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Overview of controllers for vendors of machine tools

SINUMERIK Operate – Turning

SINUMERIK ONE

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SINUMERIK ONE
SINUMERIK Operate – Turning

Overview of controllers for vendors of machine tools

Valid for:

Controller:
SINUMERIK ONE
Software:
CNC software version 6.15

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> ### ⚠ DANGER
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> ### ⚠ WARNING
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> ### ⚠ CAUTION
> indicates that minor personal injury can result if proper precautions are not taken.

> ### NOTICE
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

> ### ⚠ WARNING
> Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

Preface

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Scope of validity

This document provides you with an overview of the range of functions included in the **SINUMERIK ONE V6.15** for turning machines.

The document is focusing on vendors and dealers of machine tools.

Organization of the information

- Of the varied functional features of the SINUMERIK products, only those are listed which are of direct value to the machine user.

- All functions contained in the machine's basic configuration are identified as follows:
  ☑ Basic configuration

- All functions not contained in the machine's basic configuration are identified as follows:
  ☑ Option: ...

- For information on marketing options through the machine manufacturer, please see the technical description of each machine.

Subject to change without prior notice

Contact person at machine manufacturer

Marketing & Sales

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E-mail:	xxx@machinemanufacturer.com

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Homepage:

http://www.machinemanufacturer.com

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Orlic	Piotr	Ukraine	piotr.orlik@siemens.com
Pollack	Christopher	USA	chris.pollack@siemens.com
User support		Vietnam	hotline-dfpd.vn@siemens.com

Homepage:

For further information please visit ...

CNC4you-Portal (http://siemens.com/cnc4you)

Technical online documentation
(https://support.industry.siemens.com/cs/document/109768483)

Compact overview

<div style="text-align: right">

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Siemens Machine Tool Systems - a strong partner for the machine tool world ...

SINUMERIK ONE – optimized for performance!

☑ SINUMERIK ONE sets standards in terms of machining speed and quality. The CNC system maximizes the productivity of machine tools through maximum PLC and CNC performance. (Page 13)

User-friendliness – effective operation like on a PC

☑ SINUMERIK Operate offers a high degree of user-friendliness that is otherwise only expected from personal computers. SINUMERIK Operate thus sets the standard for the efficient operation of machine tools. (Page 19)

Setup functions "Intelligent-JOG"

☑ SINUMERIK Operate sets standards for these "functions of everyday life". Thanks to an intelligent JOG mode and intuitive tool management, all the typical setup functions feature interactive, graphical support. The "Manual Machine" function offers some highlights for cycle-controlled turning machines. (Page 25)

Tool management – powerful but easy to use

☑ SINUMERIK ONE offers powerful tool management. Thanks to SINUMERIK Operate, tool management is also "easy to use" for operation sequences in the production of individual parts and small series. (Page 33)

Data management like on a PC

☑ SINUMERIK Operate offers a modern program management system that makes the functions and user-friendliness of PC operating systems available in CNCs for the first time (Page 39)

CNC operation in automatic mode (AUTO)

☑ SINUMERIK Operate offers numerous functions for the AUTO mode - from execution from external memories, block search and program control all the way to logging of measurement results. (Page 41)

SINUMERIK CNC performance - the benchmark in all aspects

☑ SINUMERIK CNCs set standards in all aspects of machining performance – maximum accuracy while at the same time protecting the mechanical system of the machine. (Page 49)

CNC programming methods - optimally prepared for all production tasks

☑ A major advantage of SINUMERIK are two CNC programming methods that are well established on the market: AV-based, highly productive DIN/ISO programming as well as a workshop-based workstep programming. This gives you unparalleled flexibility. (Page 57)

Workpiece visualization – more safety through simple and fast control

☑ Realistic 2D and 3D simulations offer reliable programming and quotation pricing. (Page 67)

CNC technology cycles – the little helpers for daily CNC programming

☑ Irrespective of whether you use programGUIDE or ShopTurn – in either case the full range of technological cycles, position patterns and geometries is available to you. (Page 69)

Complete machining

☑ No matter whether the face or peripheral surface of lathed parts is to be machined: The machining plane is transformed at exactly the right position with TRANSMIT and TRACYL. And that is all completely automatic, thanks to the NC functionality in SINUMERIK Operate. (Page 77)

Multi-channel machining – efficient programming

☑ The CNC has to be flexible and powerful to handle large stock removal volumes and short cycle times for mass production. SINUMERIK Operate facilitates efficient programming of multi-channel machining. The result is greater reliability by means of 3D simulation with the 3-plane view and extensive control and optimization possibilities through the automatic calculation of machining time. (Page 81)

Automated cell

☑ Robots must be easy to integrate into machine tools and production processes. SINUMERIK Run MyRobot offers solutions ranging from simple connecting and user-friendly integration for handling tasks up to high-precision motion control of machines with robot kinematics. (Page 87)

Digitalization on the shop floor

☑ Digitalization is clearly a domain of Siemens, not only with powerful IT solutions for SINUMERIK. The strength of Siemens Digital Industries is the digitalization of the entire shop floor. (Page 91)

Tools and information

☑ The useful helper – DXF Reader! On the information platform CNC4you you will find helpful tips & tricks and a download area. (Page 101)

Safety functions

☑ SINUMERIK Safety Integrated permits the unrestricted movement of the machine in set-up mode with open protective doors, thus offering the machine user a significant plus in terms of user friendliness. Collision avoidance functions provide protection against collisions in the workspace. (Page 103)

System overview

<div style="text-align: right; font-size: 3em;">3</div>

With the SINUMERIK ONE controller, the easy-to-understand and intuitive SINUMERIK Operate user and programming interface, and programSYNC for multi-channel machines, you have a tailor-made solution for all computerized numerical control turning machines and turning-milling centers used worldwide at your disposal.

SINUMERIK Operate

The characteristic features of SINUMERIK Operate:

- ShopMill and ShopTurn are integrated into the SINUMERIK Operate user interface
- Intuitive and clear operation and programming, including Animated Elements
- Display in the modern Windows style
- Powerful functions covering all aspects of setting up, programming, tool and program management
- Innovative cycles for multitasking

Two options are available for the **programming**:

- DIN-ISO programming with programGuide (CNC text editor with programGuide cycle support, and DIN-ISO and readable CNC high-level language commands) for mid-sized and large series
- ShopTurn machining step programming with graphical interactive CNC machining step editor and CNC programming without DIN-ISO knowledge for small series

programSYNC – Efficient programming for multi-channel machines

Turning-milling centers with multiple saddles are considered to be the high-end machines in this segment. The individual tool carriers are distributed and managed by SINUMERIK in different channels. Programs must be created for each channel that later run simultaneously during the machining. With the uniform SINUMERIK Operate user interface, Siemens provides a standard user interface which enables programs for two channels to be created simultaneously by means of a double editor and their alignment with the programSYNC function. In this way, efficient programming is possible directly on the control.

3.1   SINUMERIK ONE

SINUMERIK ONE is optimized for performance. The consistent further development of the powerful and proven SINUMERIK CNC system software for state-of-the-art CNC hardware with Multicore µP Technology offers an undreamt-of increase in CNC performance in many areas. The integrated SIMATIC S7-1500F PLC allows cycle times that are up to ten times faster than those of the previous PLC.

With Run MyVirtual Machine, the digital twin of the SINUMERIK ONE for machining, you can always simulate central processes such as programming, work preparation or process optimization on the digital twin first.

- Drive-based modular CNC & Panel-based compact CNC
- Multi-technology CNC
- Up to 31 axes/spindles
- Up to 10 machining channels
- SIMATIC S7-1500 based PLC

You can find more information in Catalog NC 63

Benefits

- **Increased CNC performance through powerful multi-core µP technology**
- **Significantly shorter idle times and complete integration into the TIA Portal through the integrated SIMATIC S7-1500F PLC**
- **SINUMERIK ONE, suitable for both modular and compact machines**
- **SINUMERIK ONE convinces on the shopfloor with modern usability and smooth operation**
- **Create, verify, and prevent collisions offline with Run MyVirtual Machine NC programs**

3.2 Run MyVirtual Machine (digital twin)

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

With Run MyVirtual Machine, the digital twin of the SINUMERIK ONE for machining, offline programming and checking of NC programs is possible without a real machine.

Using SINUMERIK Operate and the original SINUMERIK CNC kernel, all operating processes and NC programming operations can be used and CNC programs executed, without any restrictions. New functions and programming options can thus be learned, tested and demonstrated in a secure environment.

