

**SIEMENS**

Overview of controllers for vendors  
of machine tools

## SINUMERIK Operate - Turning

SINUMERIK ONE

Edition

05/2022

[www.siemens.com/sinumerik](http://www.siemens.com/sinumerik)



# SIEMENS

## SINUMERIK

### SINUMERIK ONE SINUMERIK Operate – Turning

Overview of controllers for vendors  
of machine tools

Preface	1
Compact overview	2
System overview	3
CNC operation with SINUMERIK Operate	4
CNC operation in manual mode (JOG)	5
Tool management	6
Data management	7
CNC operation in automatic mode (AUTO)	8
CNC functionalities	9
CNC programming methods	10
Workpiece visualization	11
CNC technology cycles	12
Complete machining	13
Multi-channel machining	14
Automation	15
Digitalization	16
Tools and information	17
Safety functions	18

Valid for:

Controller:  
SINUMERIK ONE  
Software:  
CNC software version 6.15


05/2022


A5E51551703B AB


## 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.

 <b>DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.

 <b>WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.

 <b>CAUTION</b>
indicates that minor personal injury can result if proper precautions are not taken.

<b>NOTICE</b>
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:

 <b>WARNING</b>
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

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

### 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

<b>1</b>	<b>Preface</b> .....	<b>7</b>
<b>2</b>	<b>Compact overview</b> .....	<b>11</b>
<b>3</b>	<b>System overview</b> .....	<b>15</b>
3.1	SINUMERIK ONE .....	16
3.2	Run MyVirtual Machine (digital twin) .....	17
3.3	Innovative hardware .....	20
3.4	Data memory .....	21
<b>4</b>	<b>CNC operation with SINUMERIK Operate</b> .....	<b>23</b>
4.1	Animated elements .....	23
4.2	Onboard documentation .....	24
4.3	Multi-touch operation .....	25
4.3.1	Multi-touch operation - basic configuration .....	25
4.3.2	Multi-touch operation with side screen .....	26
4.3.3	SINUMERIK Operate Display Manager .....	27
4.4	Shortcuts .....	28
<b>5</b>	<b>CNC operation in manual mode (JOG)</b> .....	<b>29</b>
5.1	TSM universal cycle .....	29
5.2	Work offsets .....	30
5.3	Measuring a workpiece .....	31
5.4	Measuring tools .....	32
5.5	Stock removal cycle .....	33
5.6	Positioning cycle .....	34
5.7	Manual machine .....	35
<b>6</b>	<b>Tool management</b> .....	<b>37</b>
6.1	Tool table .....	37
6.2	Monitoring of service life and workpiece count .....	38
6.3	Replacement tools .....	39
6.4	Setup data .....	40
<b>7</b>	<b>Data management</b> .....	<b>41</b>
7.1	Program manager .....	41
7.2	Ethernet networking .....	42

<b>8</b>	<b>CNC operation in automatic mode (AUTO).....</b>	<b>43</b>
8.1	Block search .....	43
8.2	Program control.....	44
8.3	Execution from external storage .....	46
8.4	Basic block display .....	47
8.5	Simultaneous recording .....	48
8.6	Identifying tool demand.....	49
8.7	Logging measurement results in automatic mode .....	50
<b>9</b>	<b>CNC functionalities .....</b>	<b>51</b>
9.1	80-bit NANO floating-point accuracy .....	51
9.2	Block change times .....	52
9.3	Jerk limitation.....	53
9.4	Dynamic feedforward control.....	54
9.5	Friction compensation .....	55
9.6	Nodding compensation.....	56
9.7	Intelligent Load Control (ILC) .....	58
9.8	Involute interpolation .....	59
9.9	Measurement level 2 .....	60
9.10	Synchronized actions stage 2 .....	61
9.11	Analysis of internal drive values .....	62
9.12	Contour handwheel .....	63
<b>10</b>	<b>CNC programming methods .....</b>	<b>65</b>
10.1	DIN-ISO programming with programGUIDE .....	66
10.1.1	Introduction .....	66
10.1.2	Program editor .....	67
10.1.3	Languages.....	68
10.1.4	programGUIDE input support.....	69
10.2	ShopTurn machining step programming .....	70
10.2.1	Introduction .....	70
10.2.2	Sequence editor .....	71
10.2.3	Interlinking of sequences .....	72
10.2.4	Graphical view.....	73
<b>11</b>	<b>Workpiece visualization.....</b>	<b>75</b>
11.1	2D simulation .....	75
11.2	3D simulation .....	76

<b>12</b>	<b>CNC technology cycles</b> .....	<b>77</b>
12.1	CNC technology cycles for programGuide and ShopTurn.....	77
12.2	Highlights of machining cycles.....	78
12.2.1	Stock removal along contour with blank contour.....	78
12.2.2	Comb grooving.....	79
12.2.3	Engraving cycle.....	80
12.2.4	Counterspindle cycle.....	81
12.3	Residual material detection for contour cycles.....	82
12.4	Measuring functions for workpieces and tools.....	83
<b>13</b>	<b>Complete machining</b> .....	<b>85</b>
13.1	End face machining (TRANSMIT).....	85
13.2	Peripheral surface machining (TRACYL).....	86
13.3	Interpolation turning.....	87
13.4	Turn-milling.....	88
<b>14</b>	<b>Multi-channel machining</b> .....	<b>89</b>
14.1	Overview.....	89
14.2	programSYNC job list.....	90
14.3	Double editor.....	91
14.4	Balance cutting (stock removal).....	92
14.5	Simulation.....	93
<b>15</b>	<b>Automation</b> .....	<b>95</b>
15.1	SINUMERIK Run MyRobot /Direct Handling.....	95
<b>16</b>	<b>Digitalization</b> .....	<b>97</b>
16.1	Manage MyResources /Tools.....	98
16.2	Manage MyResources /Programs.....	99
16.3	Analyze MyPerformance (in line).....	100
16.4	Analyze MyPerformance /OEE Monitor (MindSphere).....	101
16.5	Analyze MyPerformance /OEE Tuning (MindSphere).....	102
16.6	Manage MyMachines.....	103
16.7	Manage MyMachines /Remote.....	104
16.8	Optimize MyMachining /Adaptive Control.....	105
16.9	Industrial Edge for Machine Tools & Applications.....	107
16.9.1	Industrial Edge for Machine Tools.....	107
16.9.2	Optimize MyMachining /Trochoidal.....	108
16.9.3	Analyze MyWorkpiece /Capture.....	109
16.9.4	Analyze MyWorkpiece /Monitor.....	110
16.9.5	Analyze MyMachine /Condition.....	111
16.9.6	Analyze MyWorkpiece /Toolpath.....	112

