HEIDENHAIN

Connected Machining

Individual Solutions for Digital Order Management in Production

09/2017

Connected Machining

The center of every metalworking manufacturing company is the workshop. Highly qualified specialists work here on modern milling machines and lathes. This is where the workpieces are produced. This is where experience and expertise determine the quality of the products and the efficiency of the manufacturing process.

The discussion about digitization raises big expectations in many manufacturing companies, but it also presents new challenges. The main question is how digital networking and software solutions can be used to analyze one's own manufacturing processes, improve internal processes, and tailor the use of external services, such as cloud solutions.

With its Connected Machining package of functions, HEIDENHAN offers solutions for individual networking of production processes. These solutions place the user at the center of digital order management through the control of his milling or turning machine. The HEIDENHAIN control is networked with all production-related areas within the company on a very individual basis tailored to the existing structures and open for future developments.

You are supported in your work through simple data usage, time-saving workflows and transparent processes in all company areas. This applies of course in the workshop, but also during design and production planning, as well as in management, logistics, servicing, etc. The production-related strengths of modern machines and plants are thus supplemented through a uniform digital job management with Connected Machining.

connected + machining

Contents

Networked manufacturing
– Making know-how useable and protecting it at the same time

Creativity and innovative power drive the important and unique features that make a production company successful. This is driven by innovative and motivated employees who place their expertise at the service of the company. To use this private, highly sensitive know-how in a targeted manner and protect it at the same time places manufacturing companies before crucial challenges.

Connected Machining deliberately makes control of the machine in the workshop the focal point of digital order management. HEIDENHAIN is therefore consistently pursuing what it already began with the TNC control and the Klartext programming format as a dialog-oriented programming language in the mid-1970s: providing the specialist in the workshop with powerful, intuitive solutions for the production of high-quality workpieces.

The realization of uniform digital order management with Connected Machining through HEIDENHAIN control leaves the necessary leeway for individual design and connection of the network. Connected Machining offers the necessary openness with its comprehensive capabilities and digital interfaces.

Even a simple TNC control system integrated into the company network via Ethernet offers with its standard functions a wide range of options for receiving and using digital job data directly on the control:

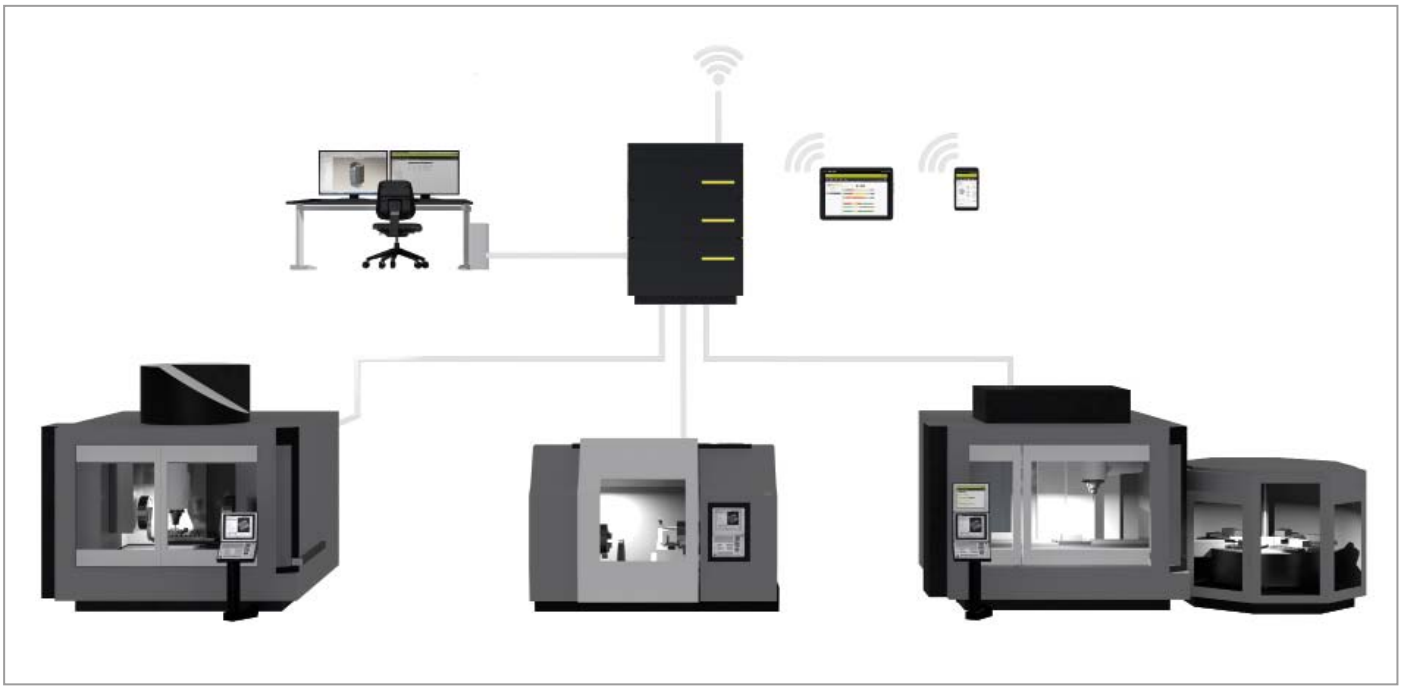
- PDF viewer, e.g. for displaying of fixture diagrams and design drawings
- DXF viewer, e.g. for displaying 3-D models
- Image display, e.g. for displaying fixture situations and manufacturing notes
- Web browser for accessing web-based applications, such as ERP and MES clients, e-mail clients, and HTML5 clients

