HEIDENHAIN

RemoTools SDK

Software Interface for Communication with TNC Controls

www.heidenhain.com

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RemoTools SDK

Software components for creating PC-based applications for TNC controls

Numerical controls from HEIDENHAIN have always had interfaces for communication with external systems. Two Ethernet interfaces are standard on the current models. With an adapter, one of the USB ports on the HEIDENHAIN control can be used as an additional network interface. The functions of Connected Machining enable the use of these interfaces to seamlessly integrate the control into your digital production process. With the following communication services, which are included in Connected Machining, you can operate the HEIDENHAIN control remotely over a TCP/IP network:

- HEIDENHAIN DNC
- Process Tracking Interface
- HEIDENHAIN OPC UA NC Server

Two other features of Connected Machining are available exclusively for HEIDENHAIN programming stations:

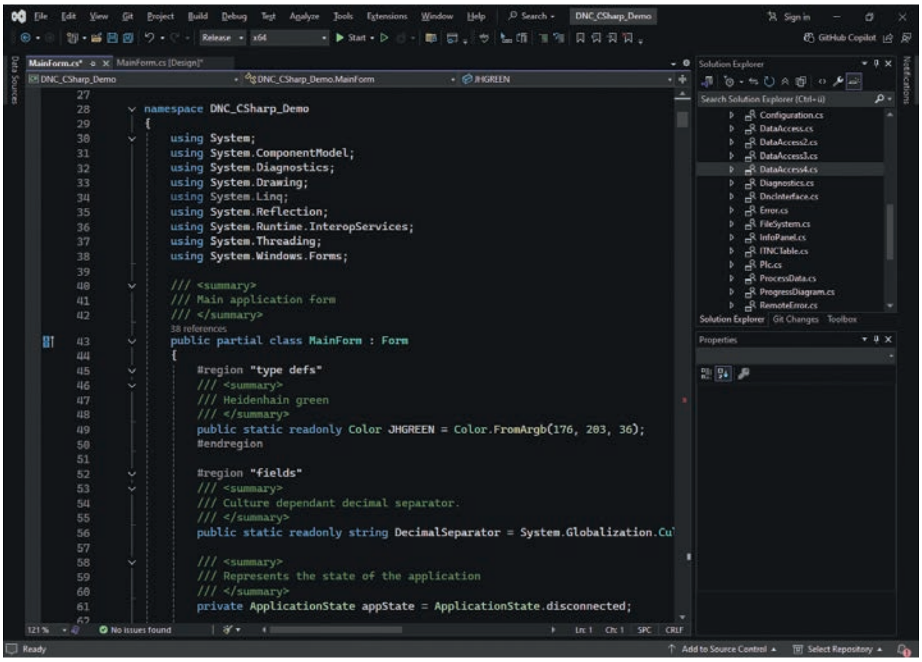
- virtualTNC
- JHIOsim

The communication services from HEIDENHAIN help you master the central challenges of modern production processes. They enable you to specifically optimize various productivity-enhancing features of your machines with HEIDENHAIN controls:

- Reliability through automatic data transfer: direct and correct transmission from the source system all the way to the TNC control
- Efficiency through optimized procedures and automated communication
- Flexibility through simple integration into existing IT structures
- Quality through consistent data availability and traceability
- Intelligent assistants

RemoTools SDK

The RemoTools Software Development Kit (RemoTools SDK) contains client libraries with examples and documentation for using the Connected Machining communication services.



Connected Machining: Possibilities with RemoTools SDK

Generally there are two possibilities for using the communication services of a HEIDENHAIN control:

- Use of a HEIDENHAIN-compatible application without RemoTools SDK
- Development of a separate application using RemoTools SDK

For users of machine tools there are numerous systems that cover a wide variety of production demands:

- Machine data collection and production data collection (MDC/PDC)
- Connection of StateMonitor via RemoTools SDK
- Manufacturing execution system (MES)
- Enterprise resource planning (ERP)
- Connection through a host computer
- Integration in automation facilities
- Computer-aided manufacturing (CAM)
- Tool databases and tool presetters
- Systems for preventive and condition-based maintenance
- Overview of all machines in a facility
- Simulation of machining operations, including tool paths and door-to-door times
- Simulation of machine hardware (inputs/outputs) within a virtual control

Suppliers of industrial software can use OPC UA NC Server or RemoTools SDK to develop individual solutions and enhance their applications in order to enable communication with HEIDENHAIN controls.

HEIDENHAIN DNC
Using the HEIDENHAIN DNC COM component, a Windows application can directly access data on a HEIDENHAIN control and change the data as needed. The component is integrated directly in the development environment, and is thus available for creating customized applications. Any COM-capable programming language (such as C++, C#, or VB.NET) can be used to develop the application. HEIDENHAIN DNC has been available for HEIDENHAIN controls since 2003. A compatible control is needed in order to use this function. In addition, the HEIDENHAIN DNC software option must be enabled on the control.

