The dream team for outstanding productivity

SINUMERIK Run MyRobot integrates robots and CNC machines

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SINUMERIK CNC—
new benchmarks in productivity

As digitalization continues to take its course, robots and CNC machines are collaborating even more closely with each other. The number of handling and machining robots (machine tools with robotic kinematics) is continually on the rise. Increasingly more machine operators are seeing that automation is an important strategy when it comes to achieving consistent workpiece quality and more flexibility. Digitalization facilitates the higher level of automation needed and the networking of the components involved.

Automated machining cells— for higher productivity and production flexibility

Automated machining cells play a decisive role in increasing the productivity and flexibility of production environments. What's especially decisive is that all of the systems can be quickly and easily integrated.

Machine tools must be able to be integrated into a production workflow using network solutions, and robots must be able to be easily integrated into a CNC machine using pre-defined interfaces. Seamlessly automated workflows can be achieved by creating automated machining cells—from production planning, through the provision of all job data and information in a digital form at the operator panel, up to the efficient operation of machine tools and robots.

Robots and machine tools—every element of integration

Siemens is the only automation manufacturer in the world that equips its SINUMERIK CNC with interfaces for robotic integration—from a basic connection, through user-friendly integration for handling tasks, up to high-precision motion control of machines with robotic kinematics.

One CNC for several robot connection versions

SINUMERIK Run MyRobot/EasyConnect

Application area:

- Handling

Simple PLC/IO interface

Can be implemented with: **SINUMERIK 828** ☑
SINUMERIK 840D sl ☑

SINUMERIK Run MyRobot/Handling

Application area:

- Handling

Intelligent PLC interface

Can be implemented with: **SINUMERIK 840D sl** ☑

Using robots in your production environment can significantly boost productivity—for example, when they support part loading and unloading or the handling of machining tasks.

SINUMERIK Run MyRobot/Machining

Application area:

- Path-controlled handling
- Machining
- Hybrid (path-controlled handling and simultaneous machining to the main machining time)

Intelligent CNC interface

Can be implemented with: **SINUMERIK 840D sl** ☑

SINUMERIK Run MyRobot/Direct Control

Application area:

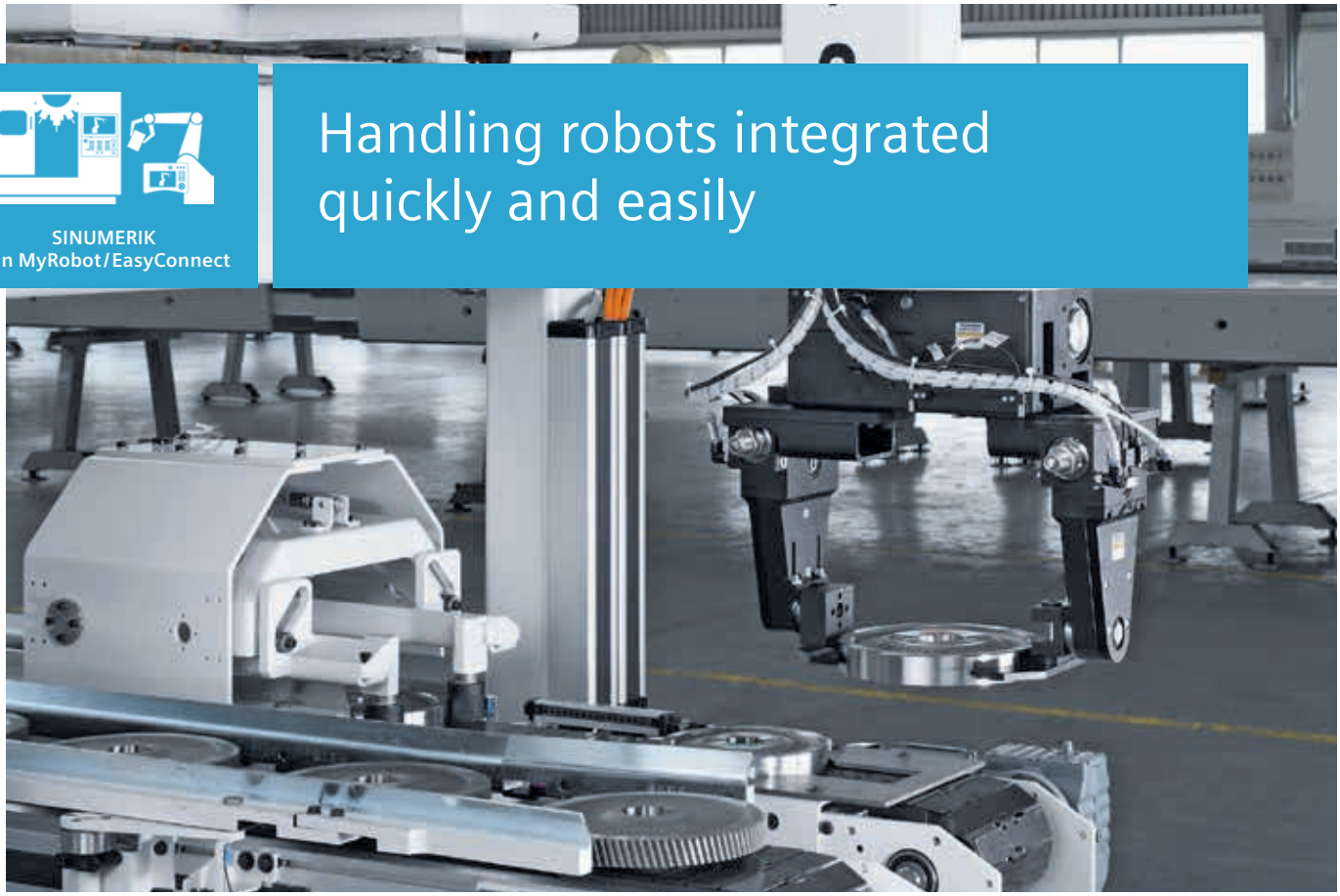
- Handling
- Standalone machining
- Hybrid (handling and simultaneous machining to the main machining time)