- In work preparation:
  - Higher machine availability through offline CNC programming on the PC during work preparation
  - Verification of CNC programs, regardless of whether they were generated via Run MyVirtual Machine itself or via CAM systems
  - No new operating and programming skills required, since exactly the same scope of CNC language commands, CNC machining cycles as well as ShopMill/ShopTurn work steps is available as in the real CNC
  - To get the best possible match with your real CNC, machine projects (*.vcp) can be loaded to match the respective machine.

    Contact your machine manufacturer for this purpose.

- In training:
  - Easy learning and professional training through pre-configured sample machines and no additional hardware costs
  - Learning as on the CNC, with additional tutorials and programming guides

- For presentation:
  - Showing (new) SINUMERIK functions live instead of slides, always and everywhere

Additional components:

- Run MyVirtual Machine /Open

  You need Run MyVirtual Machine /Operate to operate an external software application, for example your own machine room simulation.

- Run MyVirtual Machine /3D

  Run MyVirtual Machine /3D extends Run MyVirtual Machine to include integrated 3D machining and material removal simulation. This enables you to evaluate machine movements visually and to check for freedom from collision. The 3D simulation is also ideal for training setup procedures and running in machines on a virtual model without exposure to any risks whatsoever.

Note

To order Run MyVirtual Machine licenses, contact your regional customer service representative or SIEMENS Industry Software (SISW).

> Contact SISW (https://new.siemens.com/global/en/products/automation/systems/cnc-sinumerik/digitalization/manufacturing.html)

Benefits

- **Run MyVirtual Machine is the optimal tool to increase efficiency and process reliability in CNC programming**

3.3 Innovative hardware

SINUMERIK ONE is available in several control cabinet-based NCU variants as well as in a compact Panel-based PPU variant (Panel Processing Unit). The PPU variant combines the CNC and a 15-inch or 19-inch HMI Panel in one component. This makes SINUMERK ONE suitable for both modular and compact machines.

Modern operation of the machine is easily possible with SINUMERIK ONE: high-resolution multi-touch operator panels offer maximum ease of use. And with the HT 10 hand-held terminal, the machine can be operated consistently in SINUMERIK Operate even on the mobile device.

SINUMERIK blackline plus				
Panel size	15"	19"	22"	24"
Width	398 mm	464 mm	529 mm	585 mm
SIMATIC ITC Industrial Thin Client	X	X	X	(x)*
SIMATIC IFP Industrial Flat Panel (monitor)	X	X	X	X
SIMATIC IPC 477E Industrial PC (Integrated Panel PC)	X	X	X	X
PPU 1740	X	X	--	--
NCU 1740 / 1750 / 1760	X	X	X	X
SINUMERIK MCP 398C + EM				
SINUMERIK ONE MCP	--			
SINUMERIK HT 10				

*) available as a customer-specific version

3.4 Data memory

Internal memory			External storage
	PPU 1740	NCU 1740 / NCU 1750 / NCU 1760	Execution from external storage devices (EES, option P75)
Option P77 + option P12 [1]	up to 6 GB		Network, USB storage media, compact flashcard
Option P77	100 MB		
CNC user memory (option D00)	10 MB to 28 MB		Execution from the CNC expanded user memory (option P77)
Internal memory can be expanded via option P77 + P12 → 6 GB **Internal memory can be expanded via option P77 → 100 MB**			**External storage via option P75 → can be expanded almost without limit**

1) Not in combination with SIMATIC IPC for SINUMERIK

CNC operation with SINUMERIK Operate

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4.1 Animated elements

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
☑	Basic configuration	☑	Basic configuration	☑	Basic configuration	☑	Basic configuration

To illustrate which parameters affect what in machining operations, SINUMERIK Operate offers a new input support function with animated element sequences.

Benefits

☑

- **Process reliability during the setup**
- **Increased reliability at program input by easily understood depiction of selection options**
- **This results in improved efficiency and so increased availability of the machine**

4.2 Onboard documentation

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

For each input field in the operating screens, SINUMERIK Operate automatically displays help in the form of a "cursor text". Further information is provided in the form of a complete context-sensitive help system with many useful details and graphics.

Benefits

- **Programming on the machine without a handbook**
- **Help button to toggle between the editor and help screens**

4.3 Multi-touch operation

4.3.1 Multi-touch operation - basic configuration

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

SINUMERIK Operate is optimized for multi-touch operation. A new easy-to-read font, flat no-frills picture elements, and clearly visually distinguishable operating areas support user guidance and convey a positive user experience.

- Intelligent gesture operation with touchpanels, also with work gloves
- Capacitive touch for industrial use
- Palm detection
- Detection of liquids and contaminations

Extract from the multitouch operation gestures:

Tap with two fingers	Tap and hold	Pan	Flick with three fingers	Spread
Call the shortcut menu, e.g. copy, paste	Open object to be changed, e.g. NC block	Move graphic contents, e.g. simulation, mold making view	Scroll to the start or end of lists or files	Zoom out graphic contents, e.g. simulation, mold making view

Benefit

- **Modern and efficient gesture operation of SINUMERIK Operate – rugged and reliable, even in harsh industrial environments**

4.3.2 Multi-touch operation with side screen

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

With side screen you can integrate widgets and pages. The additional windows can be closed and opened and placed either on the left or right side of the screen. The side screen can be opened and closed.

You can integrate the following standard widgets and pages:

- NC/PLC variables
- Actual value
- Zero point
- Alarms/messages
- Axis load
- Current tool
- Tool life
- Program runtime
- ABC keyboard as an alternative to the virtual QWERTY keyboard
- Virtual MCP

Note

- Available for all SINUMERIK blackline plus Panels from 15" to 24"
- Resolution from 1366x768 - HDREADY up to 22", 1920x1080 - FULLHD from 22" to 24" - "Landscape - horizontal mode"

Benefit

- **All information in view in every operating situation and thus permanent control of the machine status.**

4.3.3 SINUMERIK Operate Display Manager

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: P81		Option: P81		Option: P81		Option: P81

With the Display Manager, the machine operator has the possibility to individually adapt the user interface to machines and individual requirements.

Partitioning of the display area into three or four areas.

Example:

1: SINUMERIK Operate

2: Standard widgets

3: Applications (PDF, keyboard, etc.)

4: Virtual keyboard (optional)

- Direct switching between left and right orientation
- Sidescreen widgets can continue to be used in the Display Manager
- Customized Windows applications
- Machine control panel/virtual keyboard
- Temporarily maximizing the display area

Note

- Available for all SINUMERIK blackline plus Panels from 15" to 24"
- Resolution from 1366x768 - HDREADY up to 22", 1920x1080 - FULLHD from 22" to 24" - "Landscape - horizontal mode"
- For PPU1740 only supported for PPU1740-1900 with 19" FULLHD

Benefit

- **Effective use of large screens with individually configurable contents.**

4.4 Shortcuts

✓ SINUMERIK ONE PPU 1740		✓ SINUMERIK ONE NCU 1740		✓ SINUMERIK ONE NCU 1750		✓ SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

Shortcuts are available for many menu operations in SINUMERIK Operate. A small extract follows:

CTRL + A	Select all (editor functionality)
CTRL + C	Copy
CTRL + V	Paste
CTRL + X	Cut
CTRL + I	Calculation of the time from/to line/block
CTRL + L	Language selection
CTRL + M	Maximum simulation speed
CTRL + P	For screenshots (storage location: commissioning (keyword) → System data → HMI data → Logs → Screenshots)

Benefit

- **Shortcuts in SINUMERIK Operate avoid the need for complicated menu operations and provide functions not previously expected from a CNC**

CNC operation in manual mode (JOG)

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5.1 TSM universal cycle

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

A universal cycle is available in the setup for the most commonly used machine functions:

- Tool change, also involving sister tools, with direct access via the tool table (T)

- Spindle speed and direction (S)

- M functions (M)

- Activation of work offsets

- Definition of the gearbox stage

Benefit

- **Take over and change in tools directly from the tool table**

5.2 Work offsets

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
✓	Basic configuration	✓	Basic configuration	✓	Basic configuration	✓	Basic configuration

The following work offsets are possible:

- Settable work offsets:

    It is possible to enter as many as 100 work offsets (G54 to G57, G505 to G599), offset coordinates, angles and scaling factors.

- Programmable work offsets:

    The programmable work offsets allow you, for example, to work with different work offsets for repetitive machining operations at different positions on the workpiece.

- External work offsets:

    Axis-related linear work offsets can also be activated via the PLC user software.