<b>17</b>	<b>Tools and information .....</b>	<b>113</b>
17.1	DXF Reader.....	113
17.2	Run MyScreens .....	114
17.3	CNC4you .....	115
17.4	Video tutorials .....	116
<b>18</b>	<b>Safety functions.....</b>	<b>119</b>
18.1	SINUMERIK Safety Integrated .....	119
18.2	Collision avoidance .....	120
18.2.1	Protect MyMachine /3D Primitives .....	120
18.2.2	Protect MyMachine /3D STL.....	121
18.2.3	Protect MyMachine /Open.....	122
18.2.4	Protect MyMachine /3D Twin.....	123
	<b>Index.....</b>	<b>125</b>

## Preface





### 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. For each function it is indicated whether it is included in the basic scope of SINUMERIK Operate or whether you have to purchase it separately as an option.

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

All functions that you can purchase as additional options are marked as follows:

 SINUMERIK ONE PPU 1740	 SINUMERIK ONE NCU 1740	 SINUMERIK ONE NCU 1750	 SINUMERIK ONE NCU 1760
Option: [Article No. order code]	Option: [Article No. order code]	Option: [Article No. order code]	Option: [Article No. order code]

The options are additionally differentiated as follows:

	After purchasing the option, you will receive a license key. By reading in the license key, you activate the function.
	The option requires coordination with the machine manufacturer.

Technical data subject to change.

## Contact person at machine manufacturer

### Marketing & Sales

Phone: +49 xxx xxx  
 Fax: +49 xxx xxx  
 E-mail: xxx@machinemanufacturer.com

### Service

Phone: +49 xxx xxx  
 Fax: +49 xxx xxx  
 E-mail: xxx@machinemanufacturer.com

### Homepage:

<http://www.machinemanufacturer.com>

## SINUMERIK user support worldwide contact

Name	First name	Region	E-mail
Popelka	Jiri	Austria	jiri.popelka@siemens.com
Marino	Gustavo	Brazil	marino.gustavo@siemens.com
Katsarov	Petar	Bulgaria	petar.katsarov@siemens.com
Xu	Zheng Shun	China	zhengshun.xu@siemens.com
Meriaho	Juha	Finland	juha.meriaho@siemens.com
Chevalier	Francois	France	francois.chevalier@siemens.com
Bui	Quang-Minh	Germany	quang-minh.bui@siemens.com
Palla	Csaba	Hungary	csaba.palla@siemens.com
Muthukrishna Pillai	Manish	India	manish.m@siemens.com
Widjayanto	Arif	Indonesia	arif_widjayanto@cncdesign.com.au
Marrelli	Fabio	Italy	fabio.marrelli@siemens.com
Cavazos Valle	Alicia del Carmen	Mexico	alicia.cavazos@siemens.com
Ouwehand	Hans	The Netherlands	hans.ouwehand@siemens.com
Orlik	Piotr	Poland	piotr.orlik@siemens.com
Simzikov	Sergey	Russia	sergey.simzikov@siemens.com
Popelka	Jiri	Slovakia	jiri.popelka@siemens.com
Lee	ByungChan	South Korea	byungchan.lee@siemens.com
Lopez Gomez	Javier	Spain	javier.lopez_gomez@siemens.com
Farger	Alexander	Switzerland	alexander.farger@siemens.com
Tan	Ben	Taiwan	ben.tan@siemens.com
Popelka	Jiri	Czech Republic	jiri.popelka@siemens.com
Dinler	Namik Ozkan	Turkey	ozkan.dinler@siemens.com
Coombes	Mark	United Kingdom	mark.coombes@siemens.com
Pollack	Christopher	USA	chris.pollack@siemens.com
Dat	Nguyen Van	Vietnam	nguyen-van.dat@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

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 15)



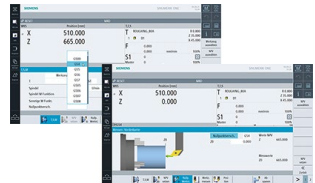
### User-friendliness – effective operation like on a PC

- ✓ 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 23)



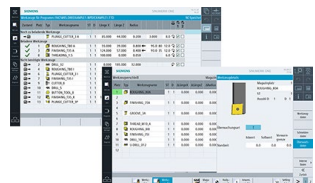
### Setup functions "Intelligent-JOG"

- ✓ 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 29)



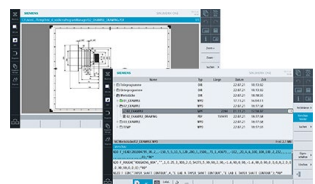
### Tool management – powerful but easy to use

- ✓ 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 37)



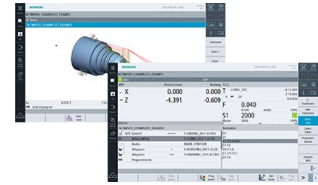
### Data management like on a PC

- ✓ 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 41)



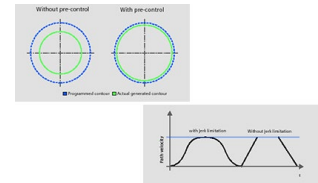
### CNC operation in automatic mode (AUTO)

- ✔ 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 43)



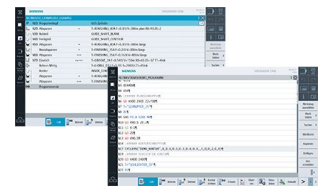
### SINUMERIK CNC performance - the benchmark in all aspects

- ✔ 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 51)



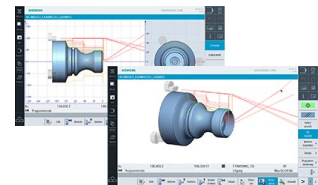
### CNC programming methods - optimally prepared for all production tasks

- ✔ 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 65)