SIK: 18
SIK2: 3-03-1

Process Tracking Interface
The Process Tracking Interface (PTI) offers live access to process signals of a TNC control during productive operation. Up to 16 signals can be recorded simultaneously, with a sampling interval of 3 ms. The signals available for recording depend on the machine's configuration and the control's software version. Since 2025, PTI has been available for TNC7 controls with SIK2 and at least version 19 of the NC software. The Process Tracking Interface (PTI) software option must be active at least once. Each activated software option makes eight recording channels for process data available. PTI requires secure communication through an SSH tunnel. The functions for establishing a secure connection are part of the PTI communication library.

SIK2: 3-04-1

JHIOsim
JHIOsim is the interface for simulating a machine's real software on the programming station and making initial setup faster and more efficient. Machine components such as tool-changer doors, chip conveyors, and hydraulic monitoring sensors are simulated realistically, including before the machine is even built. JHIOsim thus facilitates an earlier virtual initial setup and increases the quality of your PLC software. You can also run automated regression tests, shorten development times, and minimize errors. JHIOsim is your smart solution for faster and more reliable development of machines.

virtualTNC
virtualTNC can be used to enhance the simulation core of CAD, CAM, and NC-simulation systems in order to calculate more precise position values and machining times. It also enables the simulation of NC programs with any HEIDENHAIN cycles. If the programming station is prepared correctly, then cycles from machine manufacturers can also be simulated. To this end, virtualTNC offers functions in order to transmit the position information of machine axes from a virtual machine to a Windows PC while machining (live streaming). The simulation speed can be increased via a definable turbo factor. The production process of a workpiece can then be simulated in a fraction of the real machining time. You don't need a separate client library for virtualTNC, since the virtualTNC functions are part of the HEIDENHAIN DNC COM component. virtualTNC is an enhancement for programming stations, and is not available on physical controls. A corresponding virtualTNC dongle is necessary in order to enable the functions. virtualTNC is available for the iTNC 530 and many newer controls.

HEIDENHAIN OPC UA NC Server
As an open and standardized communication interface, OPC UA NC Server has a special role: It can be used with any OPC UA client SDKs if they offer the necessary scope of functions. The manufacturer of your OPC UA SDK can provide you with the corresponding libraries, examples, and documentation.

SIK: 56 to 61
SIK2: 3-02-1

Find out more about the information model at *www.heidenhain.de/opcua-nc-server*.

What is included?
RemoTools SDK V4 ID 340442-40
The following is included with RemoTools SDK V4:
- HEIDENHAIN DNC (COM component)
- Process Tracking Interface (DLL)
- JHIOsim (DLL)
- Documentation and examples

PC system requirements
- Operating system: Windows 10 or 11

Please note:
The response time when using network communication interfaces depends largely on the momentary network load. For applications with strict real-time requirements, we recommend using our bus systems.

Scope of functions

HEIDENHAIN DNC

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
- Show the machining run time (of the 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 in the 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 events 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

Virtual control

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

JHIOsim
- Read and write virtual I/Os of the PLC
- Read and write virtual I/Os of the SPLC
- Synchronous and asynchronous communication with the virtual control
- Simulation of the emergency-stop chain

Process Tracking Interface

- Synchronous recording of up to 16 process signals simultaneously
- Signal selection depends on the NC software version (see the User's Manual)
- Sampling interval: 3 ms
- Can be expanded with signals from the PLC
- Approved for use in productive operation

virtualTNC

Control software for PC-based machine simulation

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

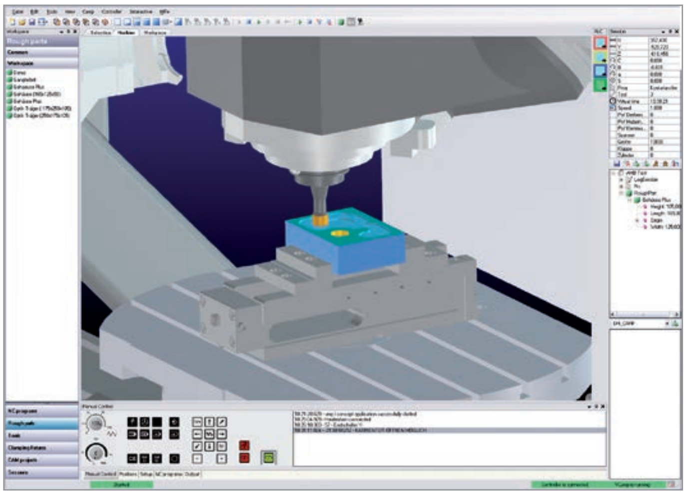
How machine simulation with virtualTNC works

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 that, thanks to a special interface, makes the machine simulation software able to ascertain 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 RemoTools SDK

Software manufacturers who would like to simulate a production system can connect their machine simulation to virtualTNC via HEIDENHAIN DNC. The axis positions must be coupled by the AxisPositionStreaming interface of the COM component. 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 for TNC7
- Dedicated graphics board for graphics-intensive applications
- Hard disk: ≥ 10 GB per programming station
- Resolution: ≥ 1024 x 768; ≥ 1280 x 1024 (TNC 640); ≥ 1920 x 1080 (TNC7)
- Interfaces: USB, LAN

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 workstation ID 1122145-03
- Network license for 14 workstations ID 1113935-03
- Network license for 20 workstations ID 1113936-03

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