Benefits

- **Flexible machining thanks to a large number of settable work offsets**
- **User-friendly understandable display of the number of work offsets**

5.3   Measuring a workpiece

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The workpieces can be measured as follows:

- Reference tool
  When the workpiece zero/work offset is calculated, the tool length is automatically taken into account.

Benefit

- **Time saving due to user-friendly determination of the workpiece zero**

5.4 Measuring tools

✓ SINUMERIK ONE PPU 1740	✓ SINUMERIK ONE NCU 1740	✓ SINUMERIK ONE NCU 1750	✓ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

The tool compensation value can be directly determined in the machine set-up.

The following variants are supported:

- Touch chuck
- Determine lengths via reference diameter
- Tool measuring probe (tooleye) or magnifier

The measurement results can be output in a measurement report (see AUTOHOTSPOT).

Benefit

- **User-friendly functions for determining the tool dimensions directly in the machine**

5.5 Stock removal cycle

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

A comfortable stock removal cycle is available in the set-up mode. Soft collet chucks can, for example, be turned with this cycle.

The following parameters can be specified:

- Roughing or finishing

- Undercut for soft collet chucks

Benefit

- **Preparation of workpiece or collet chuck without having to create a part program**

5.6 Positioning cycle

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The machine axes can be positioned directly via input screens in the setup:

- Linear axes / spindles
- Feedrate / rapid traverse

Benefit

- **Simple axis positioning without manual input, directly over the dialog screen**

5.7 Manual machine

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Option: P17		Option: P17		Option: P17		Option: P17

The Manual Machine function is part of the ShopMill/ShopTurn option package. This allows you to perform all important machining operations in the manual machine operating area without needing to create a specific part program.

The following functions are available:

- Measuring tools
- Traversing axes
- Setting the work offset (WO)
- Setting the endstop
- Turning a straight line / circle
- Drilling, including centering, deep-hole drilling, tapping
- Milling, including face milling, pocket, multiple edge spigot

Benefits

- **Simple and intuitive operation of cycle-controlled turning machines**

Tool management

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6.1 Tool table

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

Tools with their complete operating data can be managed in the tool list.

- Tools are assigned to the desired magazine locations with the load function.
- For each tool, you can store the following data:
  - Tool type (rougher, finisher, engraver, drilling and milling tools ....)
  - Tool name in plain text (ex.: "ROUGHING_80DEGREES")
  - Max. of 9 cutting edges per tool
  - Tool length and cutting plate geometry
  - Nose angle for drills or number of teeth for milling tools
  - Direction of spindle rotation and coolant (level 1 and 2)
- Direct transfer of the tool from the list in the program or for measurement
- Using the settings, for example, you can activate the graphic magazine display
- Reading tools from a file or archiving to a file

Benefits

- **All tool data at a glance**
- **Simple and secure handling via unmistakable tool names**

6.2 Monitoring of service life and workpiece count

☑	**SINUMERIK ONE PPU 1740**	☑	**SINUMERIK ONE NCU 1740**	☑	**SINUMERIK ONE NCU 1750**	☑	**SINUMERIK ONE NCU 1760**
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

You can use SINUMERIK Operate to monitor the service life of your tools and the number of exchanges. You can give your tools meaningful names instead of cryptic numbers. You will come to appreciate this convenience when you read the CNC program, if not before.

- Monitor cutting time (T) in minutes or number of exchanges (C)
- Prewarning limit for timely preparation of new tools

Benefits

- **Reduction of machine standstill times via tool monitoring**
- **Support of tool life monitoring or job time monitoring as standard**

6.3 Replacement tools

☑	**SINUMERIK ONE PPU 1740**	☑	**SINUMERIK ONE NCU 1740**	☑	**SINUMERIK ONE NCU 1750**	☑	**SINUMERIK ONE NCU 1760**
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

If needed, you can also manage replacement tools with SINUMERIK Operate. Tools with the same name are created as replacement tools. The replacement tools are identified with an incrementing number in the ST column.

Benefit

- **Automatic exchange of identical tools for unmanned operation**

6.4　Setup data

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
✅	Basic configuration	✅	Basic configuration	✅	Basic configuration	✅	Basic configuration

Part programs can be saved complete with set-up data like tool data and zero points.

Benefit

- **Time savings when you save the part programs**

6.5 Identifying tool demand

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: M77		Option: M77		Option: M77		Option: M77

When executing and simulating part programs, all required tools are optionally written as well. If you then use the part program again, SINUMERIK Operate can check whether all of the required tools are available. This creates a list of all tools with the following identifiers:

- Tool unknown

- Tool known but not loaded

- Tool known and loaded

- Tool is not used and can be unloaded.

You can load and unload tools directly in the list. In addition, you can create new tools based on the recorded data.

Benefit

- **Quick and simple check whether all machine tools are loaded before starting the program.**

Data management

7

7.1   Program manager

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
✅		✅		✅		✅	
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The program manager provides an optimum overview of the directories and programs, and very easy-to-use file handling similar to Windows Explorer.

- Plain names with as many as 24 characters for directories and files

- Management of subdirectories on external storage media, local drives, and on the NC

- Store and display files of any type (e.g. *.png, *.pdf, *.dxf, *.xml)

- Manage and open DXF files

- Display all storage media in the program manager (with details of the storage capacity), including the network drives

- Edit part programs on all media

Benefits

- **Easy and open exchange of data between the various storage media and the network**
- **User-friendly data handling in typical PC style with copy, paste, rename, etc.**
- **The preview window allows quick identification of programs without having to open them**

7.2 Ethernet networking

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The SINUMERIK ONE is set up for Ethernet (TCP/IP) networking (RJ45 connection).

- The data transfer rate is 10/100/1000 Mbit/s.

- Remote access to the control via the RCS Commander, e.g. for commissioning and remote diagnostics

- Access to the network drives is available directly from the program manager. No additional software is required on the server.

Benefits

- **Easy and economical connection via Ethernet (TCP/IP) to Windows PCs**
- **No software needs to be installed on the servers**

CNC operation in automatic mode (AUTO) 8

8.1 Block search

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
☑	Basic configuration	☑	Basic configuration	☑	Basic configuration	☑	Basic configuration

A block search may be executed in the Reset machine status, e.g. after a program interruption or to specifically return to machining. The program data is prepared in such a way that all relevant parameters (tool, work offsets, M functions, etc.) are available when accessing the program.

The following search variants are available:

- Specifically to the point of interruption, also possible after "Power Off"
- To any CNC blocks in DIN/ISO programs
- To any subprogram levels in DIN/ISO programs
- In ShopTurn machining step programs
- In position patterns for machining step programming

You can individually configure the block search:

- With calculation/without calculation
- With approach/without approach

Benefits

- **Time-saving and secure restart at any program point, as no editing of the part program is required**
- **An extremely quick block search is also available for large part programs through the "External block search without calculation" function; overstore, if necessary**

8.2 Program control

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

You can influence the program sequence in the AUTO and MDI modes. The following options are available to do this:

- PRT – no axis motion

  The program is completely executed with the axes stationary, e.g. for the program test.

- DRY – dry run feedrate

  The traversing velocities programmed in conjunction with G1, G2, G3, CIP and CT are replaced by a defined dry run feedrate.

- RG0 – reduced rapid traverse

  You define the reduced rapid traverse in the settings for automatic operation.

- M01 – programmed stop 1

  The processing of the program stops at every block in which supplementary function M01 is programmed. In this way you can check the intermediate result
  when machining a workpiece.

- SKP - Skip block

  Skip blocks are skipped during machining.

- MRD

  The display of the measurement result can be enabled or disabled during program execution.

- CST - Configured stop

  Option: see the following description

Configured stop (CST)

✅	**SINUMERIK ONE PPU 1740**	✅	**SINUMERIK ONE NCU 1740**	✅	**SINUMERIK ONE NCU 1750**	✅	**SINUMERIK ONE NCU 1760**
	Option: S24		Option: S24		Option: S24		Option: S24

The Configured stop option offers, beyond the basic scope of program control, the following possibilities:

- Additional single block type with stop and NC start only at specific and/or definable "types" of block ends.

  Freely configurable stop condition such as G1 - G0 transition, subprograms.

- The message can be configured language-independently for the type of "Configured stop".

Benefits

- **Secure positioning of new part programs**
- **Continue machining quickly after interruptions**

8.3 Execution from external storage

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

You can select, edit and execute part programs directly on the CF card, USB stick, hard disk or via the network.

Execution from external storage EES

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: P75		Option: P75		Option: P75		Option: P75

The "Execution from external storage (EES)" option provides the following advantages over the basic configuration:

- Uniform syntax for the subprogram call, independent of the storage location of the subprogram. This reduces syntax errors for the subprogram call.