Robot kinematics fully integrated in the CNC

Can be implemented with: **SINUMERIK 840D sl** ☑

SINUMERIK
Run MyRobot/EasyConnect

Handling robots integrated quickly and easily



At companies of any size, robots are increasingly being deployed for handling tasks in the production environment. The objective is to automate the workpiece flow as far as possible and boost productivity.

SINUMERIK Run MyRobot/EasyConnect is the ideal solution if a robot is to be quickly and easily connected to a CNC machine. EasyConnect is based upon the standard defined by VDW/VDMA to connect robots and handling systems to machine tools.

More and more machine builders and robot manufacturers are equipping their systems with this interface. It's extremely simple to connect the robot to the machine tool via the pre-defined interface—and for normal loading/unloading operations, no changes have to be made to the machine control program.

The same is true for robots, which can be connected by making some very simple modifications. By applying the VDW/VDMA standard, the costs associated with documenting the system are significantly reduced. This means that the integrator (e.g. machine tool dealer) can concentrate on the essentials when configuring the machining cell—optimizing workflows in order to achieve the highest possible level of productivity.

SINUMERIK Run MyRobot/EasyConnect

- The robot can be simply connected to the CNC via the PLC interface
- The machine tool's CNC is synchronized with the robot control using PLC I/O signals
- Robot control for operation, programming and motion control of the robot

Your advantages at a glance

- SINUMERIK Run MyRobot/EasyConnect is a pre-defined configuratioin interface, which can be very easily adapted to address the requirements of the particular automation solution.
- Thanks to EasyConnect, robots from the widest range of manufacturers can be connected in a standard fashion to SINUMERIK CNCs.
- An automated workflow boosts productivity in manufacturing operations with series-oriented production involving large batch quantities.

SINUMERIK
Run MyRobot/Handling

Handling robots and CNC machines operated exactly the same way

SINUMERIK Run MyRobot/Handling is the recommended approach wherever a robot should simply connect to the CNC. It also allows programming and operation directly from the SINUMERIK control. Based upon this solution, the SINUMERIK 840D sl offers the highest degree of system integration.