Beyond this, the following solutions and options are offered:

- The **StateMonitor** software creates transparent processes through data acquisition and data analysis.
- **The Remote Desktop Manager** (option 133) allows access to PCs and the installed software right at the control
- The **HEIDENHAIN DNC interface** (option 18) connects the control to enterprise-resource planning and production-activity control systems
- The **Extended Workspace** display provides clear representation and processing of the job data on the machine

The employees in the company keep the digital threads in their hands to be able to use the internal know-how individually—whether on the machine tool in the workshop, in the design stage or in production planning.

In production, on the machine, all the information is quickly and immediately available that is necessary for continuous high-quality production planning and enables a flexible order management from a batch size of one.



– Powerful solutions on the control

Order data and due dates
Important information such as order number, desired delivery date, order volume and required materials can be viewed directly with the integrated web browser of the HEIDENHAIN controls and corresponding web applications or with the help of the Remote Desktop Manager directly on the order server. Preparations on the machine can be quick, paperless and free of routing slips.

Preparation of production
The necessary production data such as NC programs, fixture and test plans, or 2-D and 3-D data can be transmitted digitally to the control via the DNC interface. HEIDENHAIN controls offer even as standard features an image display as well as PDF and DXF viewers to view these data.

Communication interfaces allow tool management systems to directly compare data with the controller. It is also possible to send confirmation of finished orders via the control automatically, either via DNC interface or the StateMonitor software. With appropriate MES and ERP systems, the user can also enter them manually through a web browser.

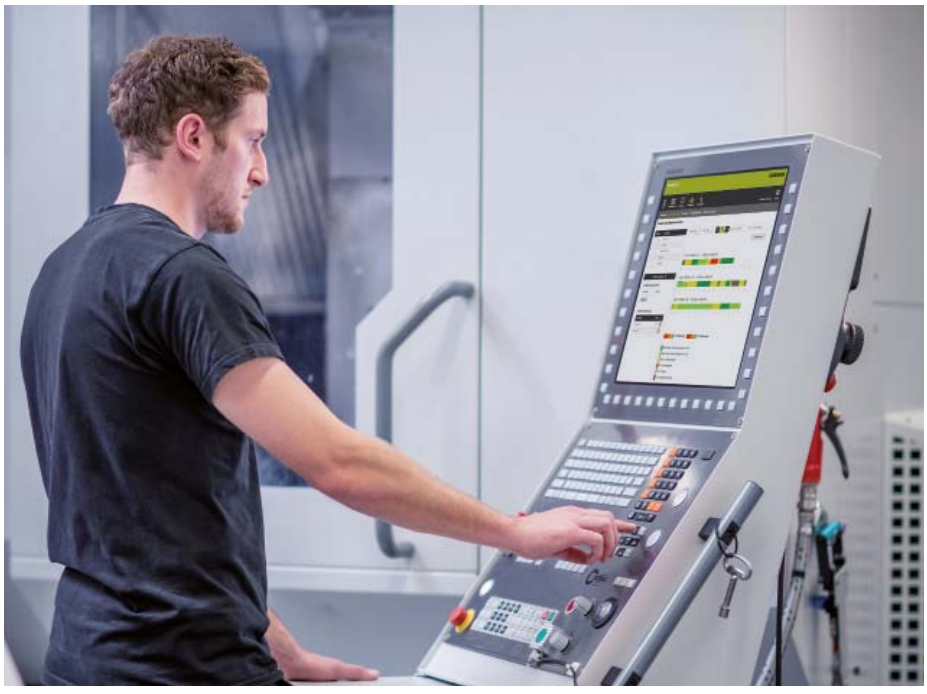
Data access during production
Fast and flexible reaction to changes requires clearly laid out, always available data. If, for example, machining strategies are wrong, or if the part program has to be examined in more detail and even edited, the NC data generation of the CAM system quickly comes into play.