- Part programs can be edited without NC reset.

- The size of the memory available on the machine can be expanded economically with external media. The size of the part programs is limited only by the capacity of the external data storage.

Benefit

- **Quick and easy access to part programs on external storage media**

8.4 Basic block display

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The individual traversing blocks are displayed as DIN/ISO commands during execution of machining steps or machining cycles.

The basic block display guarantees an especially high process security while running-in programs in single block mode.

This function is available to you for programGUIDE as well as for ShopTurn (figure below).

Benefit

- **Optimal control of the program execution, even in complex sequences or machining cycles, especially in single block mode**

8.5 Simultaneous recording

✅	**SINUMERIK ONE PPU 1740**	✅	**SINUMERIK ONE NCU 1740**	✅	**SINUMERIK ONE NCU 1750**	✅	**SINUMERIK ONE NCU 1760**
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

During machining, the tool paths can be simultaneously recorded on the display of the controller in side view, front view, two window view or in 3D view. Workpiece depiction and views correspond to the graphic simulation.

Benefit

- **Machining can also be monitored in a complex machine room**

8.6 Logging measurement results in automatic mode

✓ SINUMERIK ONE PPU 1740		✓ SINUMERIK ONE NCU 1740		✓ SINUMERIK ONE NCU 1750		✓ SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

In automatic operation, you can output the measurement results as measuring log. You can configure the output. The following settings are some of those possible:

- Display mode: autom. 8 s, NC start, for alarm

- Log type: standard log, user log

- Log format: text format (*.txt), table format (*.csv)

- Log data: new (discard old log data), append (append to old log data)

- Log storage: storage directory (complete path)

You can then open the measuring log in the program management at the configured storage path. The measuring log contains data that includes:

- Date and time when the log was written

- Measuring method

- Correction target

- Setpoints, measured values and differences

Note: Irrespective of the user interface language, the measuring logs are output in English.

Benefit

- **Simple logging of measured values in log files**

CNC functionalities

9

9.1   80-bit NANO floating-point accuracy

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The accuracy of the workpiece is determined by more factors than just the mechanical characteristics of the machine. The CNC also contributes to a critical degree towards the precision of the workpieces. SINUMERIK Operate offers many CNC functions for this purpose.

The SINUMERIK controls and the SINAMICS drive calculate with 80-bit NANO floating-point accuracy. This enables a calculation accuracy much less than a nanometer. This exactness is available not only for closed loop position control but also for closed-loop power and speed control and also for sensor evaluation of the drive.

Benefit

- **Maximum precision in the workpiece results due to extremely high calculation accuracy**

9.2 Block change times

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

In the following table you can see typical block cycle times (block processing times) as a function of the PPU/NCU being used:

PPU 1740	NCU 1750	NCU 1760
0.7 ms	0.3 ms	0.2 ms

Requirement: use of the compressor

Benefit

- **Minimum block cycle times for the respective performance versions**

9.3 Jerk limitation

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

The control calculates a steady acceleration profile instead of jumps in acceleration. This enables jerk-free speed characteristics for the involved path axes. The jerk limitation can also be directly activated in the part program with the »SOFT« NC language command.

Benefits

- **Longer machine lifespan through protection of the mechanical components**
- **Higher path accuracy through softer acceleration**

9.4 Dynamic feedforward control

☑	**SINUMERIK ONE PPU 1740**	☑	**SINUMERIK ONE NCU 1740**	☑	**SINUMERIK ONE NCU 1750**	☑	**SINUMERIK ONE NCU 1760**
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

Inaccuracies in the resulting workpiece contour due to following errors can practically be eliminated using dynamic feedforward control FFWON. The result is excellent machining precision even at high path speeds. This is clarified with a circularity test on the machine.

Example:

Benefit

- **Higher path accuracy through compensation of contouring errors**

9.5 Adaptive Control & Monitoring (ACM)

✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Adaptive Control & Monitoring (ACM) monitors the current cutting conditions in real-time and automatically adjusts the feedrate to the optimum speed.

- If an overload is detected, ACM reduces the feedrate and can trigger an alarm to stop the machine.

- Detection of tool breakage to prevent consequential damage.

The solution consists of two main components:

- Real-time component:

  Compile Cycle Run MyCC /IMD to access the necessary data

- HMI component:

  SINUMERIK Operate, based on Run MyHMI /3GL

Optional: With the "Cross-operational actions" option, the synchronous action between the compile cycle and the HMI is executed automatically.

Note

Contact SIEMENS Industry Software (SISW) for further questions regarding the products and licenses.

> Contact SISW (https://new.siemens.com/global/en/products/automation/systems/cnc-sinumerik/digitalization/manufacturing.html)

Benefit

- **ACM boosts productivity, extends the machine and tool life, and ensures a stable production process.**

9.6 Intelligent Load Control (ILC)

✓ SINUMERIK ONE PPU 1740	✓ SINUMERIK ONE NCU 1740	✓ SINUMERIK ONE NCU 1750	✓ SINUMERIK ONE NCU 1760
Option: S11	Option: S11	Option: S11	Option: S11

The "Intelligent load adjustment" function is used to optimize the following characteristics of a machine tool by adapting dynamic response and control parameters:

- Shorter machining times

- Increased dynamic response

- Greater accuracy

- Higher accuracy

The clamping and the weight of the workpiece influence the dynamic response of the machine due to their moment of inertia. During axis movements, inaccuracies in workpiece machining can arise. Using cycle CYCLE782, you can automatically adapt the controller settings of the drive or the dynamic response parameters of the axes to a specific situation. The following axes are supported:

- Rotary table for holding a workpiece

- Linear axes

- Spindles

- Other rotary axis (e.g. A axis for the rocker)

Benefits

- **You achieve faster and more accurate machining on the workpiece.**

9.7 Contour handwheel

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: M08		Option: M08		Option: M08		Option: M08

With the contour handwheel function, the handwheel has a velocity-generating effect in AUTO and MDI operating modes on all programmed traversing movements of the path and synchronized axes.

A feedrate specified by the part program becomes ineffective, and a programmed velocity profile is no longer valid. The feedrate, in mm/min, results from the handwheel pulses as based on pulse weighting (machine data) and the active increment.

The handwheel's direction of rotation determines the direction of travel:

• Clockwise: In the programmed direction of travel, even beyond block boundaries

• Counter-clockwise: Opposite to the programmed direction of travel, continuation beyond the start of the block is prevented

Benefit

• **Can be used with conventional turning machines for setup/scratching**

• **More user-friendly operation of the machine in setup mode**

CNC programming methods

10

SINUMERIK Operate provides the following programming methods for selection:

DIN-ISO programming with programGUIDE

CNC text editor with programGuide cycle support, and DIN-ISO and readable CNC high-level language commands for mid-sized and large series

The wide choice of technology cycles and the ease of parameterization allows you to reduce the programming time.

ShopTurn - Machining step programming

with graphical interactive CNC machining step editor and CNC programming without DIN-ISO knowledge for small series.

Machining operations such as stock removal, grooving or thread cutting are shown in ShopTurn in the form of worksteps. In this way CNC programs – even for complex machining operations – are very compact and easily read. Associated sequences are automatically interlinked and can be assigned any position patterns.

ShopTurn offers you the shortest programming times even for highly demanding machining tasks. The parameter input is supported by Animated Elements.

Benefit

- **Whether you use programGUIDE or ShopTurn – in either case the full range of technological cycles, position patterns and geometries is available to you**

10.1 programGUIDE DIN/ISO and SINUMERIK high-level language

10.1.1 Introduction

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

Below is an overview of the characteristic functions of programGUIDE and SINUMERIK CNC programming. This includes:

- DIN/ISO editor

- Languages

- programGUIDE input support

These functions belong to the basic configuration of SINUMERIK Operate.

10.1.2 Program editor

A line-oriented program editor is available to you for DIN/ISO programming. The editor enables you to input CNC language commands directly or to edit them. Thereby, the complete range of CNC functions are available for the most complex machining.

The following functions are included in the program editor:

- Contour calculator

- Tool selection directly from tool list

- Support screens for standard machining and measuring cycles

- "Copy", "Insert" and "Cut" key group

- "Find", "Replace" and "Replace All" character string

- The syntax is highlighted in various colors (comments, NC blocks, etc.)

- Renumbering a program

- Direct execution from any NC program block (block search)

- Jump to program start or program end

Benefits

- **Time saving by using a powerful editor when programming**
- **Even large part programs allow extremely fast editing in MB size**

10.1.3 Languages

The CNC interpreter of the SINUMERIK ONE can also process more complex CNC commands, in addition to DIN 66025 standard commands. The commands are presented in clearly readable form.