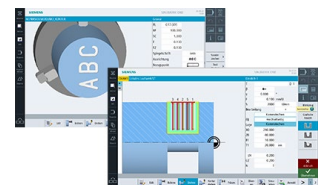
### Workpiece visualization – more safety through simple and fast control

- ✔ Realistic 2D and 3D simulations offer reliable programming and quotation pricing. (Page 75)



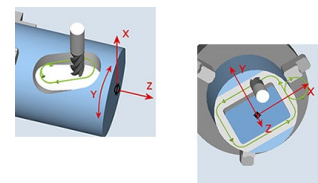
### CNC technology cycles – the little helpers for daily CNC programming

- ✔ 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 77)



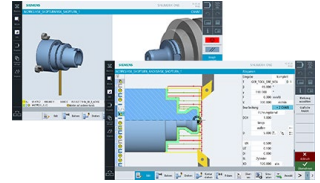
### Complete machining

- ✔ 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 85)



### 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 89)



### 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 95)



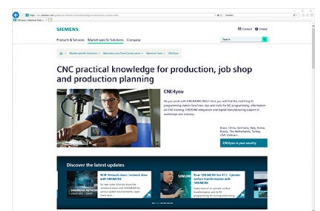
### Digitalization on the shop floor

- ✓ 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 97)



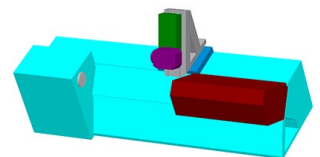
### Tools and information

- ✓ More than just useful helpers - DXF Reader and Run MyScreens! On the information platform CNC4you you will find helpful tips & tricks and a download area. (Page 113)



### 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 119)





## System overview

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

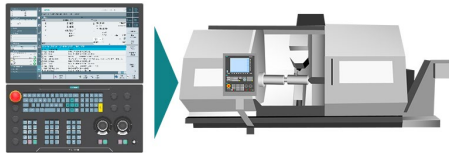
### programSYNC – Efficient programming for multi-channel machines

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  $\mu$ P 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  $\mu$ P 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
  - Learning as on the real machine with control functions and machine movements through a complete virtual image of the machine (digital twin)
  - Practicing in the virtual world (incl. measuring, scratching, etc.) without the risk of a machine crash
- For presentation:
  - Showing (new) SINUMERIK functions live instead of slides, always and everywhere
  - Even before the delivery of an ordered machine, you can program and test components and train employees for the new machine.

3.2 Run MyVirtual Machine (digital twin)

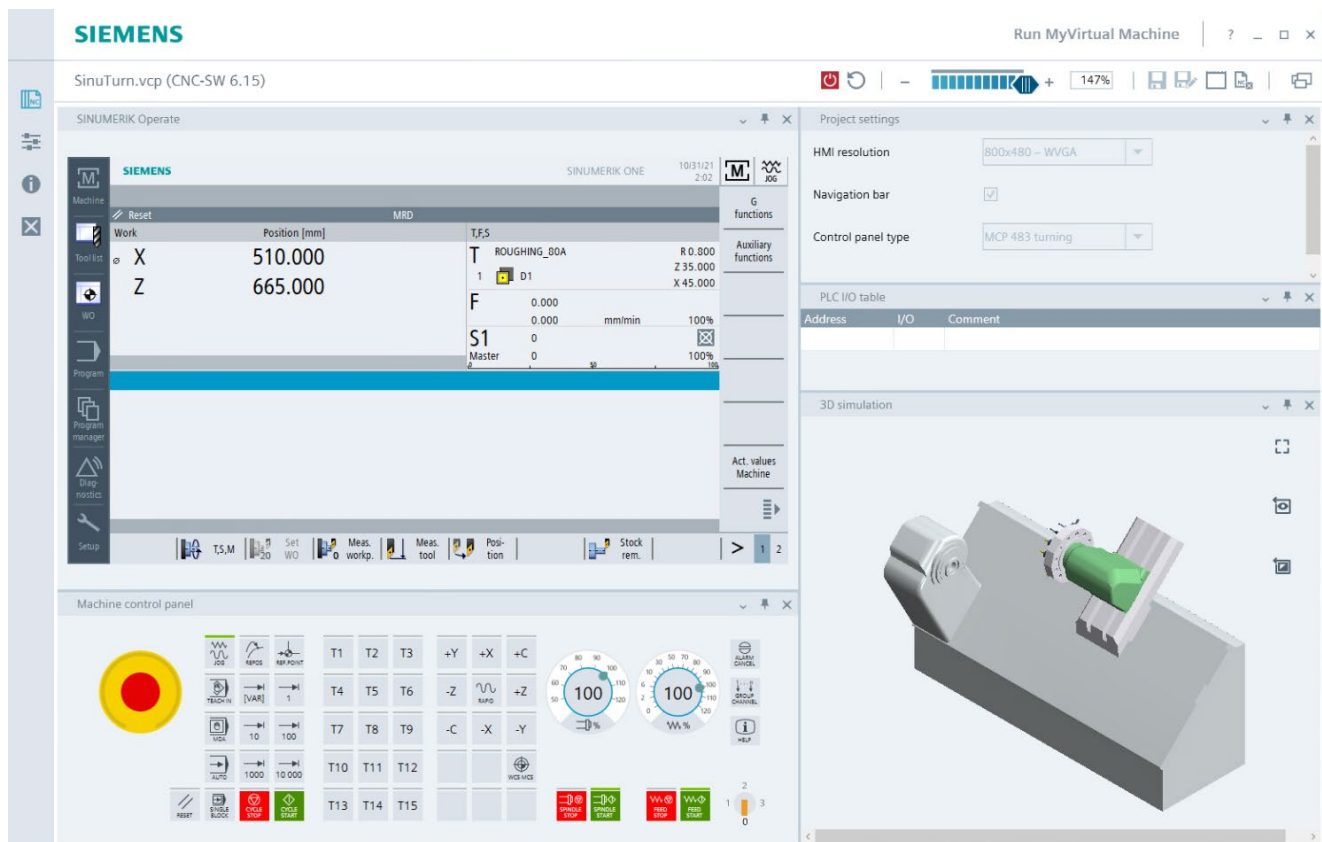
Additional components:

- 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>)