The Remote Desktop Manager allows access to the data of the CAM system from the PLC during NC machining. With its help, the user is able to call up the first information on the machine and conduct examinations.

Overview and documentation during production
With the expanded display of Extended Workspace, the user has additional workspace available on which he displays the CAM system as needed. He has the NC program running in parallel on the control screen.

In addition, Extended Workspace also makes it possible to display other applications such as process monitoring, monitoring and status information. Whether a workspace camera or display of multi-machine status at the push of a button—a clear status overview helps the user to quickly locate and correct problems on a machine such as a tool failure.

StateMonitor can also send targeted status messages on events via e-mail. The events and recipients of the status e-mails are freely configurable.



Networked manufacturing
– Support in the office

Simple production planning
Connected Machining also supports production planning. If all production-relevant data are known and prepared for an order, the order data can be transmitted to the machine tool via a DNC interface or can be provided on a server for retrieval. The user receives information digitally via e-mail or through a web application. He can either use an e-mail client on an IPC or the web browser of the HEIDENHAIN control via the Remote Desktop Manager. This reduces paperwork and eliminates superfluous communications.

The constantly available information about current production orders is also a valuable tool for production planning. This information can be displayed and tracked quickly and easily via StateMonitor's machine data acquisition. But StateMonitor does not simply display machine data. The software also allows its evaluation and comments on events. This provides important data for optimizing the organizational sequence of production.

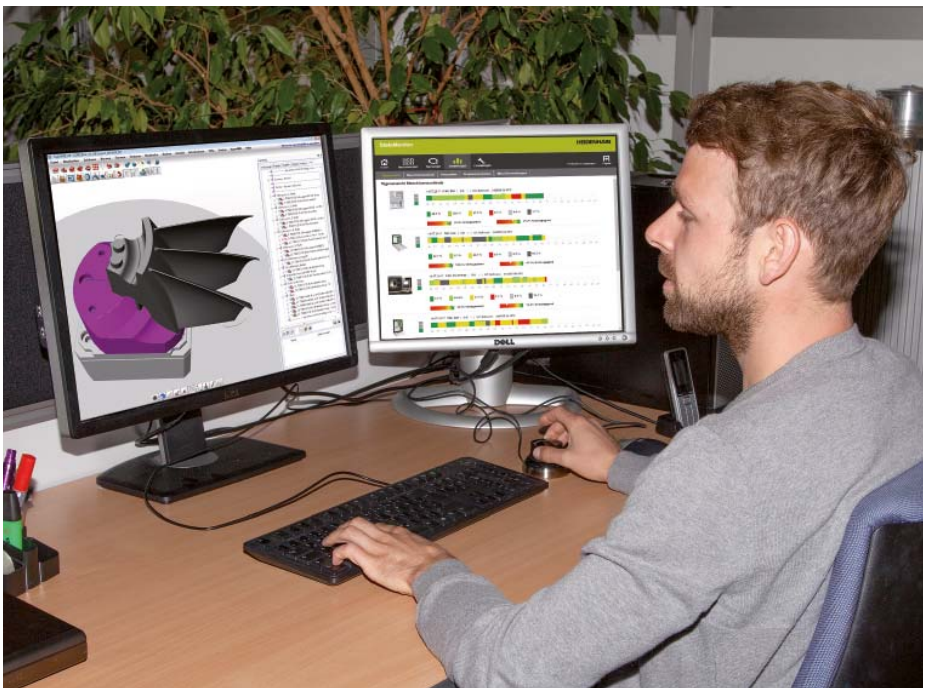
Data exchange for continuous horizontal integration
In an automated production setup, Connected Machining can implement a targeted data exchange over the DNC interface. Handover units or tool and workpiece handling systems for example, then always provide the right information at the right time in order to make the flow of automation trouble-free. The communication is over Ethernet interface, supported by commonly available fieldbus systems.

