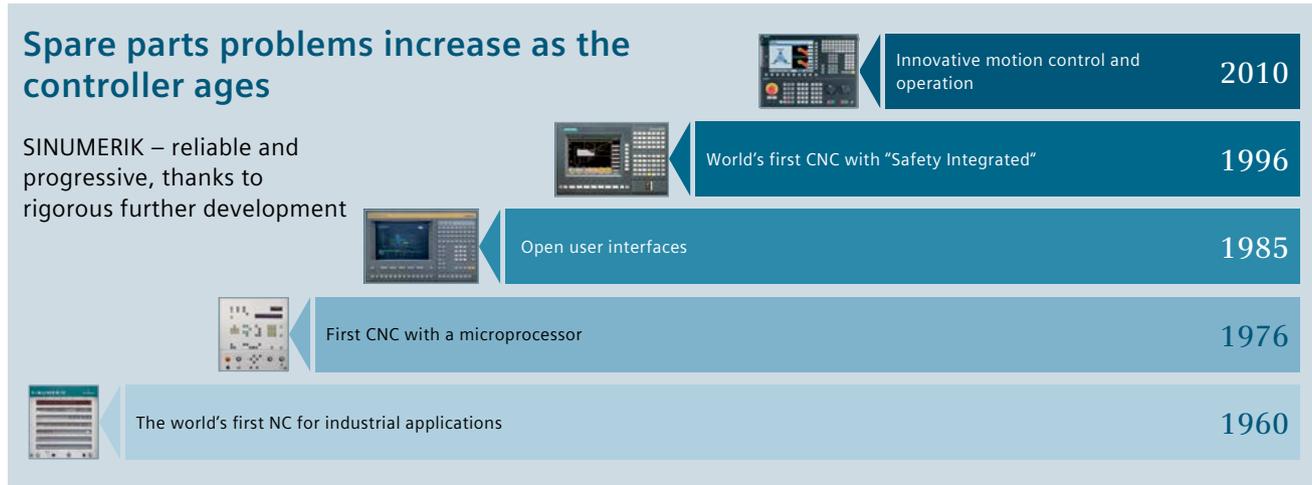
The financing models are tailored to the machine operator's individual operating needs – with customized installments and a contract duration harmonized with the customer's intended machine utilization period.

Service and support

In our capacity as service specialist, expert consultant or spare parts supplier, Siemens is the right partner in every phase of a machine's life cycle. We offer services that go beyond the retrofit to increase your equipment availability:

- **Online support:**
Anytime over the Internet – from product support to service & support activities
- **Technical support:**
Complete telephone consulting to resolve technical issues
- **Repairs and spare parts:**
Optimum service to get you up and running again quickly

Ensuring availability – for more efficient production



Spare parts for older-generation machine tools are often no longer available – for example, the failure of one electric component can bring the entire machine to a standstill.

The diagram on this page shows excerpts of an overview of CNC control and drive components and the time at which their spare parts will no longer be available.

Retrofits for machine tools
Spare parts availability

System	End of spare parts supply	System	End of spare parts supply	System	End of spare parts supply
Machine tool controller		Machine tool controller		Machine tool controller	
Old systems		Other systems (continued)		Other systems (continued)	
FANUC 0, 220 and 260 A / B	3 / 1984	SINUMERIK 10, 10-0, 20, 20-0, 30, 30-0 (FANUC production)	3 / 1991	SINUMERIK 840D OP 010 FT	9 / 2017
FANUC 260 S	9 / 1982	SINUMERIK 50, 52 B, 54 S, 56, 56 S	9 / 1989	SINUMERIK 840D OP 012T	9 / 2021
Numeric relay	7 / 1978	SINUMERIK 200 / 300 / 500	3 / 1983	SINUMERIK 840D OP 015-416 / OP 015	9 / 2020
SINUMERIK PRIMO S / SG	9 / 2003	SINUMERIK 270, 271, 320, 381, Mopos	6 / 1993	SINUMERIK 840D OP 030 / OP 031	9 / 2016
SINUMERIK Sprint T (FANUC production)	3 / 1989	SINUMERIK 805, 805 SM	12 / 2007	SINUMERIK 840D OP 032 / OP 032S	9 / 2016
SINUMERIK Sys 500 (520, 530, 540, 550)	6 / 1993	SINUMERIK 810 / 820 (Classic)	9 / 2008	SINUMERIK 840D OP 032S (CNC full keyboard)	9 / 2019
SINUMERIK System 520 K	6 / 1993	SINUMERIK 850	9 / 2005	SINUMERIK 840D HT 6	9 / 2019
SINUMERIK System 580 / 590	6 / 1993	SINUMERIK 880	9 / 2007	SINUMERIK 840D PHG	9 / 2013
SINUMERIK System 840	9 / 2003	SINUMERIK 840D NCU 572.5	9 / 2021	SINUMERIK 840D PP 031 / PP 032 (push button panel)	9 / 2015
SINUMERIK 3, GA 0 to 3	9 / 1995	SINUMERIK 840D NCU 573.2	9 / 2012	SINUMERIK 840D TP 012	9 / 2017
SINUMERIK 3, GA 4	9 / 2007	SINUMERIK 840D NCU 573.2 -DIG.	9 / 2010	SINUMERIK 840D 19" machine control panel	9 / 2019
SINUMERIK 5, 6, 10, 11, Mate (FANUC production)	6 / 1995	SINUMERIK 840D NCU 573.3	9 / 2014	SINUMERIK 802D	9 / 2019
SINUMERIK 7, Sprint T	6 / 1995	SINUMERIK 840D NCU 573.4	9 / 2017	SINUMERIK 802S / C OP 020 / OP 021	9 / 2013
SINUMERIK 8	9 / 2004	SINUMERIK 840D NCU 573.5	9 / 2021	SINUMERIK 802S / C MCP	9 / 2015
		SINUMERIK 840D OP 010 FC	9 / 2013		

It is therefore important that you contact your Siemens consultant to discuss the availability of spare parts as well as ways to upgrade or repair the electric components of your machine tool.