---

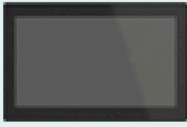







**Benefits**

- Run MyVirtual Machine enables the simulation of machining incl. machine and workspace, offline programming and checking of NC programs without a real machine using the digital twin of the SINUMERIK ONE and the machine.
- 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 SINUMERIK 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	<input checked="" type="checkbox"/>	Execution from external storage devices EES (option P75) Network, USB storage media, compact flashcard
<input checked="" type="checkbox"/>	Option P77 + option P12 <sup>1)</sup>	up to 6 GB		
<input checked="" type="checkbox"/>	Option P77	100 MB		
<input checked="" type="checkbox"/>	CNC user memory (option D00)	10 MB to 28 MB	<input checked="" type="checkbox"/>	Execution from the CNC expanded user memory (option P77)
<input checked="" type="checkbox"/>	Internal memory can be expanded via option P77 + P12 → 6 GB Internal memory can be expanded via option P77 → 100 MB		<input checked="" type="checkbox"/>	External storage can be expanded almost without limit (option P75)

1) Not in combination with SIMATIC IPC for SINUMERIK

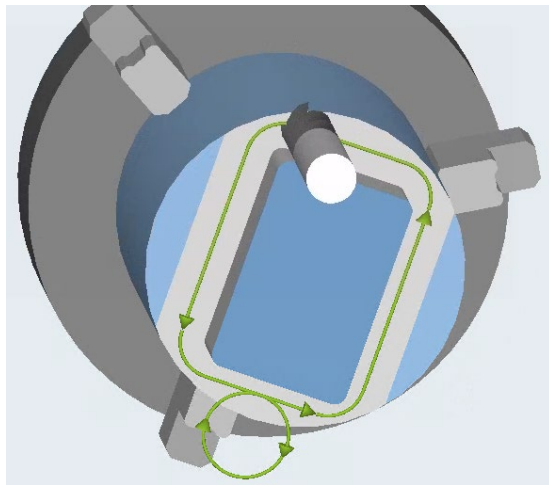


# CNC operation with SINUMERIK Operate

## 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

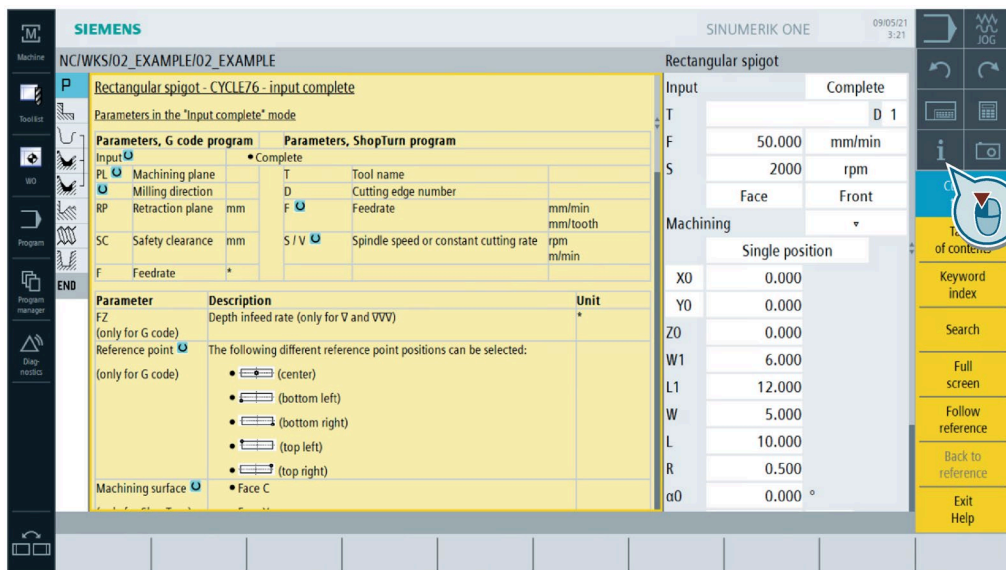


- Process reliability during the setup
- Increased reliability at program input by easily understood depiction of selection options
- This results in improved efficiency and so increased availability of the machine

## 4.2 Onboard documentation

<input checked="" type="checkbox"/>	<b>SINUMERIK ONE PPU 1740</b>	<input checked="" type="checkbox"/>	<b>SINUMERIK ONE NCU 1740</b>	<input checked="" type="checkbox"/>	<b>SINUMERIK ONE NCU 1750</b>	<input checked="" type="checkbox"/>	<b>SINUMERIK ONE NCU 1760</b>
	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, modern 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:

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

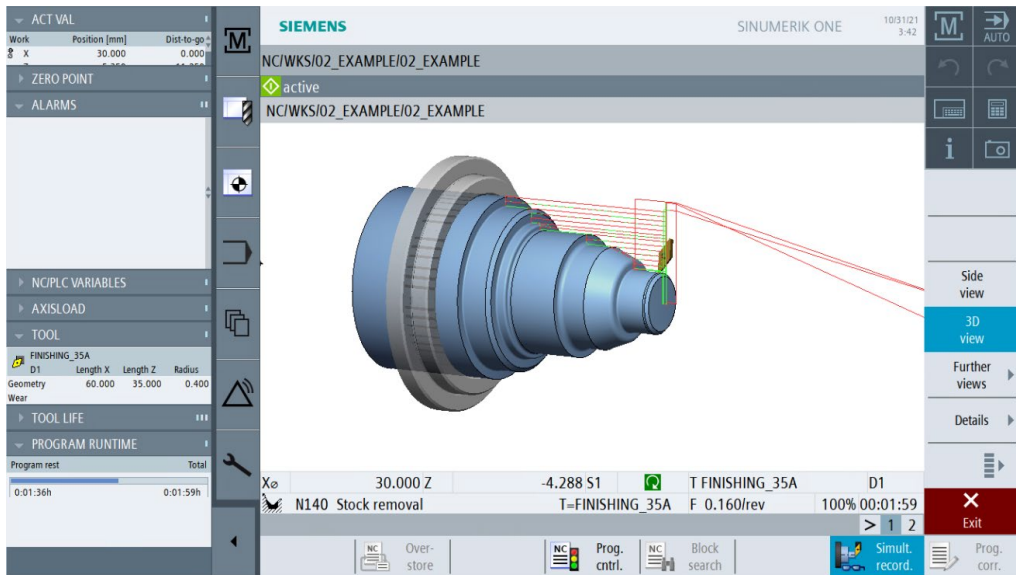
### 4.3.2 Multi-touch operation with side screen

✓	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**



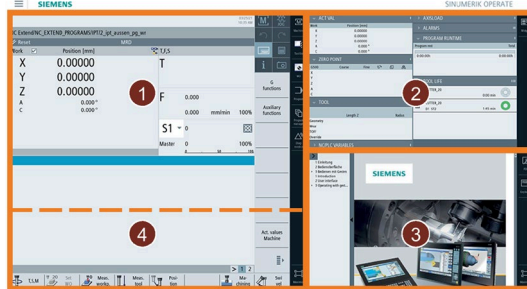
- All information in view in every operating situation and thus permanent control of the machine status.