Coordinated order and production planning
A good overview of the current production process facilitates further planning, e.g. for the procurement of tools, the preparation of follow-up orders or the logistics around the finished parts. In particular the managers of manufacturing and production require simple and easily accessible information as provided by StateMonitor. These data ensure plannable production that is successful in the long term and offers the necessary security for investments.

Systematically reduce unplanned shutdowns
StateMonitor provides configurable fault messages and, if desired, documents machine messages in the log that are then available as machine history. Their evaluation can show creeping wear and tear or possible disturbances, so that early preventive measures can be planned and production losses can be avoided.

For maintenance and service, the DNC interface also supports planning in advance. Third party providers, for example, can pick up the necessary machine data via HEIDENHAIN DNC from the control for evaluation and use it to assess the maintenance situation or to correct problems.

Sound investment planning
Machine utilization and the efficiency of the machines are a key aspect in investment planning. They provide valuable information on whether old machines should be modernized, machinery should be expanded or further automation should be considered. The StateMonitor helps you with these decisions and ensures transparency.



StateMonitor
– Acquiring and evaluating machine data

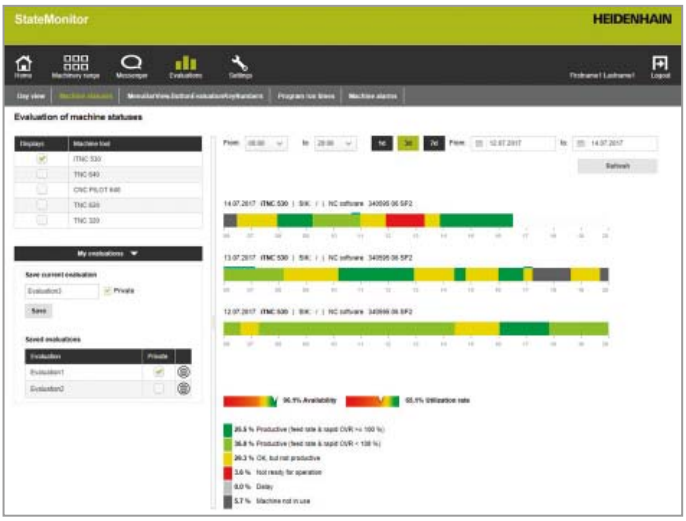
StateMonitor records the states of the machines in production and visualizes them. By evaluating important data such as current machine status, machine messages, override positions and utilization history, StateMonitor provides in-depth information on the machine's degree of utilization. StateMonitor also uses the collected data to show existing optimization possibilities. The operator can enter comments on machine downtimes and set-up times in order to uncover machine-specific as well as organizational potential for optimization. Using the messenger function, StateMonitor notifies the responsible person by e-mail of specific events such as program end, machine standstill, or service warnings based on individually combinable machine signals and statuses.

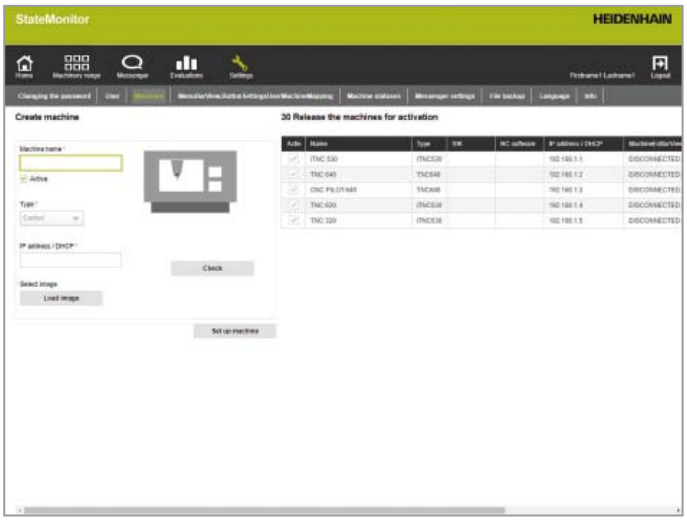
State Monitor is installed on a server in the company network and collects machine states of HEIDENHAIN controls via the HEIDENHAIN DNC interface. The software runs in the local network as a client-server application and has a web-based user interface. This allows StateMonitor to be displayed and operated via any device (TNC controls, PCs, mobile devices) that has a web browser and has access to the respective server. No further software or app has to be installed on the respective display and control units. It is sufficient to enter or store the respective web address. The user interface of StateMonitor adapts to the respective screen resolution and can be operated by mouse as well as by a touchscreen.