SINUMERIK Run MyRobot/Handling allows a robot to be operated and taught in using a SINUMERIK operator panel. Connected robots and machine tools can be setup, programmed, operated and maintained via the usual SINUMERIK Operate user interface. The robot is programmed using cycles found in the control.

Robots and machine tools are coordinated via channel synchronization. This means that machine tool and robot program sequences can be tracked and controlled on the SINUMERIK screen in parallel channels—making the integration of robots significantly more attractive and straightforward, as personnel do not require any specific robotic expertise.

In practice, the focus is using robots for handling tasks—loading and unloading the machine tool, feeding in tools and therefore speeding up the material flow associated with the machine.

SINUMERIK Run MyRobot/Handling

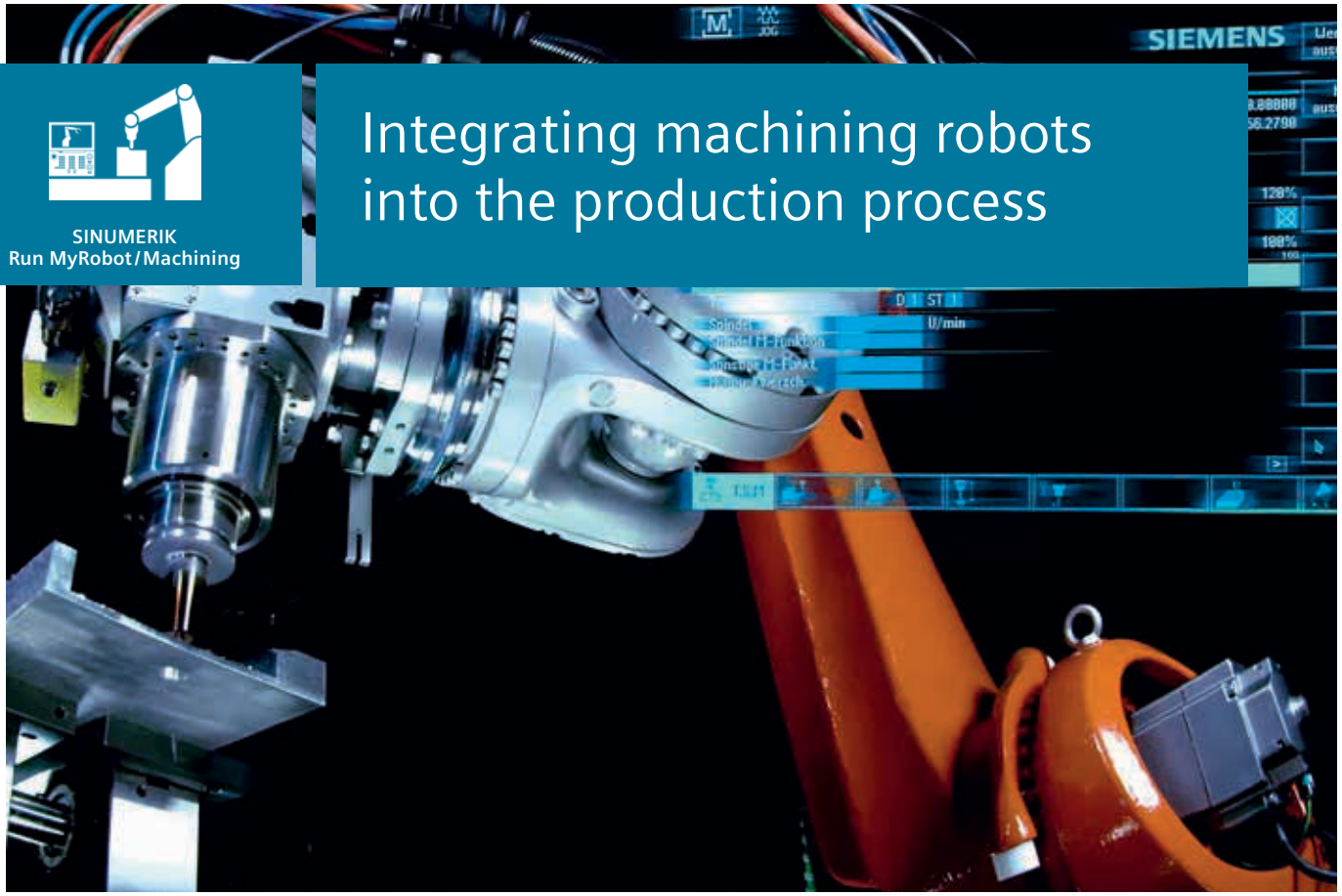
- Combines robot and part programs in the CNC
- Standard operation of robots and machine tool via the SINUMERIK Operate graphical user interface
- Robotic functions such as programming, manual travel, teach-in and diagnostics can be directly executed from the CNC.