### 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:



Select all (editor functionality)



Copy



Paste



Cut



Calculation of the time from/to line/block



Language selection



Maximum simulation speed



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

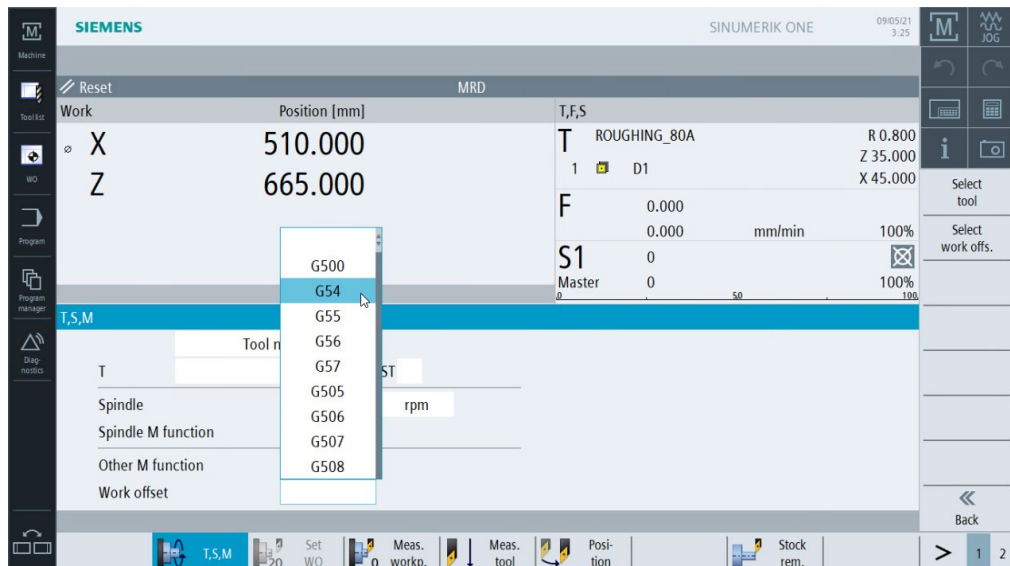
## CNC operation in manual mode (JOG)

### 5.1 TSM universal cycle

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	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



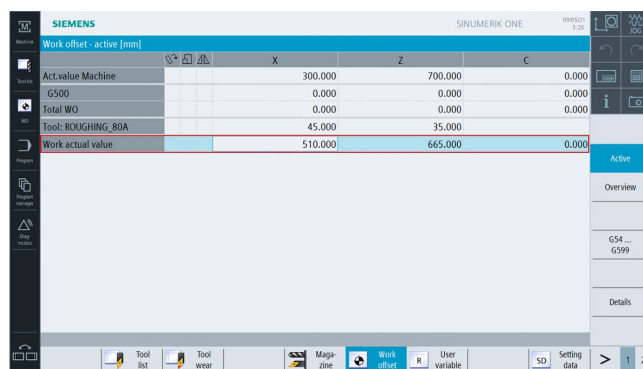
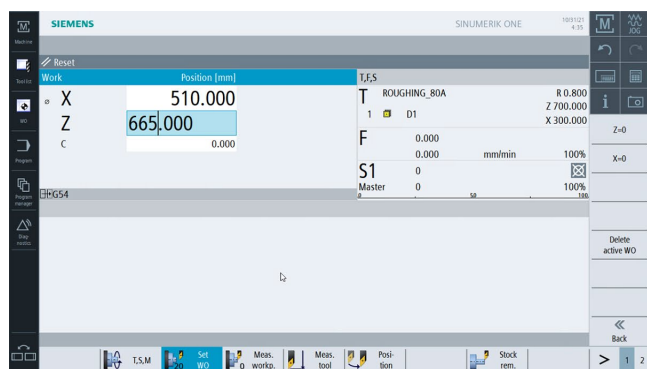
- Take over and change in tools directly from the tool table

## 5.2 Work offsets

<input checked="" type="checkbox"/>	<b>SINUMERIK ONE PPU 1740</b>	<input checked="" type="checkbox"/>	<b>SINUMERIK ONE NCU 1740</b>	<input checked="" type="checkbox"/>	<b>SINUMERIK ONE NCU 1750</b>	<input checked="" type="checkbox"/>	<b>SINUMERIK ONE NCU 1760</b>
	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



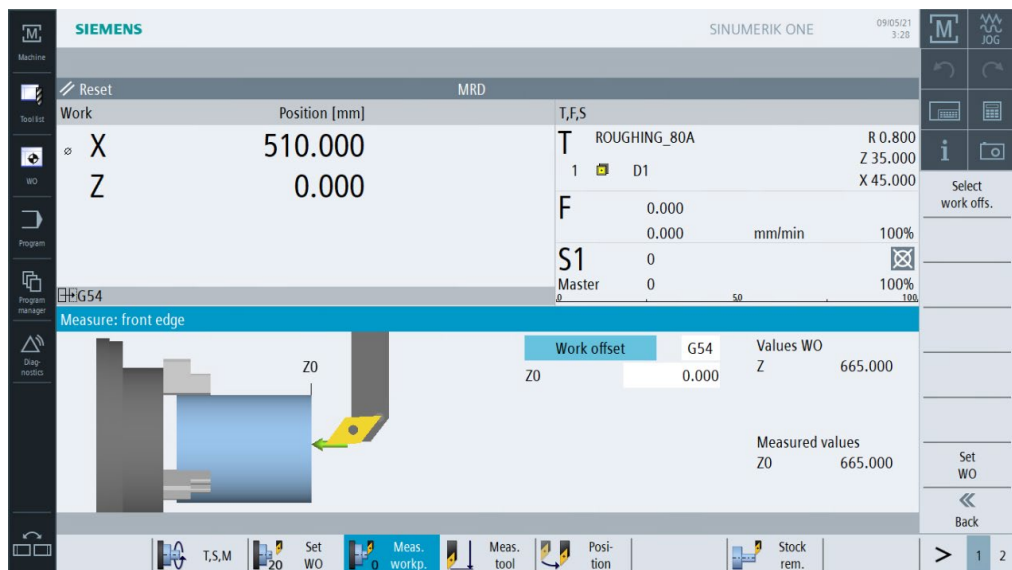
- **Flexible machining thanks to a large number of settable work offsets**
- **User-friendly understandable display of the number of work offsets**