StateMonitor captures and visualizes the following information of the networked machines:

- Operating modes
- Override positions (spindle, rapid traverse, feed rate)
- Program status and program name, if appropriate also subprograms
- Program run time
- SIK number and software number
- Machine messages

StateMonitor is installed on a server or PC with Windows operating system, the so-called host. The hardware prerequisites depend on the number of machines to be connected. The HEIDENHAIN controls to be connected must be accessible from the server through the IP address or DHCP name. Also, HEIDENHAIN control must have HEIDENHAIN DNC (option 18).





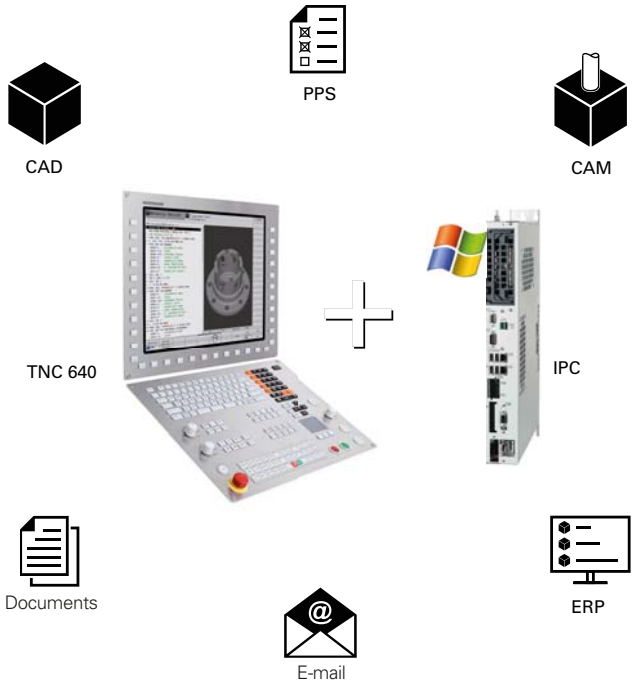
Remote Desktop Manager
– Display and remote control of external computer units

In daily operations it can often be necessary to make entries in planning and control systems or perform diagnostics using Windows-based software. The **Remote Desktop Manager** option provides the user with the opportunity to operate one or more Windows PCs directly from the TNC. It offers complete integration of Windows PC operation in the user interface of the TNC control's screen.

With a simple keystroke on the machine operating panel you can switch between the control screen and the screen of a separate Windows PC in your local network. And it makes no difference whether the Windows computer operates as an industrial PC (e.g. IPC 6641) in the machine's control cabinet, or as a server in the local network.

Possible applications include the central management of job orders or tools and NC programs, all the way to remote operation of CAD/CAM systems from the machine. In this way, the machine tool operating panel becomes a flexible and efficient workplace for the steps in the CAD/CAM/CNC process chain, including decentralized order processing.

The Remote Desktop Manager can be set up through the control's operating system.



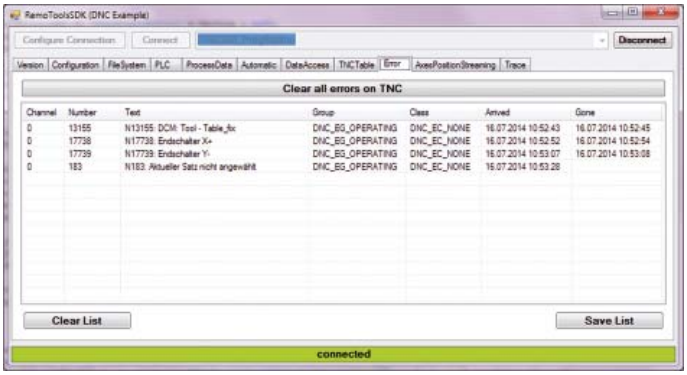
Connected Machining permits uniformly digital order management in networked manufacturing You also profit from:
- Easy data usage
- Time-saving procedures
- Transparent processes

Remote Desktop Manager	Option 133	ID 894423-01
TNC 640 HSCI	As of NC SW 34059x-01	
TNC 620 HSCI	As of NC SW 81760x-01	
TNC 320	–	
iTNC 530 HSCI	As of NC SW 60642x-02	
iTNC 530	–	
Installation by IT specialists		
For more information see the Technical Manuals		

HEIDENHAIN DNC
– Communication via COM components

Paperless order management requires the seamless exchange of data about all process steps in the production process. The **HEIDENHAIN DNC** option enables a Windows application to access data of the TNC, and to edit the data if required. Possible fields of application include, for example:

