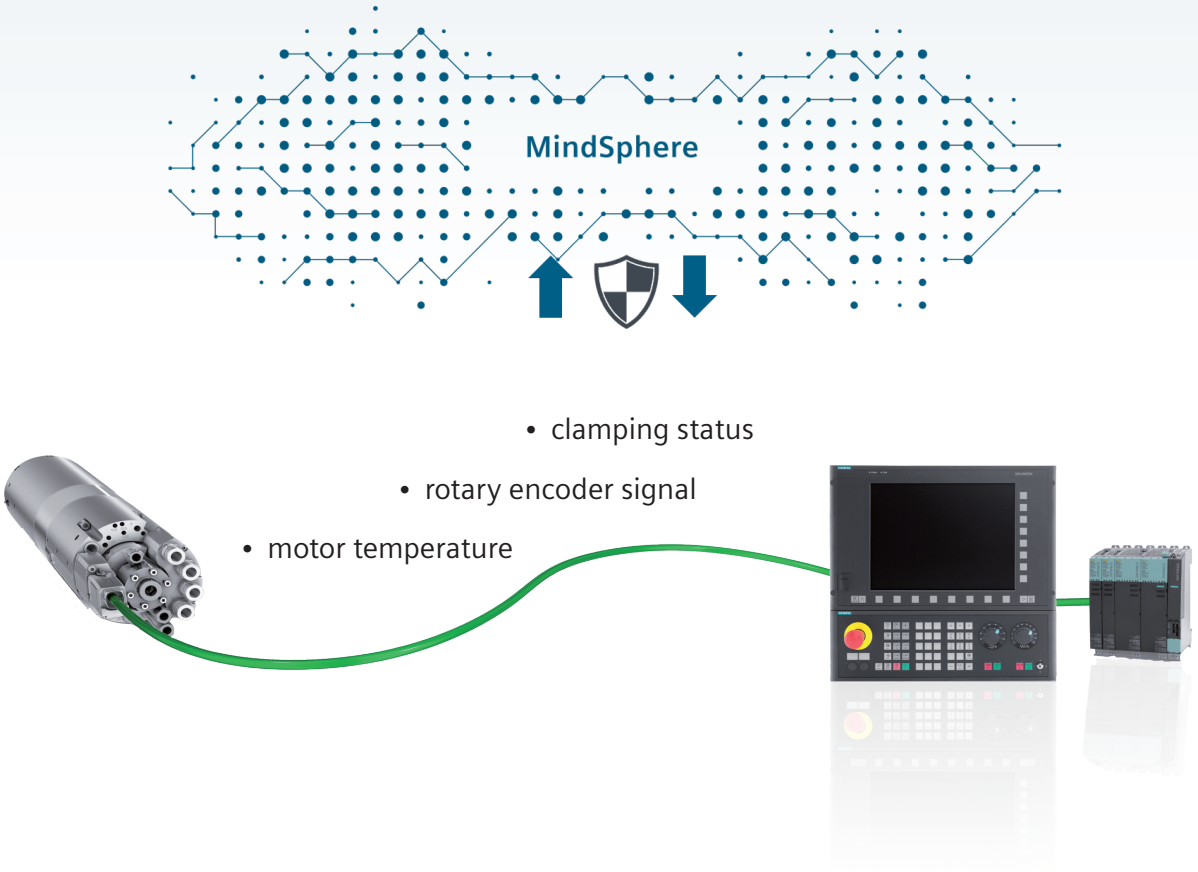
SIEMENS
Ingenuity for life



The smart spindle

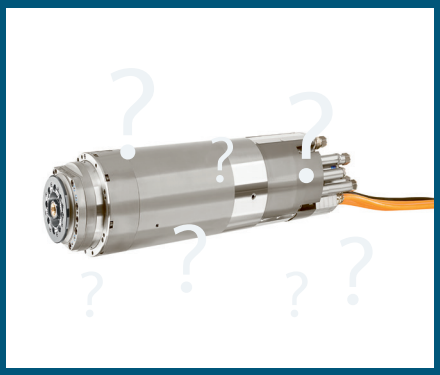
Reduce unexpected downtime risks with spindle data analysis

Option for Siemens Weiss spindles for 840D sl off SW 4.5 SP3/ 828D of SW 4.7
September 2019

siemens.com/spindeln

WEISS spindle with Sensor Module - SMI24

1 + 1 = 3



Current situation

When it comes to spindles in machine tools, only little information or none at all is currently available in most cases about the current operating conditions and previous operating indicators of the spindle in the machine. For this reason, it is difficult to determine parameters for wear rates that could be used to prevent unexpected machine downtime.