The following commands are available:

- **G-code**
  G-code in accordance with DIN 66025 and in ISO dialect mode

- **G functions**
  G0, G1, G2, G71 ...

- **Language commands (extended G functions)**
  CIP, SOFT, BRISK, FFWON ...

- **Frame operations (programmable work offsets)**
  The workpiece coordinate system can be shifted, scaled, mirrored or rotated with the commands TRANS, SCALE, MIRROR, ROT.

- **R parameters (arithmetic parameters)**
  300 predefined R parameters are available as arithmetic parameters (floating-point format).

- **User variables**
  Users can define their own variables by name and type.

- **System variables**
  System variables can be read/written in all programs. They enable access to work offsets, tool offsets, axis positions, measurement values, control conditions etc.

- **Arithmetic operations**
  The following arithmetic operations are available to combine the variables:
  arithmetic operations + - * / sin, cos, exp, etc.
  logical operations == <> >=, etc.

- **Program control structures**
  BASIC-style language commands are available for flexible programming of the user cycles:
  IF-ELSE-ENDIF, FOR, CASE ...

Benefits

- **Established programming according to DIN 66025**
- **Unbeatable range of commands for flexibility and time saving while programming**

10.1.4   programGUIDE input support

The cycle support is an extension of the highly flexible DIN/ISO programming. The input screens are based on the ShopTurn cycles input screens, so as to ensure optimum continuity.

The calls for tool, feedrate and spindle speed can of course also be input in the DIN/ISO editor.

Benefits

- **Existing DIN/ISO part programs with cycles can continue to be used**
- **Minimum learning requirements due to the continuity of the input support**

10.2 ShopTurn machining step programming

10.2.1 Introduction

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
☑	Option: P17	☑	Option: P17	☑	Option: P17	☑	Option: P17

The following information provides you with an overview of the characteristic functions of ShopTurn. This includes:

- Sequence editor
- Interlinking of sequences
- Graphic view (broken-line graphics)

These functions are part of the machining step programming options package in ShopTurn.

10.2.2   Sequence editor

The graphical programming is performed via a graphic interactive sequence editor. Each program line represents a technological sequence (such as: face turning, centering, drilling, tapping) or geometric data required for the sequences (position patterns or contours). Graphical programming offers, in comparison to DIN/ISO programming, a compact and comprehensible program overview.

Entering individual sequences requires no knowledge of DIN/ISO. All required technical and geometric parameters are entered in screen forms. Simple, intuitive programming with sequences can always be expanded very flexibly by inputting DIN/ISO blocks and control functions.

Benefits

- **Intuitive program input, without knowledge of DIN/ISO or Operating Manual**
- **Compact, clearly arranged machining programs**
- **Reducing the programming time by graphical input screens and copying / inserting machining steps**

10.2.3 Interlinking of sequences

In ShopTurn, associated sequences are interlinked with each other. The interlinked sequences are performed consecutively at the appropriate contours or pattern positions.

In the following example, the sequences centering, drilling and tapping are applied to 4 holes on the pitch circle pattern position.

Benefit

- **Reduced programming time due to linking of machining steps**

10.2.4 Graphical view

While programming, the previously entered sequences will be continuously displayed to scale. A simulation is not required for this. The switching between the machining step program and the broken-line graphics is performed with the "Graphics View" softkey or the "Ctrl+G" shortcut.

- Turning view
- Front face and peripheral surface

Benefit

- **Increased reliability at program input by quickly checking the contour, without having to start a simulation run**

Workpiece visualization

11

11.1   2D simulation

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

SINUMERIK Operate offers with 2D simulation the facility to make optimum and reliable preparations for machining workpieces, such as by detecting collisions. Calculating the machining time also supports optimum calculation of tooling costs.

- Use of the real geometry values of the tools mounted in the machine

- Simulation in side view, front view or two window view

- Simulation can be interrupted at any time, and the speed is controllable

Benefits

- **Maximum process reliability through simulation using real geometry values**
- **Perfect clarity by showing the workpiece dimensions with a scale**

11.2 3D simulation

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: P25		Option: P25		Option: P25		Option: P25

SINUMERIK 3D workpiece simulation offers you optimum assistance and reliability in programming and in quotation costing.

- Reliability:
  realistic 3D volume model, with zoom to details and free rotation of the viewing angle

- Support:
  - Simulation speed controllable
  - Single block operation and start / stop available at any time

- Checking:
  Automatic calculation of machining time

Benefits

- **Particularly realistic simulation through representation of the tool**
- **Optimum help and reliability in programming and in quotation costing**

CNC technology cycles

<div style="text-align: right; font-size: 3em;">12</div>

12.1 CNC technology cycles for programGuide and ShopTurn

Irrespective of whether you use programGUIDE or ShopTurn – in either case the full range of technological cycles, position patterns and geometries is available to you.

Benefits

- **Significant simplification of programming, even for complex jobs, using CNC technology cycles**
- **Continuity of cycles for programGuide and ShopTurn**

12.2 Highlights of machining cycles

12.2.1 Stock removal along contour with blank contour

☑	**SINUMERIK ONE PPU 1740**	☑	**SINUMERIK ONE NCU 1740**	☑	**SINUMERIK ONE NCU 1750**	☑	**SINUMERIK ONE NCU 1760**
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

With the intelligent contour stock removal cycle, free contours can be processed in a variety of ways:

- Processing any contour calculator geometry
- Cylindrical blank, freely-defined blank, blank as allowance of finished-part contour
- Longitudinal / face / contour-parallel roughing on outside and inside
- Processing sloping contours (relief cuts)
- Consideration of tool's setting and plate angle
- Grooving any contours on outside, inside or end face
- …

Benefits

- **Effective processing through orientation to the actually existing material**
- **Lower risk of accident and better chip disposal through feed interruption**

12.2.2 Comb grooving

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Option: S58		Option: S58		Option: S58		Option: S58

In the turning cycle "Groove1" and "Groove2" the comb grooving function is available. The function enables significantly higher stock removal due to better chip guidance.

Benefit

- **Significantly higher feeds (up to 200%) due to uniform cutting edge load**

12.2.3 Engraving cycle

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Basic configuration	Basic configuration	Basic configuration	Basic configuration

The engraving cycle is used to engrave a text on a workpiece along a line or arc. You can enter the text as fixed text or assign it via a variable as variable text.

Examples of variable texts:

- Date and time
  The values for the date and time are read from the CNC.

- Quantity
  The "Quantity" variable is available as a pre-defined user variable

- Numbers
  When outputting numbers (e.g. measurement results), you can select the output format (digits before and after the point) of the number to be engraved.

- Text
  Instead of entering a fixed text in the engraving text field, you can specify the text to be engraved via a text variable (e.g. _VAR_TEXT="ABC123").

Benefits

- **Reduction of set-up times by complete machining on one machine**
- **Simple program input of engraving**

12.2.4　Counterspindle cycle

☑	**SINUMERIK ONE PPU 1740**	☑	**SINUMERIK ONE NCU 1740**	☑	**SINUMERIK ONE NCU 1750**	☑	**SINUMERIK ONE NCU 1760**
	Option: P17		Option: P17		Option: P17		Option: P17

Note: This function is only available in conjunction with the ShopTurn/ShopMill machining step programming option.

SINUMERIK Operate enables the use of a fully-functional counterspindle. The main spindle and counterspindle can be operated under conditions of angular synchronism.

DIN/ISO programming

The commands for spindle synchronization and the axis movements for workpiece transfer can be programmed as DIN/ISO language commands.

Machining step programming

A user-friendly counterspindle cycle is conveniently available for spindle synchronization and axis movements for workpiece transfer.

Benefits

- **Simple and secure programming of all counterspindle functions**
- **High quality of workpieces by workpiece transfer in synchronous spindle mode**

12.3 Residual material detection for contour cycles

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: P13		Option: P13		Option: P13		Option: P13

Contour areas which do not permit machining by tools with large plate angles are automatically recognized in the stock removal cycle. The operator can rework these areas using a suitable tool with a smaller plate angle.

Benefit

- **Time saving through avoiding idle cuts during residual stock removal**

12.4 Measuring functions for workpieces and tools

✅	**SINUMERIK ONE PPU 1740**	✅	**SINUMERIK ONE NCU 1740**	✅	**SINUMERIK ONE NCU 1750**	✅	**SINUMERIK ONE NCU 1760**
	Option: P28		Option: P28		Option: P28		Option: P28

For measurement tasks in automatic operation, powerful measuring cycles are available both within the sequence and in DIN/ISO programming. Input screens with dynamic help displays are used for convenient entry of the measuring parameters.

