HEIDENHAIN

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RemoTools SDK virtualTNC

Software Interface for
Interaction with
TNC Controls

RemoTools SDK
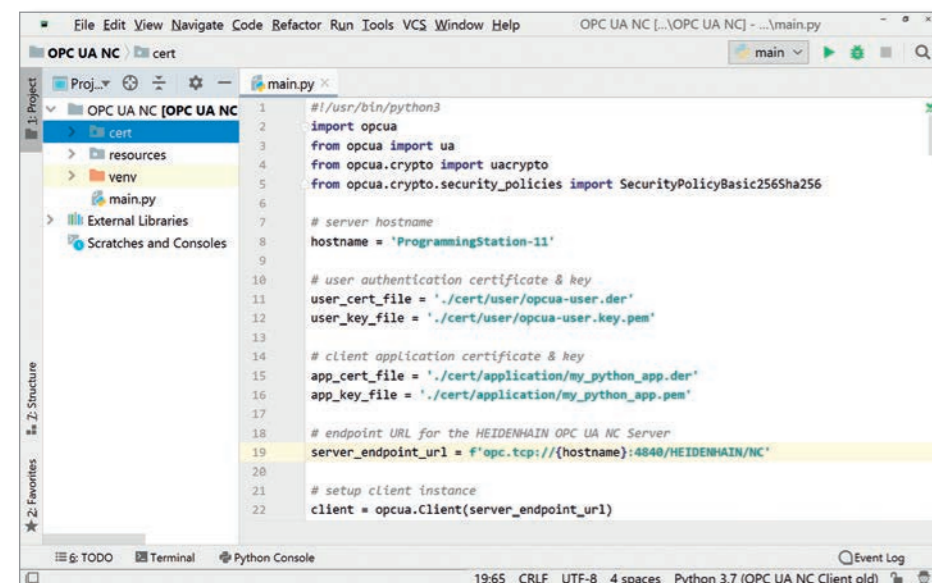## Software components for creating PC-based applications for TNC controls

TNC controls from HEIDENHAIN have long featured data interfaces for communication with external systems. Two Ethernet interfaces are standard on current HEIDENHAIN controls. In combination with the software development kit, this opens diverse possibilities for fulfilling the increasingly complex requirements of automation technology for machine tools.

HEIDENHAIN offers the software development kit **RemoTools SDK** for interaction with TNC controls. Communication takes place according to the TCP/IP protocol. If the option HEIDENHAIN DNC (option 18) is enabled on a HEIDENHAIN control, a Windows application can access TNC data and, if necessary, change it. The flexibility of the PC software and the large selection of ready-to-use software components and standard tools in the development environment enable you to develop PC applications of great use to your customers in a very short time.

Possible fields of application include:
- 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:
  – Programs for increasing 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
  – Gathering a base of data for generating valuable insights

The main component of RemoTools SDK is the HEIDENHAIN DNC component, which is based on Microsoft's (D)COM (Component Object Model) standard. It makes your programming interfaces available independently of any regional language. Each interface supports one or more methods, properties or events that can be called from an application. The COM component is integrated in the development environment, and is thus available for developing your own applications. Any COM-enabled programming language, such as C++, C#, VB.NET, as well as many of the scripting languages available under Windows can be used to develop applications. Another advantage of the COM component is the version-independence typical of COM. It eliminates the need to update an existing application with every version jump of the component.

Please note:
It is not possible to communicate according to strict real-time conditions over conventional PC networks. The reaction time attainable over HEIDENHAIN DNC depends on the network's utilization.

Functional overview and items supplied

Functional overview of the COM component

General machine functions
- Configure and show connections
- Establish and break connections to the control
- Show information about the connection status
- Make connections available to all other objects

Version information
- Show information about the control model and NC software
- Show information about the active PLC program
- Check SIK numbers (Software Identification Key)
- Show version of the COM component

Process information
- Show operating time of the control
- Show operating times of the machine, spindles and axes
- Display the run time of machining (NC program)

Configuration information
- Show number and designation of axes
- Show type and associated channel of axes

Machining control
- Report changes to the state of the operating mode, active NC program, program status and DNC mode
- Report tool changes, including old and new tool numbers
- Report information from the NC program via FN 38
- Set presets on the control
- Select and start the NC program
- Interrupt program run immediately or at a certain block
- Query the current position of the tool and machine
- Read and switch the operating mode
- Query the status of the currently running NC program
- Query and change the values of the override potentiometers

Data access
- Access the tables in the control
- Create and delete rows of information
- Read and change contents
- Define the data to be monitored for event triggering
- Read and write machine data

File operations
- Create, rename and change directories
- Read directory contents (also with filter)
- Read current directory path on the control
- Delete empty directories on the control
- Transfer files to and from the control
- Rename files on the control
- Set the change date and change time of a file on the control
- Cancel file transfer
- Read and set file attributes on the control
- Read the total and available memory on the control
- Define the files to be monitored for event triggering
- Report changes to a monitored file
- Report the conclusion of file transfer
- Report the progress of active file transfer

Error management
- Readout of pending error information
- Acknowledge all current errors
- Read error description
- Create own error codes on the control
- Report error results of peripheral devices
- Report acknowledgment of an error
- Read out a service file
- Configure logging
- Create screenshot of the control screen