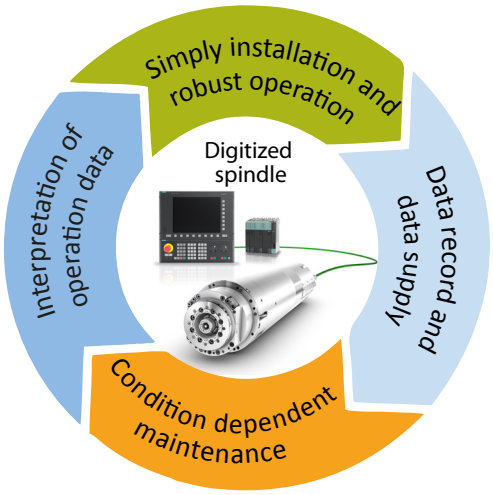
The following questions cannot currently be answered:

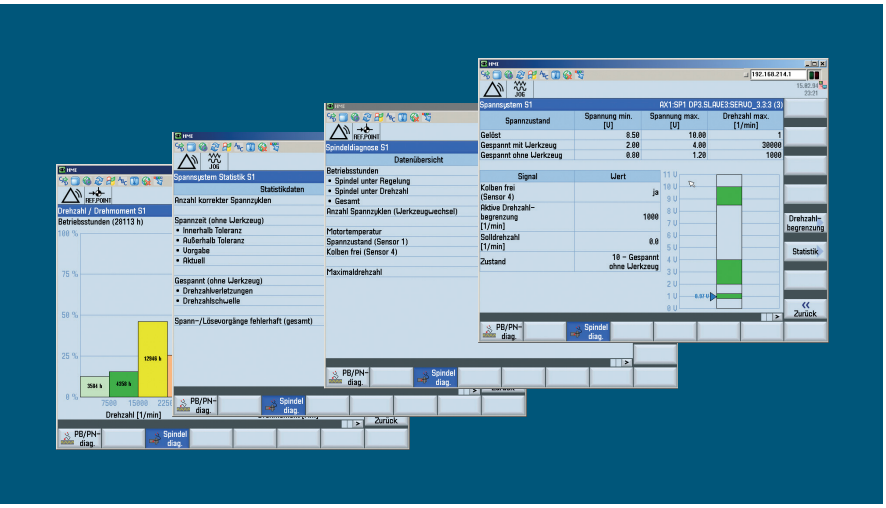
- What is the run time of the spindle under speed and under control?
- What are the speed and torque ranges during the duration of spindle use?
- How many clamping cycles have been performed until now?
- What are the operating conditions of the tool clamping system?

Aim

Integration of WEISS motor spindles – SINAMICS and SINUMERIK in one intelligent system.

This leads to a simplification of spindle commissioning and the integration of signals into the PLC. Collection, analysis and visualization of information and data during spindle run time. Evaluation of data to determine spindle states that could cause downtime. Increased duration of spindle use through better planning of preventive measures for spindle maintenance, thereby increasing machine productivity.