The following cycles are available for workpiece measurement:

The following measurement variants are available for tool measurement:

- Calibration of the tool probe
- Determation of the tool length of turning tools and drills
- Determation of length/radius/length and radius of milling tools on a turning machine

The following measuring tasks can be made:

- Automatic value correction for tool geometry or work offset
- Display of measurement results
- Logging of measurement results

Benefits

- **Reliable quality of the manufactured parts by automatic measurement in the machine**
- **Fast programming for complex measuring tasks thanks to input screens with graphic support**

Complete machining

13

13.1 End face machining (TRANSMIT)

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: M27		Option: M27		Option: M27		Option: M27

Drilling and milling can be performed on the end face of workpieces in the main and counterspindle with ShopTurn.

The part program is easily created in a right-angle coordinate system with the end face transformation TRANSMIT (C axis mode) .

The path movements are conducted with the linear axes X / Z and the rotary axis C.

Machine without Y axis

- Machining with TRANSMIT

Machine with Y axis

- Machining with Y axis
- Machining with TRANSMIT

Benefit

- **Full functional range for drilling and milling on the end face**

13.2 Peripheral surface machining (TRACYL)

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: M27		Option: M27		Option: M27		Option: M27

Using the peripheral surface transformation TRACYL, drilling and milling machining can be executed on the peripheral surface of workpieces in the main and counterspindle.

Machine without Y axis

- Any drill holes on the peripheral surface
- Any milling without slot wall offset on the peripheral surface

Machine with Y axis

- Any drill holes on the peripheral surface
- Any milling without slot wall offset on the peripheral surface
- Any milling with slot wall offset on the peripheral surface
- Grooving on parallel walls of the peripheral surface with milling radius correction

Benefits

- **Full functional range for drilling and milling on the peripheral surface**
- **Reduction of set-up times by complete machining on one machine**

13.3 Turn-milling

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Basic configuration		Basic configuration		Basic configuration		Basic configuration

The turning technology in ShopTurn and programGUIDE provides comprehensive technology cycles for milling and contour milling.

This includes the following functions for turn-milling:

- TSM mode
- Tool measurement
- Face milling
- Milling cycles for pocket, multi-edge spigot, groove, thread milling, and engraving
- Contour milling cycles for path milling, pre-drilling, pocket, pocket residual material, spigot, sprigot residual material
- Swivel tool

You can check the programming result, even for turn-milling, with the simulation function.

If the turning machine has a swiveling B-axis, complex milling operations and even freeform surfaces can be implemented:

- With an additional B axis, you have the option of aligning milling machines and turning tools. The milling cycles in ShopTurn and a B-axis enable milling on swiveled planes on the turning machine.
- Programming for angled tools is graphically interactive. The setting angle of the B-axis and the positioning angle of the tool spindle are specified directly in the technology area of the cycle.

Benefits

- **Uniform look-and-feel for turning and milling permits a high degree of consistency in operation and programming for turn-milling**
- **Uniform technology cycles for turning, milling and measuring tasks**
- **Powerful tool management for turn-milling, including multitools**
- **Simulation permits a high degree of process reliability**

Multi-channel machining

<div align="right">

14

</div>

14.1 Overview

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
✅		✅		✅		✅	
	Option: P05		Option: P05		Option: P05		Option: P05

SINUMERIK Operate offers numerous functions to support you with programming and production of multi-channel machining processes.

With programSYNC, you can easily synchronize, optimize and visualize programs for multi-channel machining processes.

For the machine basic screen you can choose between single-channel and multi-channel view. The active channel is highlighted in color.

Benefit

- **SINUMERIK supports the easy handling of complex machines.**

14.2 programSYNC job list

In programSYNC multi-channel, the programs for processing of the respective channels are managed in job lists. In the job list, you assign arbitrary ShopTurn or G code programs to the respective channels.

Benefit

- **Simple program management in Windows Explorer style**

14.3 Double editor

The double editor facilitates the creation of the programs for the respective channels.

- You structure the programs by means of blocks. These can be expanded and collapsed for a clear representation.

- In the double editor, you can program the chronological sequence and check the wait marks through the synchronized view.

- Through the automatic time evaluation, you can further optimize the multi-channel program in the double editor. If required, you can transfer individual machining processes to other channels to create a time-optimized program.

Benefit

- **Easy creation of time-optimized programs through synchronization of wait marks and determination of the processing time of the respective blocks**

14.4 Balance cutting (stock removal)

With the multi-channel contour stock removal cycle (CYCLE952), complex 4-axis turning can be programmed directly on the machine without a CAD/CAM system. The contour and stock removal parameters can simply be entered in the master channel. The CNC sequences are created completely automatically by the contour stock removal cycle. With just two additional parameters, machining with a tool can be extended to highly productive balance cutting with two tools.

With the multi-channel stock removal cycle, contours can be machined in a variety of ways. Powerful functions facilitate the workpiece machining:

- Automatic detection of residual material ensures an optimum cut segmentation

- Automatic feedrate interruption breaks the chips evenly and removes them

Note: 4-axis stock removal with CYCLE952 is available on multi-channel turning machines.

Benefit

- **Cylce support enables efficient programming of complex machining tasks for multi-channel turning machines**
- **Higher throughput of workpieces per machine while maintaining a high level of machining accuracy**

14.5 Simulation

For the simulation, you can select, among other things, machining on the main spindle and counterspindle and choose between different views, including 3D view.

Benefit

- **With the workpiece simulation, SINUMERIK offers optimum help and safety for programming - even during parallel machining**

Automation

15

15.1 SINUMERIK Run MyRobot /EasyConnect

☑ SINUMERIK ONE PPU 1740		☑ SINUMERIK ONE NCU 1740		☑ SINUMERIK ONE NCU 1750		☑ SINUMERIK ONE NCU 1760
Basic configuration		Basic configuration		Basic configuration		Basic configuration

The prepared Run MyRobot / EasyConnect configuring interface enables handling robots to be connected to machine tools.

- Prepared NC/PLC interface in accordance with VDMA/VDW 34180

- Prepared CNC diagnostic screen

Note:

The robot is normally connected to the CNC by the machine manufacturer or a system integrator.

Benefit

- **The prepared Run MyRobot / EasyConnect configuration interface provides a universal and multi-vendor interface for the low-effort automation of machine tools.**

15.2 SINUMERIK Run MyRobot /Handling

✅ SINUMERIK ONE PPU 1740	✅ SINUMERIK ONE NCU 1740	✅ SINUMERIK ONE NCU 1750	✅ SINUMERIK ONE NCU 1760
Option: via SISW	Option: via SISW	Option: via SISW	Option: via SISW

The Run MyRobot / Handling option enables a robot to be operated, programmed and diagnosed for handling tasks with SINUMERIK Operate.

- Operation, teaching and programming of the robot in the familiar CNC programming environment.

- Minimum training effort, because fully integrated in SINUMERIK Operate.

- Efficient loading and unloading of a machine by direct programming in a control system.

Note

The robot is connected to the CNC by the machine tool manufacturer or a recommended system integrator[*].

[*] For details, please contact your local Siemens office.

Benefit

- **Run MyRobot /Handling offers the integration of handling robots in machine tools with the best-possible user-friendliness thanks to the familiar CNC look-and-feel.**

15.3　　　SINUMERIK Run MyRobot /Direct Handling

☑ SINUMERIK ONE PPU 1740		☑ SINUMERIK ONE NCU 1740		☑ SINUMERIK ONE NCU 1750		☑ SINUMERIK ONE NCU 1760	
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

The Run MyRobot /Direct Handling option is a tailor-made package for the integration of handling robots into the SINUMERIK control system:

The package includes all the necessary options for operating a handling robot with a special axis:

- No separate robot control necessary since the robot arm is controlled directly by the CNC

- Programming is done via G-code

- No training overhead since operation is entirely via SINUMERIK Operate

Benefit

- **Run MyRobot /Direct Handling gives you the option to increase the spindle times of the machines.**
- **Robot automation made easy, especially for flexible production.**

Digitalization

<div style="text-align: right; font-size: 3em;">16</div>

The portfolio of the Siemens CNC Shopfloor Management Software covers the entire value chain in production – from product design all the way to actual production and service.

Digitalization offers a wide range of opportunities to increase productivity, reduce costs, and improve quality.

You can optimize your production in four specific areas – even with a full-fledged hardware and software landscape.