- Software solutions controlling the manufacturing process
  - Machine and operating-data acquisition systems (MDA/PDA)
  - Connection to higher-level ERP/MES systems
  - Planning of preventive maintenance based on the actual condition of the machine
- Standard or customer-specific PC software
  - Increase in process reliability and system availability
  - Error reporting systems that, for example, send the customer a message to his smartphone reporting problems with the currently running machining process
  - Overview plans that provide information about the current condition of all machines used in production
  - Creation of a database for comprehensive data mining



RemoTools SDK development package
To enable you to use the HEIDENHAIN DNC software interface, HEIDENHAIN offers the RemoTools SDK software development package. RemoTools SDK provides a Microsoft COM component for the development environments on Windows operating systems in order to make communication with the HEIDENHAIN control possible. During the installation of RemoTools SDK the COM component is registered in the Windows operating system.

HEIDENHAIN DNC	Option 18	ID 526451-01
RemoTools SDK	Accessories	ID 340442-xx
TNC 640 HSCI	As of NC SW 34059x-01	
TNC 620 HSCI	As of NC SW 34056x-01/73498x-01	
TNC 320	As of NC SW 34055x-01/771851-01	
iTNC 530 HSCI	As of NC SW 60642x-01	
iTNC 530	As of NC SW 34049x-01	
Installation by the machine tool builder		
For more information see the *HEIDENHAIN DNC* brochure		

Extended Workspace
– Expanded display

Extended Workspace makes it possible to work in parallel on the machine and job management directly at the machine and control. A second screen with an integrated computer is simply connected to the controller via Ethernet and configured as an additional screen in the TNC operating system. This enables the user to work effectively and knowledgeably with additional applications on the second screen without losing his grasp on the center of his work on the control screen.

The applications for the additional screen workspace are multiple:
- Parallel work during NC program run on:
  - Order management
  - CAD/CAM programming (e.g. via Remote Desktop Manager)
  - Documentation
  - Machine-specific applications (e.g. the use of maintenance software)
- Monitoring the working space
- Operating two or more machines by one machine operator, display of StateMonitor's machine overview on the second screen

Extended Workspace can be configured individually for the desired applications. The computer integrated in the second screen has a powerful processor and thus relieves the main computer of the controller. The applications run natively on the computer of Extended Workspace which, however, receives all necessary data from the TNC controller and can also be used for display processes (e.g. PDF and DXF viewer, web browser and image display) during concurrent processes.

Connected Machining
– Overview

User function	Option number	ID	Available for	Remark
Remote Desktop Manager	**133**	894423-01	TNC 620 iTNC 530 TNC 640 CNC PILOT 640	• Fast access to an external PC (e.g. Windows, Linux) at the push of a button on the control's operating panel • Use of CAD/CAM, MES, ERP or e-mail via the control's screen • Minimization of legwork through local data provision • Simple configuration and commissioning
Extended Workspace	–	1174935-01 (with hardware ITC 860)	TNC 640	• Dual-screen solution with an extended workspace: 19" touch system • Parallel working during program execution on: – Order management – CAD/CAM (e.g. via Remote Desktop Manager) – Documentation – Machine-specific work such as operation of maintenance software • Workspace monitoring on the second screen with a camera • Operation of multiple machines, use of the StateMonitor's machine overview on the second screen. • Simple toggling between different applications by touch operation
StateMonitor	–	1218930-01 (PC software)	TNC 620 iTNC 530 TNC 640 CNC PILOT 640 MANUALplus 620	• Machine data acquisition for server PC (Windows) • Clear live representation of the machine tools available • Detailed machine depiction with useful information on: – The NC program – Pending machine messages – Executed programs (with start/stop) – Interrupted programs – Override settings – A machine's degree of utilization • Simple access by web-server applications (e.g. via tablet, smartphone or PC) • Fast visualization of running machines, machines during setup mode, and machines with pending faults • Configurable e-mail notification and documentation of messages and faults • Targeted evaluation of – Machine statuses – Program run times – Characteristic values – Machine messages • User management for defining view rights to the available machinery • Support of several conversational languages
HEIDENHAIN DNC	18 (on the control)	526451-01		• Powerful communication interface • Comprehensive provision of data (operating data and tool data) • Comprehensive access to machine data • Communication possibility with the PLC of the control

You can find more information in the brochure titled *Options and Accessories*.

HEIDENHAIN

Mastering nanometer accuracy

HEIDENHAIN

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