Your advantages at a glance

- Teach-in of new workpieces to be handled is significantly simplified as a result of the standard and uniform operation at the SINUMERIK.
- The robot is programmed quickly and easily using the cycle programming functionality of the SINUMERIK.
- No robotic expertise is required, the robot can be operated by machine operators without requiring any in-depth training.

SINUMERIK
Run MyRobot/Machining

Integrating machining robots into the production process



Companies are integrating robots more and more into their production workflows—and using them for machining tasks. The six degrees of freedom of a robot make it flexible for machining otherwise inaccesible points at the workpiece. To achieve a high degree of precision and quality at the workpiece, robotic motion has to be integrated into the SINUMERIK CNC.

With SINUMERIK Run MyRobot/Machining, the control handles the path control of the robot. All of the programming methods that can be used with Siemens controls are also available for the robot. Functions in SINUMERIK Operate—such as tool management, tool radius compensation and NC cycles—can also be used for the machining robot. The measuring cycle found in the SINUMERIK control automatically aligns the workpiece to the robot.

If the production process is supplied as a digital twin, the robot can be integrated in the CAD/CAM/CNC process chain. Siemens offers a seamlessly integrated engineering workflow along the complete value-added chain—from design up to the finished part.

Robotic integration into the SINUMERIK CNC has proven to be a decisive strategy in reaching a high degree of productivity and flexibility while achieving the specified precision and quality of workpieces.

SINUMERIK Run MyRobot/Machining

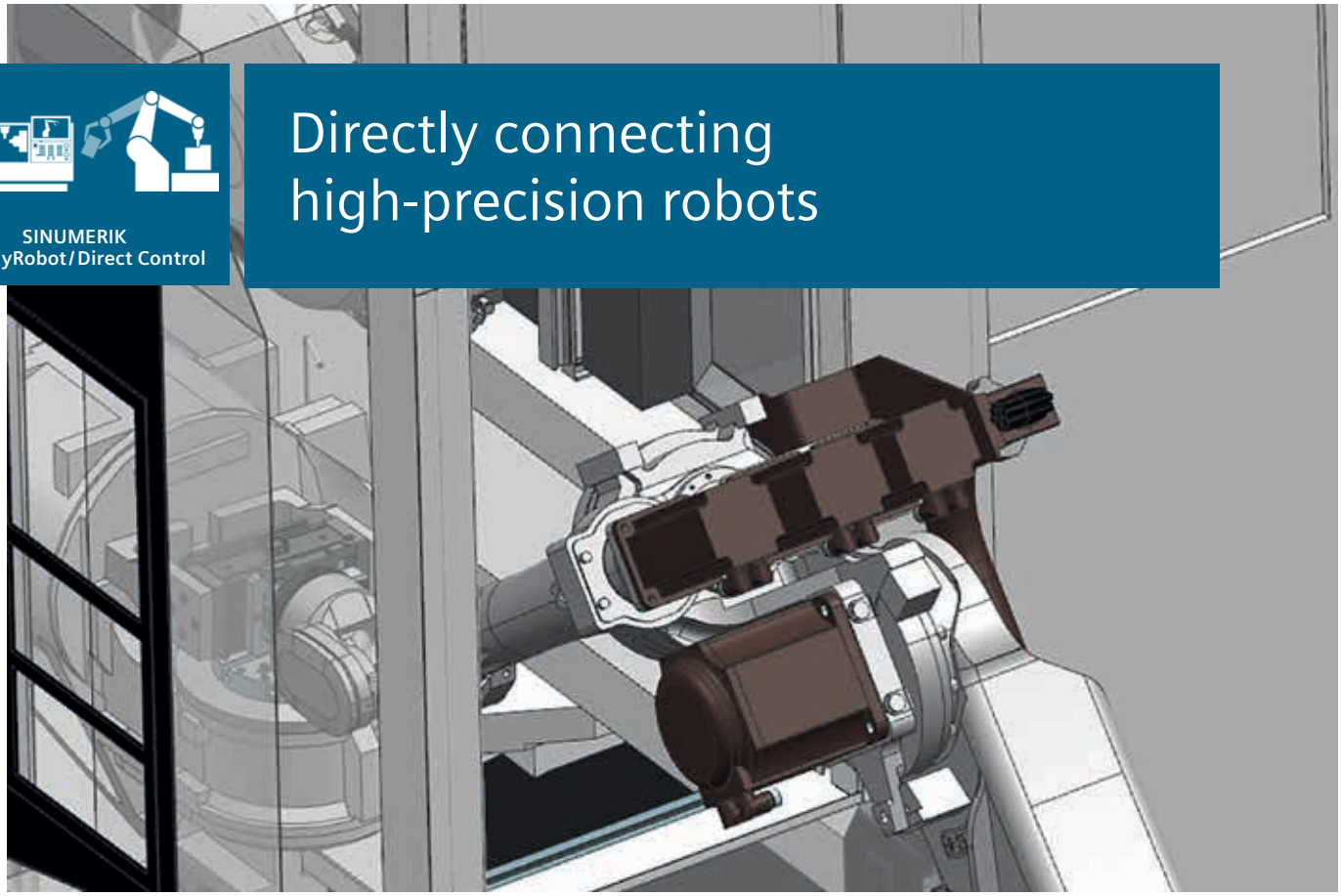
- Robot connected to the CNC via PROFINET
- Operation and programming in G-code or programGUIDE—directly via the CNC
- Robot-specific programming expertise not required
- Robotic controller for axis control, robot-specific compensation and Cartesian safety