## 5.3 Measuring a workpiece

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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

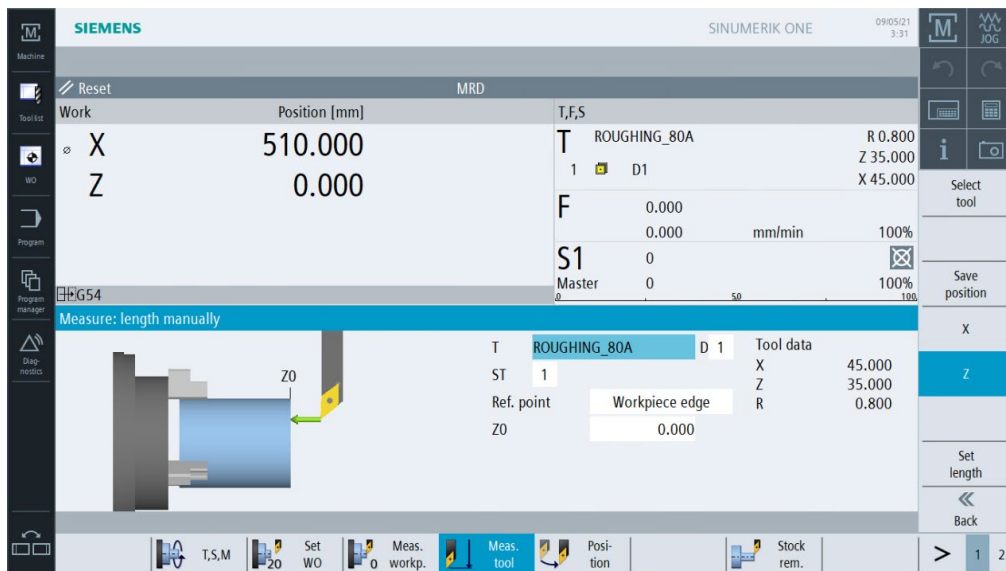
## 5.4 Measuring tools

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	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



### Benefit



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

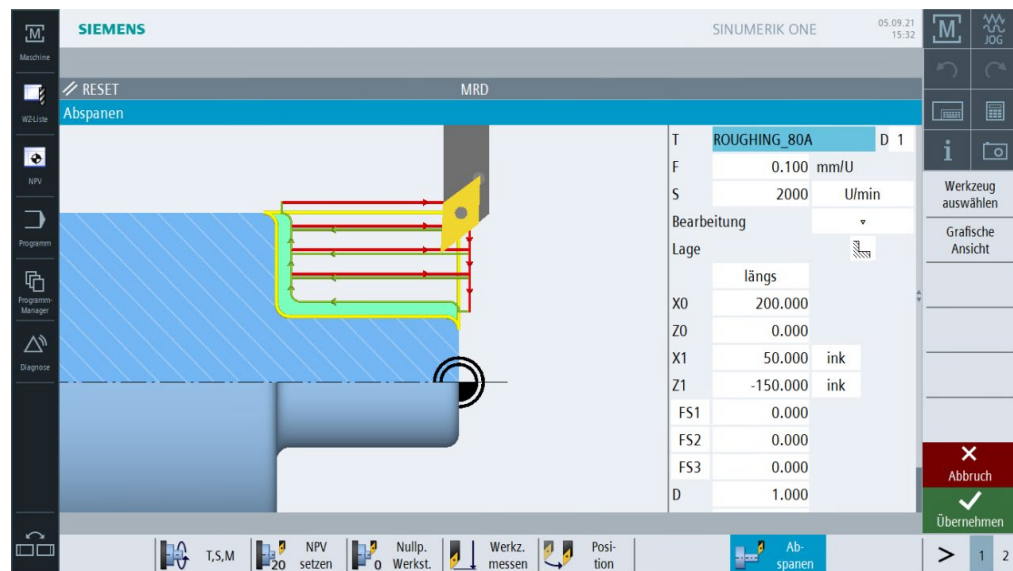
## 5.5 Stock removal cycle

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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



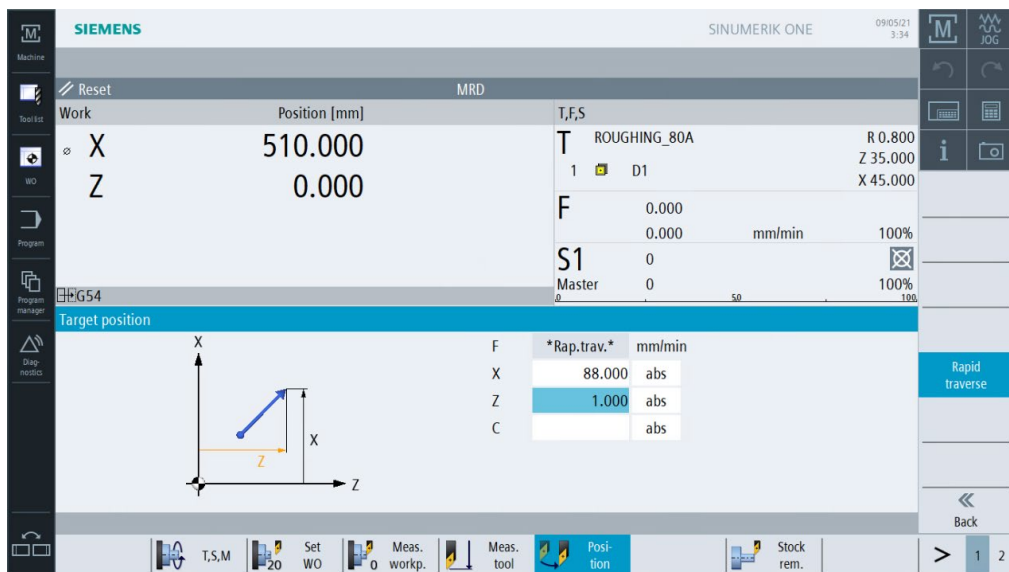
- Preparation of workpiece or collet chuck without having to create a part program