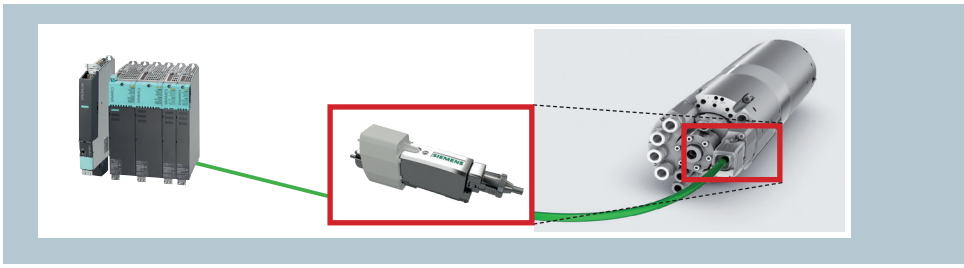


Solution

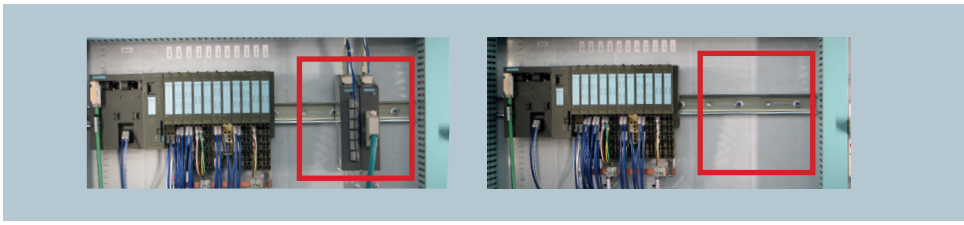
The WEISS Spindle Sensor Module SMI24 facilitates spindle commissioning, reduces the amount of hardware required for the integration of spindle signals into controls and displays spindle state information on the HMI. The SINUMERIK option „Integrated Spindle Monitor" ISM can be used to access additional information on spindle state and data on spindle use via HMI screens.

Cycle-independent signal transmission for increased productivity
Visualization of operating conditions for easier diagnosis.
More control cabinet space thanks to fewer components.

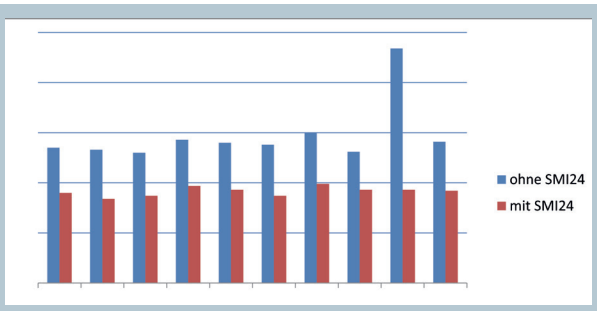
Easy wiring with **only one Drive-CliQ cable** for the signals of encoder, motor temperature, clamping status query and piston query.



This means **fewer components** (cables, processing units) in the control cabinet for feeding of analog and digital spindle signals.



SMI24 enables **changing tools as fast as possible** thanks to its independence from the PLC cycle. Simple and fast configuration of the tool change without the need to involve the PLC. Quick access to spindle information thanks for example to the display of spindle designation and serial number.



Measured chip-to-chip times after performed tool changes.

Options:

Integrated Spindle Monitor ISM

- Clamping cycle counter tool
- Clamping time diagnosis tool
- Temperature monitoring motor/bearing
- Operating conditions in speed and torque histograms

Data-Export

Export a csv file with SMI24 data on a data recorder

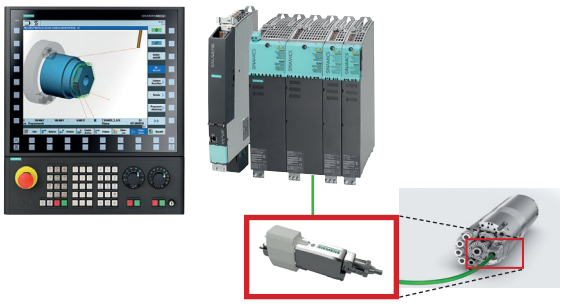
Manage My Machine/ Spindle Monitor V1.6

https://siemens.mindsphere.io/content/dam/mindsphere/pdf/App_MMMSpindleMonitor_ProductSheet_SpecificTerms_v1.1.pdf

SINUMERIK and WEISS spindle with Sensor Mod

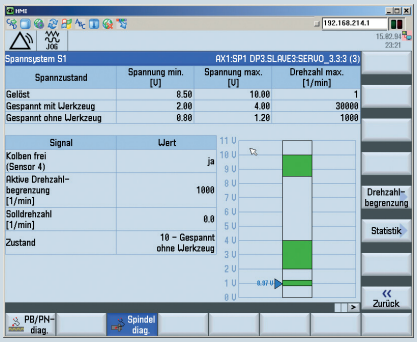
Increasing the availability and productivity of machine tools - ef