Your advantages at a glance

- Interfacing a robotic controller into the SINUMERIK control boosts productivity and flexibility—and facilitates the specified workpiece precision and surface finish quality
- Machine programs are more precise and more quickly executed as a result of CNC path planning, interpolation and transformation.
- NX CAM Robotics allows robots to be seamlessly integrated into the CAD/CAM/CNC process chain as the machine tool.

SINUMERIK
Run MyRobot/Direct Control

Directly connecting high-precision robots



The demand for machine tool automation solutions teamed up with high precision industrial robots is increasing at a rapid pace. This applies for handling— as well as high-precision and complex processing tasks. With SINUMERIK Run MyRobot/Direct Control, robot kinematics can be directly integrated into CNC systems.

The unique SINUMERIK-controlled robot technology further enhances precision and dynamic performance in conjunction with the advantages of a control concept from a single source.

With the introduction of the direct control concept, the complete range of control and drive functionality can be utilized. An additional robot controller is not required in the machine. As a result, important advantages are realized—such as more compact hardware dimensions, easier spare parts management and a higher degree of reliability.

Due to the seamless integration of the robot kinematics in the SINUMERIK control, commissioning and engineering tasks are significantly simplified to the customer's advantage. The complete engineering process chain is guaranteed with the inclusion of the robot's digital twin in the CAD/CAM system; thus benefiting of the existing SINUMERIK post-processor and VNCK simulations.

SINUMERIK Run MyRobot/Direct Control

- Drive-based connection of the robot kinematics with the SINUMERIK CNC system (Direct Control concept)
- Setup, programming and operation in the SINUMERIK-specific environment (Create MyConfig, G-Code, programGUIDE etc.)
- Pre-configured setting data available for a selection of robots
- Robot-specific programming knowledge not required

Your advantages at a glance

- Integrating the robot mechanical model in the SINUMERIK CNC increases productivity and flexibility, thus facilitating high workpiece precision and quality.
- The Direct Control concept significantly simplifies the controller hardware configuration resulting in optimized spare parts management.
- Reduced time and effort for commissioning and engineering—including ready-to-run setting data for selected robots.

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