PLC communication
- Transmit messages to the control's PLC
- Receive messages from the control's PLC

Direct access to PLC memories
- Read- and write-access to PLC memories, such as marker, counter, timer, byte, word, double word, and string
- Input marker, byte, word, double word
- Output marker, byte, word, double word

Functions for virtualTNC
- Read current axis positions
- Set time and position filters for axis streaming
- Set and test current position
- Set time lapse

User authentication
- RPC Secure

Items supplied
RemoTools SDK V3.3   ID 340442-33
The following is included with RemoTools SDK:
- COM component
- API documentation as CHM help system
- Various Visual Studio examples (C#)
- JHIOSIM DLL for simulating the I/Os for virtualTNC

Prerequisites for the PC
- Operating system: Windows 10/11
- CPU ≥ 1 GHz
- RAM ≥ 4 GB
- Free memory on the hard disk ≥ 1 GB
- Ethernet interface

virtualTNC
Control software for PC-based machine simulation

Simulation of NC programs on the control has been a feature of HEIDENHAIN contouring controls for some time now. The PC software **virtualTNC** makes it possible to use HEIDENHAIN controls as a control component for machine-simulation applications on external computer systems.

How machine simulation with virtualTNC works
Machine-simulation applications can simulate entire production units in order to optimize production processes in advance.

VirtualTNC can control the axes of a machine simulation as with a real system. Users program and operate the control in the same way as they do an actual HEIDENHAIN control. virtualTNC is the programming station software of the respective HEIDENHAIN control with a special interface that enables the machine simulation software to identify the current axis positions of the running "virtual" control. In order to simulate the interaction with a real machine, virtualTNC also makes the input and output states of the integrated PLC available.

Coupling of virtualTNC through the RemoTools SDK
Software manufacturers who would like to simulate a production system can connect their machine simulation to virtualTNC via HEIDENHAIN DNC. The AxisPosition-Streaming interface of the COM component must be used for coupling the axis positions. The JHIOsim DLL is used to read the PLC input and output states. Both are included in the RemoTools SDK development package. A software release module is required to enable the functionality of the interface.

Prerequisites for the PC
Operating system: Windows 10/11 (64-bit)
- Processor with virtualization support (VT-x or AMD-V)
- RAM: ≥ 8 GB, ≥ 16 GB (TNC7)
- Dedicated graphics board for graphicsintensive applications
- Hard disk: ≥ 10 GB per programming station
- Resolution: ≥ 1024 x 768,
  ≥ 1280 x 1024 (TNC 640),
  ≥ 1920 x 1080 (TNC7)
- Interfaces: USB, LAN

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Supported NC software
- TNC7:   NC software ≥ 81762x-16
- TNC 640:   NC software ≥ 34059x-07
- iTNC 530: NC software ≥ 34049x-03

virtualTNC
Control software for PC-based machine simulation:
- Single station license   ID 1113933-03
- Network license for
  1 workstations: ID 1122145-03
- Network license for
  14 workstations: ID 1113935-03
- Network license for
  20 workstations: ID 1113936-03
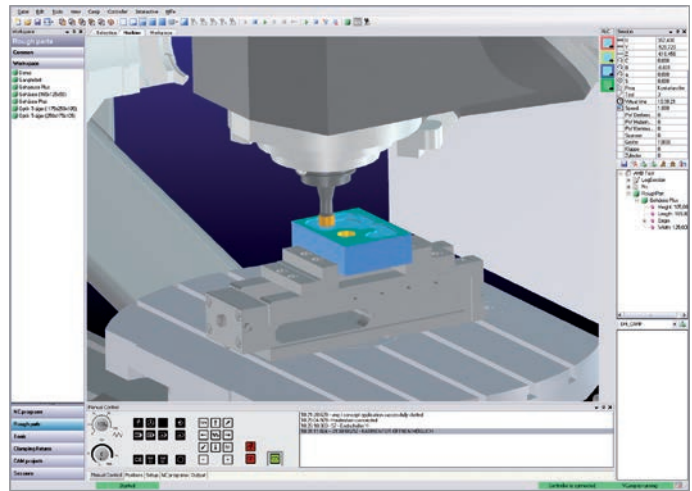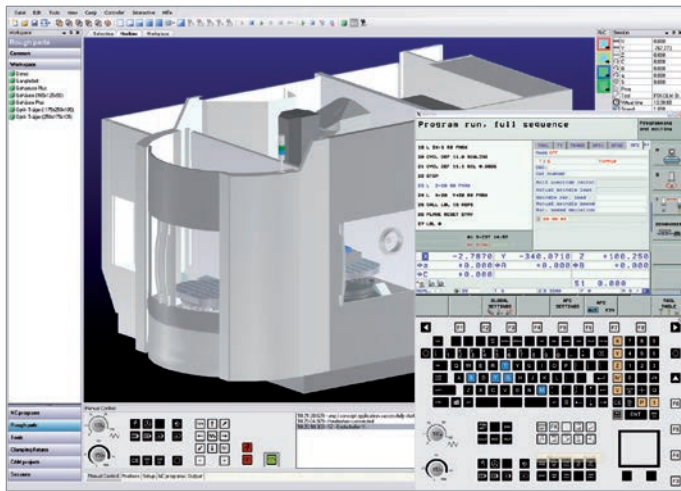
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