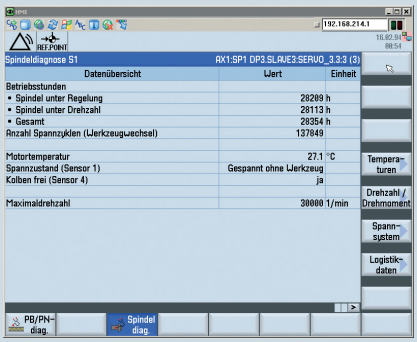
SINUMERIK 840D sl NCU7x0.3 PN
SINAMICS S120/ COMBI

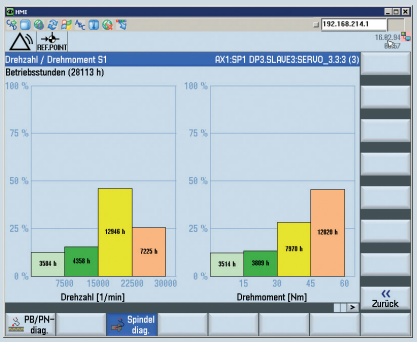


SINUMERIK 828D PPU2xx
SINAMICS S120 COMBI

Integrated Spindle Diagnosis - ISM:
Display of spindle status data on the HMI of the machine





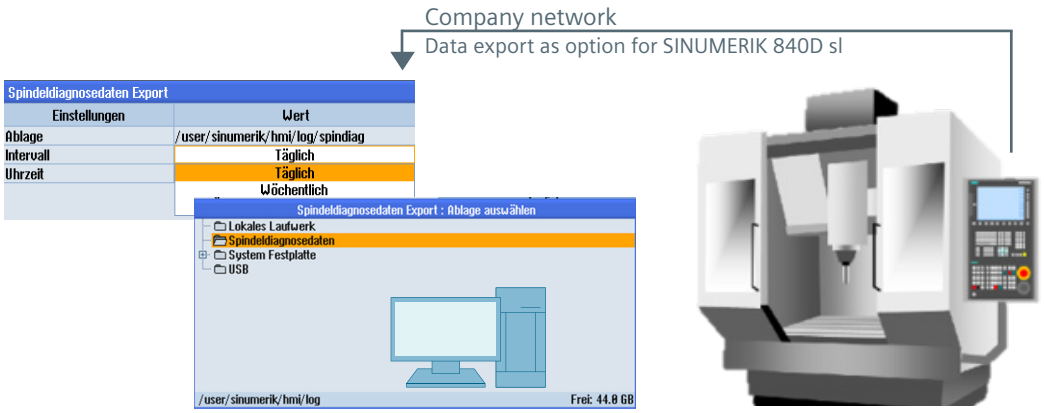


Visualization of current spindle information facilitates the diagnosis of faults and supports the planning of service intervals and preventive maintenance.

ule - SMI24

fficiency in maintenance and service!

Data-Export



Spindle

Drawing number	175442L
Serial number	168
Production date	27.03.2013

Operating data

Operating hours spindle under control	5020 h 22 min
Operating hours spindle under speed	5014 h 36 min
Number clamping cycles	902520
Number fault clamping cycles	65

Motor data

Motor type	synchron
Nominal power	29 KW
Nominal speed	8000 min^{-1}
Field weakening speed	8000 min^{-1}
Maximum speed	18000 min^{-1}

Service 1

Date	04.08.2013
Service file	20123652

Occasions

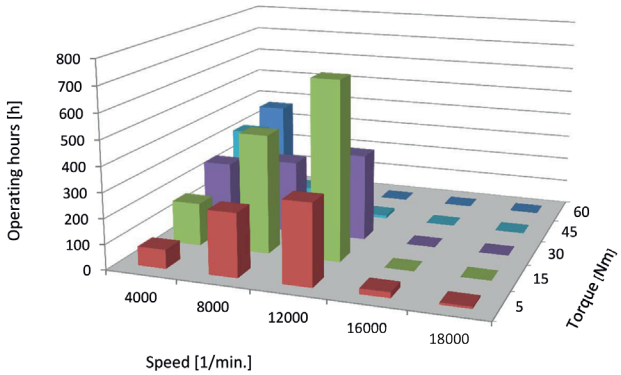
2 times exceedance of warning motor temperature 80 °C
2 times exceedance of interference motor temperature 100 °C
4 times exceedance of warning temperature 55 °C for additional temperatur sensor
1 time exceedance of interference temperature 100 °C for additional temperature sensor