- Order preparation and execution
  - Manage MyResources /Tools (Page 92)
  - Manage MyResources /Programs (Page 92)
- Efficiency and flexibility in production
  - Analyze MyPerformance (in line) (Page 93)
  - Analyze MyPerformance /OEE Monitor (MindSphere) (Page 94)
  - Analyze MyPerformance /OEE Tuning (MindSphere) (Page 94)
  - Manage MyMachines (Page 95)
  - Manage MyMachines /Remote (Page 95)
- Machine availability
  - Analyze MyMachine /Condition (Industrial Edge for Machine Tools) (Page 99)
  - Optimize MyMachining /Trochoidal (Industrial Edge for Machine Tools) (Page 97)
  - Optimize MyMachining /AC AUTO (Page 96)
- Improved machining processes
  - Industrial Edge for Machine Tools (Page 97)
  - Analyze My Workpiece /Capture (Industrial Edge for Machine Tools) (Page 98)
  - Analyze My Workpiece /Monitor (Industrial Edge for Machine Tools) (Page 98)
  - Analyze My Workpiece /Toolpath (Industrial Edge for Machine Tools) (Page 100)

Note

If you have any questions about the applications, please contact our CNC digitalization experts at SIEMENS Industry Software (SISW). You will receive information about which apps you can use to optimize your manufacturing processes and information about the ordering process and licensing.

> Contact (https://new.siemens.com/de/de/produkte/automatisierung/systeme/cnc-sinumerik/digitalisierung/produktionsoptimierung.html)

16.1 Manage MyResources /Tools

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Manage MyResources /Tools permits centralized management of tools.

- Factory-wide management of tools:

  Tool planning and stock management for tools and components

- Tool stock during magazine assignment:

  Overview of the current tool data, setup dialog for loading and unloading the physical tool

- Data exchange and evaluation:

  Standard interface to measuring devices for tool presetting, provision of tool history

Benefit

- **Increased transparency through cross-machine availability of tool information**
- **Increased efficiency through identification of optimization potentials**

16.2 Manage MyResources /Programs

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Manage MyResources /Programs supports you in managing NC packages.

- Secure data transmission to and from the machine, i.e. no manual data handling for the machine operator
- Package life cycle management
- Restoring of older revisions

Benefit

- **Secure handling of data**
- **Transparency of the NC package status**

16.3 Analyze MyPerformance (in line)

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Analyze MyPerformance enables a targeted analysis of weak points and thus the optimization of production.

- Acquisition of machine data to calculate key parameters:

  Key parameters provide information about the state of the plant and allow optimization potential to be identified.

- Acquisition of alarms/messages:

  Avoiding disruptions to production by supporting maintenance and deriving preventive maintenance measures.

- Provision of the widest range of evaluations and analyses:

  – Display of the average duration of disturbances and their percentage of the planned machine usage time.

  – Weak point analysis by showing the effects on upstream and downstream stations.

Benefits

- **Improved productivity**
- **Increased machine availability**
- **Enhanced transparency of the production status**

16.4 Analyze MyPerformance /OEE Monitor (MindSphere)

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Analyze MyPerformance /OEE Monitor for analyzing performance in production with machine tools:

- Analyze MyPerformance /OEE Monitor creates maximum transparency of machine states and production data, thus enabling maximum productivity in the production environment.

- Analyze MyPerformance /OEE Monitor calculates the overall equipment efficiency (OEE) and provides important indicators for measures to increase efficiency.

- By automatically acquiring machine data and providing a user dialog for planning machine utilization and adding quality data, Analyze MyPerformance /OEE Monitor provides all the information required to optimize production.

Benefits

- **Improved productivity**
- **Reduction of production costs**
- **Enhanced transparency of the production status**

16.5 Analyze MyPerformance /OEE Tuning (MindSphere)

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

With Analyze MyPerformance /OEE Tuning on MindSphere, you can increase productivity and reduce production costs:

- Analyze MyPerformance /OEE Tuning creates maximum transparency of machine states and production data, thus enabling maximum productivity in the production environment.

- Analyze MyPerformance /OEE Tuning calculates the overall equipment efficiency (OEE) and provides important indicators for measures to increase efficiency.

- By automatically acquiring machine data and providing a user dialog for planning machine utilization and adding quality data, Analyze MyPerformance /OEE Tuning provides all the information required to optimize production.

Benefits

- **Reduction of production costs based on insights into machine performance**
- **Optimized planning to ensure delivery reliability**
- **High transparency of machine utilization**

16.6 Manage MyMachines

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Manage MyMachines visualizes numerous operating and plant-specific data of machine tools or individual machine components for production, as well as service and maintenance.

- Possibility to combine critical machine data for a meaningful analysis
- Data acquisition from time series and easy creation of rules and threshold values
- Determination of the machine utilization

Benefit

- **Increased availability, utilization and efficiency of machine tools.**

16.7 Manage MyMachines /Remote

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Manage MyMachines /Remote permits global and secure remote control and monitoring of machine tools connected to MindSphere via Manage MyMachines.

- For critical situations and preventive maintenance, OEM service organizations have immediate access to a comprehensive toolbox for remote diagnostics and troubleshooting.
- If you need support from service specialists such as internal experts or the machine manufacturer, you can provide real-time access to your HMI. All connections to and from a machine tool via the Internet are encrypted.
- Manage MyMachines /Remote meets all security guidelines for remote access to industrial machines.

Benefits

- **Faster problem solving and higher machine availability**
- **Improved service response time and quality**

16.8 Optimize MyMachining /AC AUTO

✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Optimize MyMachining /AC AUTO monitors the cutting conditions in real time and automatically optimizes the feedrate. By adjusting the feedrate, Optimize MyMachining /AC AUTO minimizes production time and avoids tool breakage.

- Automatic feedrate adjustment to the spindle load
- Feedrate reduction in case of tool overload and impact on material
- Simple and fast configuration

Precondition:

- Run MyCC /IMD
- Run MyHMI /3GL

Optional:

With the "Cross-operational actions" option, the synchronization between the compile cycle and the HMI is executed automatically.

Benefit

- **Optimize MyMachining /AC AUTO system for production optimization gives the CNC machine the ability to feel by dynamically adjusting the feedrate!**

16.9 Industrial Edge for Machine Tools & Applications

16.9.1 Industrial Edge for Machine Tools

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Industrial Edge for Machine Tools enables new capabilities for the machine tool, for immediate processing of high-frequency data volumes – directly where they arise.

By decoupling data processing tasks and automation, safe machine operation is always guaranteed. At the same time, customer-specific applications run on Industrial Edge for Machine Tools – for example to ensure workpiece quality and increase machine availability and machine productivity.

The cloud-based services of Industrial Edge for Machine Tools make it possible to distribute updates and new applications within a very short time. Entire machine parks can thus follow shorter innovation cycles – with maximum efficiency.

Benefits

- **Enables the storage and transmission of high-frequency data**
- **Reaction-free: no load on the NCU**
- **Use and development of further applications on Industrial Edge for Machine Tools**

16.9.2 Optimize MyMachining /Trochoidal

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Optimize MyMachining /Trochoidal extends the existing vortex milling functionality by using the most advanced algorithms running on Industrial Edge for Machine Tools.

Based on the best possible optimized tool path and dynamic machine data, Optimize MyMachining /Trochoidal adapts programs – for more productive and tool-friendly machining of grooves [as well as pockets in the future].

The application for optimizing the NC programs is accessed directly on the controller. Its use is therefore particularly intuitive.

Benefits

- **Extends tool life and increases productivity**
- **Extension of the productive use of older machines – due to reduced mechanical load (e.g. bearings)**
- **Optimized process operations**

16.9.3 Analyze MyWorkpiece /Capture

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Measurement data from SINUMERIK are stored in a structured way using Analyze MyWorkpiece /Capture:

- Generic acquisition of high-frequency data, storage in protected file

- Access to stored data via Siemens applications such as Analyze MyWorkpiece /Toolpath

- Access to data from different Edge devices as well as different programs via one instance of Analyze MyWorkpiece /Toolpath

Benefit

- **Analyze MyWorkpiece /Capture provides high-frequency data as the basis for a variety of use cases**

16.9.4 Analyze MyWorkpiece /Monitor

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW		Option: via SISW		Option: via SISW		Option: via SISW

Analyze MyWorkpiece /Monitor provides you with the following functions:

- Monitoring of process tags and comparison against the reference model

- Provision of information on the quality produced

- Flexible and job-based monitoring, e.g. for selected NC programs/tools

- Feedback on quality and traceability documentation for each workpiece, e.g. based on KPIs as indicators

Benefit

- **Documentation of workpiece and process quality**

16.9.5 Analyze MyMachine /Condition

✅ SINUMERIK ONE PPU 1740	✅ SINUMERIK ONE NCU 1740	✅ SINUMERIK ONE NCU 1750	✅ SINUMERIK ONE NCU 1760
Option: via SISW	Option: via SISW	Option: via SISW	Option: via SISW

Analyze MyMachine /Condition enables users to generate a machine tool's mechanical fingerprint so that potential deviations can be identified at an early stage, machine failures prevented, and machine operation optimized.