## 5.6 Positioning cycle

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	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

### 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

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	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

Loc.	Type	Tool name	ST	D	ΔLength X	ΔLength Z	ΔRadius
1		ROUGHING_80A	1	1	0.000	0.000	0.000
2							
3		FINISHING_35A	1	1	0.000	0.000	0.000
4							
5		GROOVE_3A	1	1	0.000	0.000	0.000
6							
7		THREAD_M10_A	1	1	0.000	0.000	0.000
8		ROUGHING_80I	1	1	0.000	0.000	0.000
9		FINISHING_35I	1	1	0.000	0.000	0.000
10		DRILL_10	1	1	0.000	0.000	0.000
11		U-DRILL_D12	1	1	0.000	0.000	0.000
12							

### 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.

Loc.	Type	Tool name	ST	D	Length X	Length Z	∅						
1		ROUGHING_80A	1	1	45.000	35.000	0.800	←	95.0	80	11.0	↻	<input type="checkbox"/>
2		ROUGHING_80I	1	1	-6.000	100.000	0.800	←	95.0	80	5.0	↻	<input type="checkbox"/>
3		DRILL_10	1	1	0.000	74.000	10.000		118.0			↻	<input type="checkbox"/>
4		U-DRILL_D12	1	1	0.000	74.000	12.000					↻	<input type="checkbox"/>
5		U-DRILL_D12	2	1	0.000	74.000	12.000					↻	<input type="checkbox"/>
6		U-DRILL_D12	3	1	0.000	74.000	12.000					↻	<input type="checkbox"/>
7		FINISHING_35A	1	1	60.000	35.000	0.400	←	93.0	35	11.0	↻	<input type="checkbox"/>
8		FINISHING_35I	1	1	-5.000	100.000	0.400	←	93.0	55	3.0	↻	<input type="checkbox"/>
9		GROOVE_3A	1	1	60.000	44.000	0.200		3.000		10.0	↻	<input type="checkbox"/>
10		THREAD_M10_A	1	1	70.000	35.000	0.200				10.0	↻	<input type="checkbox"/>
11													
12													

### Benefit

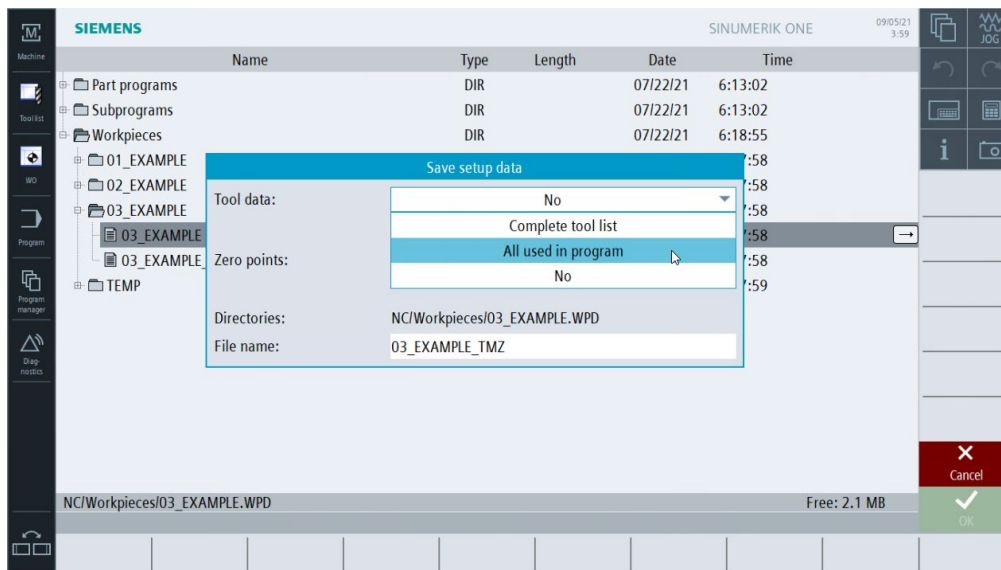


- Automatic exchange of identical tools for unmanned operation

## 6.4 Setup data

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	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

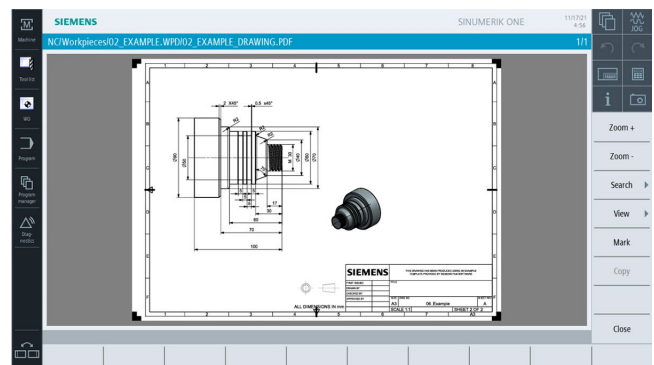
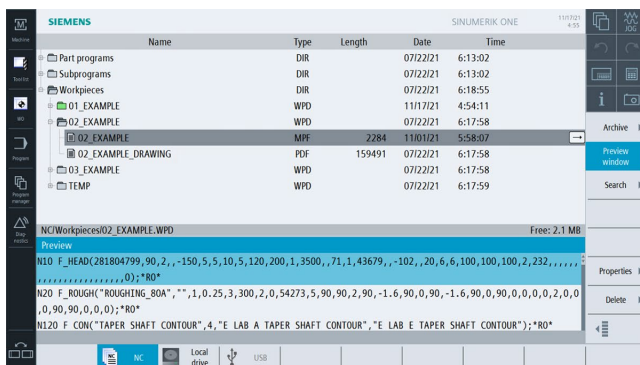
# Data management

## 7.1 Program manager

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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

	<b>SINUMERIK ONE PPU 1740</b>		<b>SINUMERIK ONE NCU 1740</b>		<b>SINUMERIK ONE NCU 1750</b>		<b>SINUMERIK ONE NCU 1760</b>
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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)

## 8.1 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

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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.