Reference clamping time

Minimum	46.808 ms
Average	50.594 ms
Maximum	71.875 ms

Trend clamping time

Last 24 hours	52.112 ms
Last 10 days	50.715 ms
Last 100 days	50.502 ms

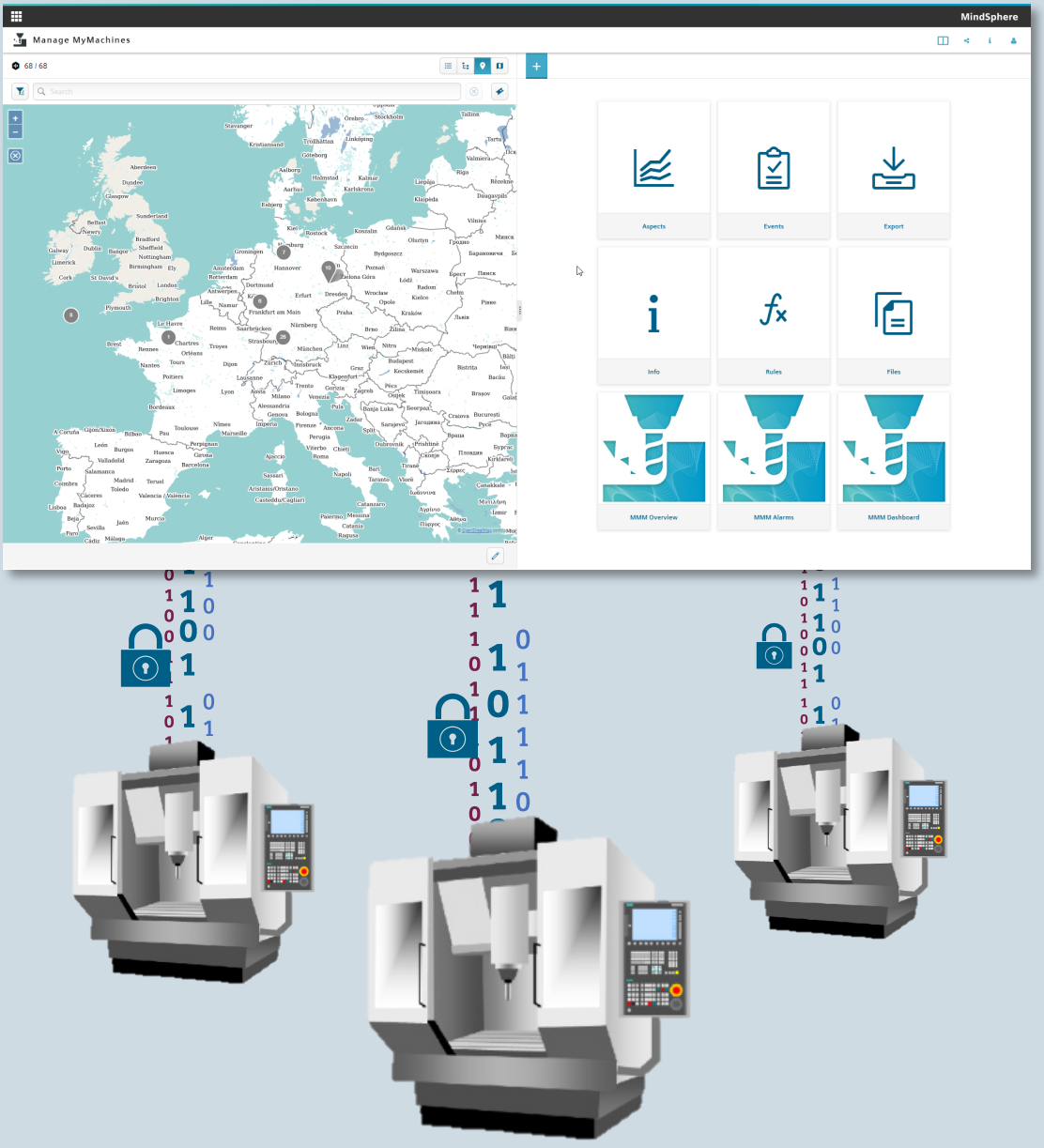


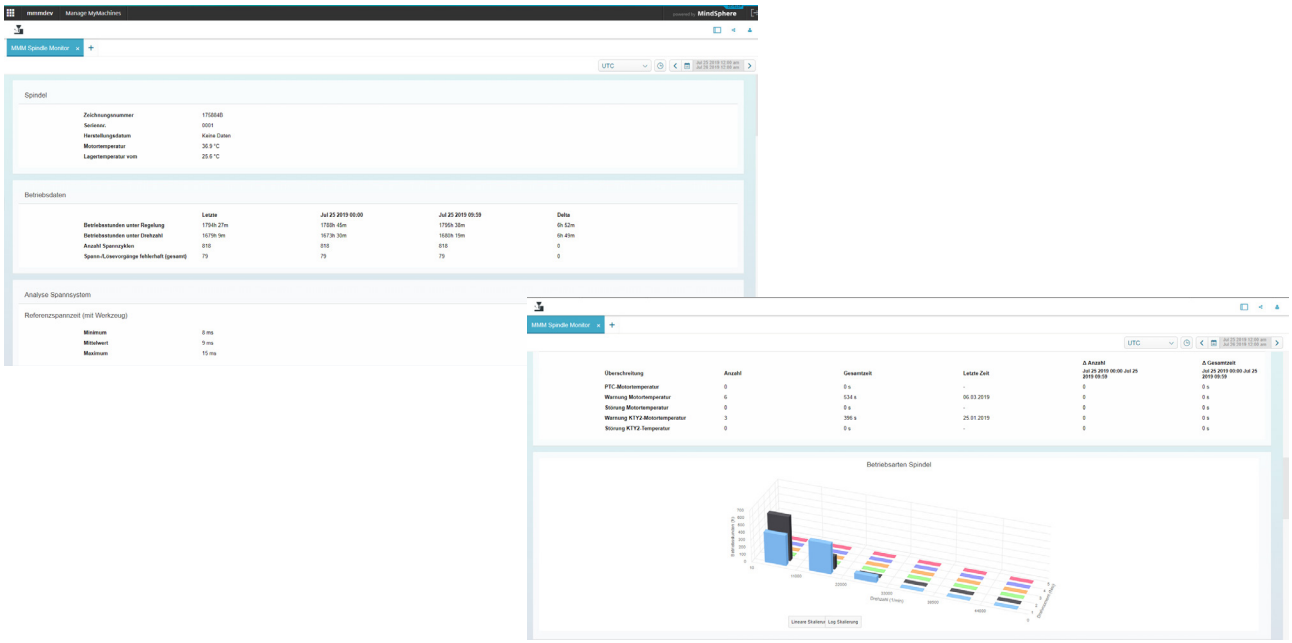
Individual evaluation of spindle data, e.g. run time-related speed and torque ranges, to provide information on respective spindle data and spindle use. This enables more targeted deduction of spindle wear behavior and planning of preventive maintenance.

SMI24 und Manage MyMachines - Spindle Monitor V1.6

Decentralized access to spindle data via cloud-based application MindSphere/ Manage MyMachines/ Spindle Monitor

Manage MyMachines/ Spindle Monitor is an extension of the Manage MyMachines cloud application to display specific data from main spindles. This requires the DriveQliq SMI24 module on the main spindle. This information about speed distribution, torque distribution, temperature distribution and tool clamping times are recorded and stored in the cloud application. The clear arranged dashboard then allows the visualization and analysis of the data.





Feature	Benefit
• Dashboard displays the information on the master data of the connected main spindle	• Time-efficient access to required information in case of maintenance or service
• Statistics for operating points: speed / torque / temperature	• Information on possible power reserves and suitability of the design
• Statistics on tool clamping times • Statistics on the clamping condition	• Evaluation of the clamping times in comparison to the reference value
• Selection and comparison of statistical data at different points in time	• Detection of wear of the clamping system through change of the clamping times • Recognition of changes in use
• Export of saved data in a standard CSV format	• Management and monitoring of globally distributed machine parks • New service methods and business models

Subject to change without prior notice
Printed in Germany
© **Siemens AG 2019**

Siemens AG
Industry Sector
Motion Control Systems
P.O. Box 3180
91050 Erlangen
GERMANY
www.siemens.com/spindles

The information provided in this brochure contains merely general descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

All product designations may be trademarks or product names of Siemens AG or supplier companies whose use by third parties for their own purposes could violate the rights of the owners.