Solutions from an expert partner

With retrofits for machine tools from Siemens, customers benefit from the strengths of an experienced modernization partner. The retrofit solution is therefore a perfect fit with your production process, makes it more economical and more flexible, and saves cash compared to investing in a new system. At the same time, the solution increases machine availability by using the latest standard products. Thanks to preassembled replacement and hardware packages, you can expect short project planning and commissioning times. Siemens Industry Services also has the engineering capacities for smoothly integrating cutting-edge system components into a perfect system. This approach is based on a unique combination of Siemens' decades of experience, extensive expertise with CNC controllers and machine and plant modernization as well as in-depth industry knowledge and professional project management. This expertise helps customers take full advantage of the productivity potential of the retrofit solution.

The benefits of modernizing with Siemens:

- Comprehensive consulting and reliable execution by experienced specialists in the areas of modernization, control and drive technology, machine tool technologies and production processes
- Customized modernization concepts for maintaining or increasing productivity
- Higher machine availability due to spare parts supply and services secured in the long term
- Greater operating and programming convenience
- Greater safety for people and machines through SINUMERIK Safety Integrated
- Improved energy efficiency with SINUMERIK Ctrl-Energy
- More cost-effective than purchasing a new machine
- Complete modernization from a single source: from the CNC controller, drive, motors and IT integration to mechanical reconditioning by Siemens partners
- Reliable, on-schedule execution
- Comprehensive add-on services and functions

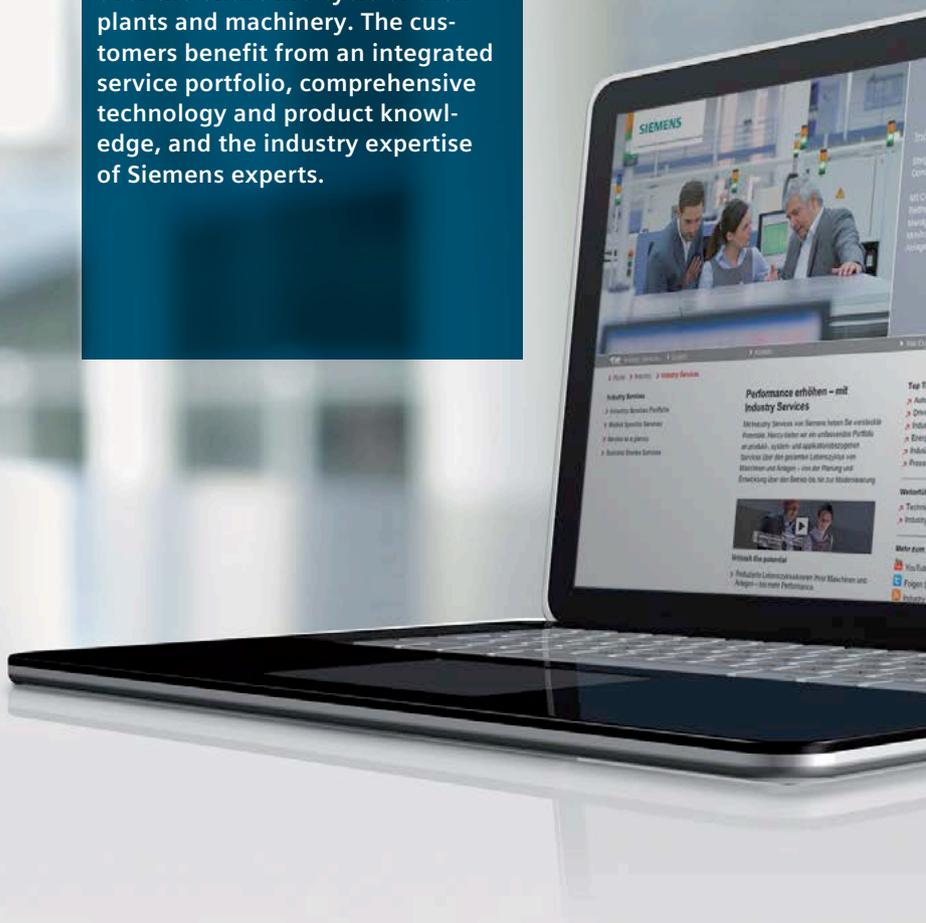


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Industry Services

Siemens supports its customers around the world with product, system and application services over the entire life-cycle of their plants and machinery. The customers benefit from an integrated service portfolio, comprehensive technology and product knowledge, and the industry expertise of Siemens experts.



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Retrofit: siemens.com/motioncontrol/retrofit

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