AUTOMATION – Industry 4.0

CNC machining with robots from design to production

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CNC machining with robots without specialist robot knowledge

The Challenge

Ever shorter product life cycles, small batch sizes and a wide range of variants demand highly flexible automation with digital networked processes (Industry 4.0). Manually programming the different variants is costly, and any changes require the use of robot programming with the consequent downtime of the plant during adjustments. This was the challenge, for example, faced by Siemens Process Industries and Drives Division, in Nuremberg, in the manufacture of a wide range of variants for their Simotics FD motor series.

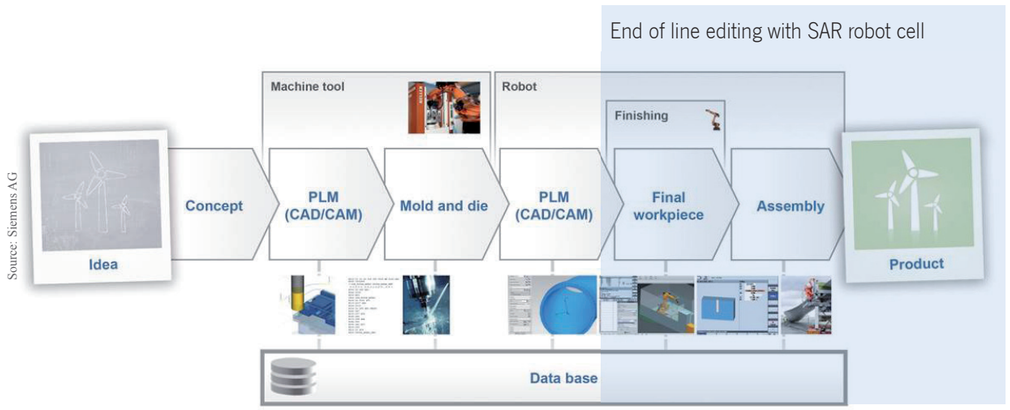
The Solution

A robot cell developed by SAR has been able to provide the desired flexibility and efficiency. This is controlled entirely via a high-level Sinumerik 840D sl CNC. Two KUKA robots carry out programs created directly by the CNC user. And it is possible to make changes in the Sinumerik control without any robotic knowledge.

The cell is used for direct CNC machining during manufacture of the Simotics FD motor series. A flexible modular system with extensive options allows optimal design of the Simotics FD motors to meet a variety of requirements and offers customers a high degree of flexibility in configuration. The wide variety of product variants for the Simotics FD motor series is correspondingly evident in the manufacturing process. In addition to robotics, the SAR cell also includes metrology, process engineering and materials handling technology.

The Functional Principle

A robot with milling and drilling tool attachments replaces the classic milling machine. The robot can be controlled directly from the Sinumerik through an interface (Run MyRobot) jointly developed by Siemens and Kuka. The application is suitable for production operations with a repeatability of +/- 0.1 mm. Due to the 6-axis kinematics the robot has a larger processing footprint than a standard milling machine.



Source: Siemens AG

Future integrated engineering through the entire process chain

Single point of operation for robots and tooling

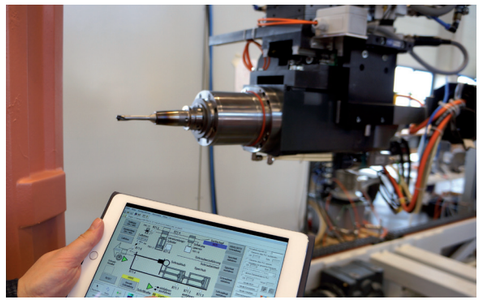
The following work steps are currently covered by the SAR robot cell:

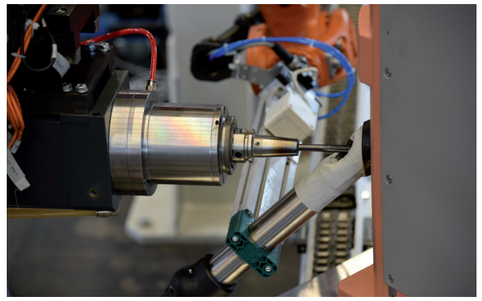
- Applying Hylomar sealant to cover plates
- Mounting the cover plates on the housing
- Measuring the fit and drilling and reaming

Other work steps can be easily integrated. With integrated engineering across the entire value chain, the robotic cell is a step toward Industry 4.0. In the future everything, from programming and simulation through to production, will stay at the software level. After the simulation, the result is translated directly into machine code and implemented by the system.

Robot programming just like CNC programming

- Full operation and diagnostics of the robot through Sinumerik Operate
- Integration into the CAD/CAM chain and integrated programming
- Full use of robot-specific functions, e.g. Safe Operation
- Programming in the familiar NC environment: The robot is represented like any other machine component, through its function blocks. The movement sequence of the robot is fully programmable in the Sinumerik control.
- No special knowledge of robot programming and operation is required
- Logic examination and comparison of online and offline worlds





Summary of Advantages

- Sinumerik controller as a single point of operation
- Changes in the 3D Design after the simulation are transfered directly into the robot program without rework
- Everything at the software level, from programming and simulation through to production
- Significantly lower investment compared with conventional machining centers
- Combination of robot flexibility and NC accuracy
- Changes and improvements without specialist robotic knowledge
- Flexible and adaptive manufacturing options
- Cost advantages through reduction of manual tasks and demonstrably shorter throughput times

The SAR Group has been actively involved in designing Industry 4.0 for 30 years. As part of the seven SAR core business areas in automation, Process and Big Data Management play a central role in the processing of signals and measurement data from production processes. From cell controllers to global TIA portals, SAR automation solutions not only deliver performance indicators and transparency, they provide targeted information for optimum process methods and high customer value.

Solution Partner

Automation

SIEMENS

KUKA

OFFICIAL SYSTEM PARTNER

With headquarters in Germany, SAR has been a supply partner for professional industrial and process automation since 1985. Together with offices in the US, South Africa, England, Switzerland and Slovenia, more than 500 staff are employed.

Products and services can be provided flexibly on a worldwide basis in the specialist areas of Automation, Process and Environmental Technology, Testing and Measuring Technology, IT Services, Surface Application Systems, Plastics Systems and Green Energy, together with Switchgear construction, installation, training and servicing.

Our customers include well-known, globally active industrial corporations, small businesses and municipal organizations.

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