Various parameters can be recorded with the aid of flexibly configurable measurement series:

- Stiffness

- Friction/friction distribution

- Backlash

- Quadrant error

- Signature

- Down-cut

- Frequency response

The measurement results can be visualized and compared to reference values.

Benefits

- **Basis for condition-based maintenance**
- **Documentation and comparison of machine conditions**
- **Improved machine utilization through optimization of settings**

16.9.6   Analyze MyWorkpiece /Toolpath

☑ SINUMERIK ONE PPU 1740	☑ SINUMERIK ONE NCU 1740	☑ SINUMERIK ONE NCU 1750	☑ SINUMERIK ONE NCU 1760
Option: via SISW	Option: via SISW	Option: via SISW	Option: via SISW

Analyze MyWorkpiece /Toolpath can be used in various production stages:

- Analysis of the part program/dynamic files (trace) before starting machining.
- Analysis of dynamic files (trace) after machining with a real machine

Analyze MyWorkpiece /Toolpath provides various analysis functions:

- Analysis of the NC code
- Comparison of different versions of the optimization
- Checking the alignment of the tool
- Checking the dynamic tool paths

Benefits

- **Quick localization of errors/tool paths in the NC program**
- **Comparison of programmed and real NC paths**

Tools and information 17

17.1 DXF Reader

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
☑		☑		☑		☑	
	Option: P56		Option: P56		Option: P56		Option: P56

The integrated DXF Reader allows you to accept and extract contours and positions from DXF files.

- **DXF Reader in the Program Manager**

  With the Program Manager, you can open DXF files in the DXF Reader. You can either clean DXF data automatically
  or select the desired layer yourself.

- **Import DXF data in the contour calculator**

  You can either clean the imported DXF data automatically or select the desired layer yourself.

  Cleaned DXF data can be buffered as new DXF file.

- **Import DXF data in position patterns**

  You can import the positions from a DXF file for position patterns for the associated technologies.

Benefits

- **Time saving for generating the production data**
- **Avoidance of mistakes and inaccuracies**
- **Higher workpiece quality**

17.2   CNC4you

On the CNC4you portal, SINUMERIK users can find helpful tips & tricks, SinuTrain downloads, tutorials and more.

CNC4you portal:
http://www.siemens.de/cnc4you (http://www.siemens.com/cnc4you)

Safety functions

18

18.1 SINUMERIK Safety Integrated

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: refer to the catalog		Option: refer to the catalog		Option: refer to the catalog		Option: refer to the catalog

SINUMERIK Safety Integrated provides integrated safety functions that support the implementation of highly effective personnel and machine protection.

"Safety Integrated" with the safety-relevant components "F-PLC" and "SINAMICS Integrated" can be used up to the following safety requirements:

- SINAMICS Safety Integrated functions:
    - SIL2 - safety class (Safety Integrity Level) according to IEC 61508
    - Performance level (PL) d according to DIN EN ISO 13849-1
    - Category 3 according to DIN EN ISO 13849-1
- F-PLC:
    - SIL3 - safety class (Safety Integrity Level) according to IEC 61508

As a consequence, the essential requirements concerning the functional safety can be implemented simply and cost-effectively.

The functional safety for machine tools covers:

- Functions for reliable monitoring of velocity and standstill
- Functions for establishing safe boundaries in work spaces and protected spaces, and for range recognition
- Functions for the safe activation and testing of holding brakes
- Direct connection of all safety-related sensors/actuators and their internal logic combination

Benefits

- **High level of flexibility: Supports the implementation of practical safety and operating concepts**
- **High level of security: Complete implementation of the safety functions in Category 3/SIL 2**
- **Increased availability: Absence of interference-susceptible electromechanical switching elements**
- **High degree of cost effectiveness: Reduction of the hardware and installation costs; simple commissioning and acceptance**

18.2 Collision avoidance

Machine tools are becoming ever faster and more complex. This is also placing more challenging demands on machine operators and programmers.

Operating errors often cause collisions and the associated production outages. This results in standstill times and high repair costs.

Whatever moves in space has the potential to collide. The collision avoidance options ensure optimum protection of moving and static machine components against collisions and prevent major damage.

Note

- The use of collision monitoring requires the availability of the relevant machine data and the associated visualization.
- The options for collision avoidance demand machine-specific enabling. Please contact your sales representative.

18.2.1 Protect MyMachine /3D Primitives

☑ SINUMERIK ONE PPU 1740		☑ SINUMERIK ONE NCU 1740		☑ SINUMERIK ONE NCU 1750		☑ SINUMERIK ONE NCU 1760	
	Option: S03		Option: S03		Option: S03		Option: S03

With the Protect MyMachine /3D Primitives option (previously collision avoidance ECO option), you can monitor the minimum clearance between protection areas. The geometry of the protection areas is defined using protection area elements.

- Up to 64 protection areas
- Up to 64 protection area elements/Primitive
- Up to 20 collision pairs
- Block, cylinder, ball, or truncated cone
- In the modes JOG, MDI, Automatic
- Single-channel, multi-channel

Benefits

- **Low-cost entry into the protection of the machine.**
- **Reduced CPU load of the CNC.**

18.2.2 Protect MyMachine /3D STL

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
☑	Option: S02*	☑	Option: S02*	☑	Option: S02*	☑	Option: S02*

* with constraints

With the Protect MyMachine /3D STL option (previously Collision Avoidance option), you can monitor the minimum clearance between protection areas. The geometry of the protection areas is defined using protection area elements.

- Such as Protect MyMachine /3D Primitives

- Up to 500 protection area elements (based on CAD – STL format)

- In the modes JOG, MDI, Automatic

Benefit

- **Machine-oriented mapping of complex protection areas possible.**

18.2.3 Protect MyMachine /Open

✅	SINUMERIK ONE PPU 1740	✅	SINUMERIK ONE NCU 1740	✅	SINUMERIK ONE NCU 1750	✅	SINUMERIK ONE NCU 1760
	Option: S04		Option: S04		Option: S04		Option: S04

The Protect MyMachine /Open option (previously: collision avoidance ADVANCED) provides the following functions:

- Data interface for the integration of the Collision Avoidance system from ModuleWorks
- Inclusion of the entire machine model (3D machining area) in collision avoidance
- Collision protection even when using cycles and transformations
- Import/modification of the 3D models of tool, tool holder, clamping device, workpiece and tool adapter (angular head) directly from the CAD/CAM system
- Color highlighting in case of danger of collision enables quick identification of the collision location
- Real-time simulation of material removal
- Predictive collision detection by the CAS system enables controlled stopping or braking of the axes
- Collision detection using the look-ahead function
- JOG, MDI, Automatic modes

Benefit

- **Collision avoidance also possible for complex machining operations such as for turning with B axis.**

18.2.4   Protect MyMachine /3D Twin

☑	SINUMERIK ONE PPU 1740	☑	SINUMERIK ONE NCU 1740	☑	SINUMERIK ONE NCU 1750	☑	SINUMERIK ONE NCU 1760
	Option: via SISW*		Option: via SISW*		Option: via SISW*		Option: via SISW*

* In addition, you need the options Industrial Edge for Machine Tools (via SISW) and Protect MyMachine /Open (option S04)

Protect MyMachine /3D Twin visually displays the machining process and machine movements using 3D Simulation, calculates potential collisions in advance, and stops machining when they are detected. Collision avoidance is based on a machine model of the real machine. This model also describes the protection areas of the machine and is provided by the machine manufacturer. In Protect MyMachine /3D Twin, you define the variable protection areas such as tools with holders, blanks and clamping operations.

* Import tool and clamping components as 3D model (*.stl) or redefine via fast protection

* Tool geometries and work offset data are continuously retrieved from NC and updated in the app

* Material removal simulation based on future positions (800 ms Ghost image) and actual axis positions

* Operating modes: AUTOMATIC, MDI, JOG

Benefit

* **Complete collision detection without compromising control performance.**
* **High usability through automatic updating of tool and offset data**

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