- RGO – 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)

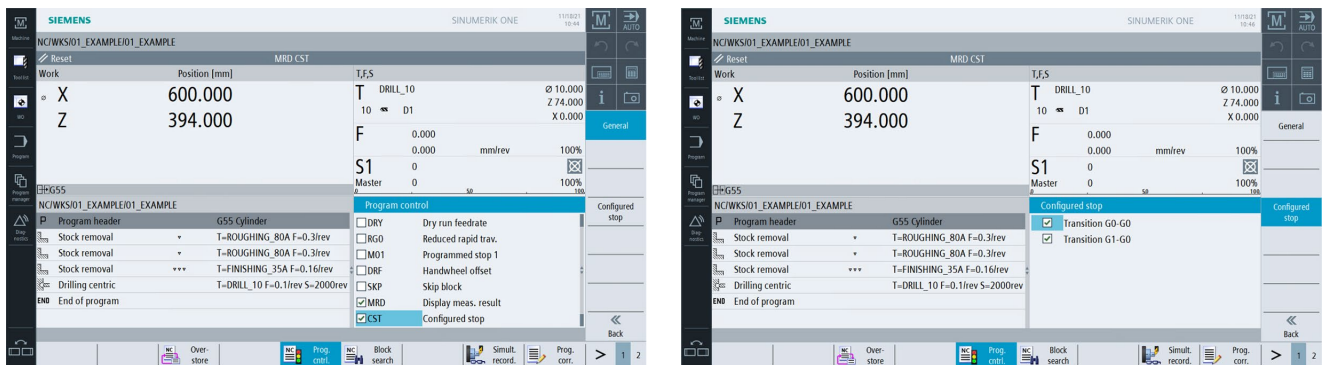
<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: S24	<input checked="" type="checkbox"/>	Option: S24	<input checked="" type="checkbox"/>	Option: S24	<input checked="" type="checkbox"/>	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 - and thus quasi infinite storage space and relief of the internal memory of the SINUMERIK controller**

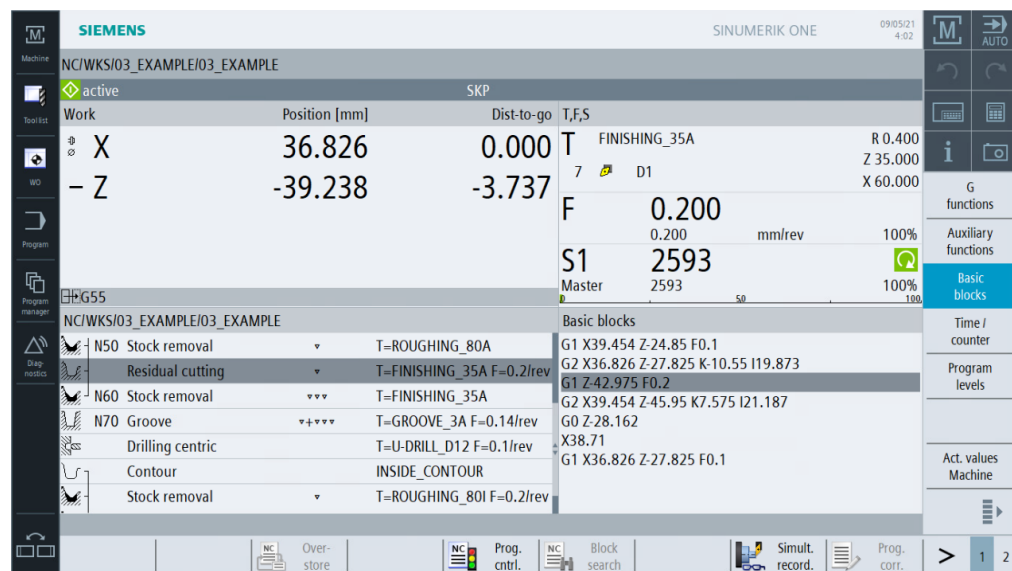
## 8.4 Basic block display

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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).



The screenshot displays the Siemens SINUMERIK ONE Basic Block Display interface. The main window shows the following data:

Work	Position [mm]	Dist-to-go	T,F,S
X	36.826	0.000	T FINISHING_35A
Z	-39.238	-3.737	7 D1

Below the coordinate table, the 'Basic blocks' section is visible, showing a list of G-codes and their parameters:

Block	Parameters
G1	X39.454 Z-24.85 F0.1
G2	X36.826 Z-27.825 K-10.55 I19.873
G1	Z-42.975 F0.2
G2	X39.454 Z-45.95 K7.575 I21.187
G0	Z-28.162
X38.71	
G1	X36.826 Z-27.825 F0.1

The interface also includes a sidebar with various icons for machine status, tool list, program, and diagnostics. The bottom status bar shows 'Over-store', 'Prog. cntrl.', 'Block search', 'Simult. record.', and 'Prog. corr.'.

### Benefit

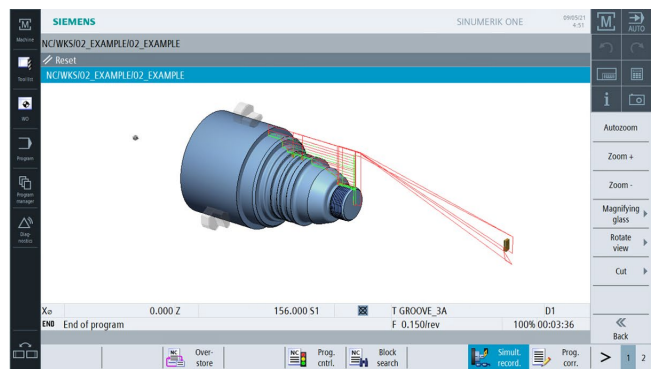
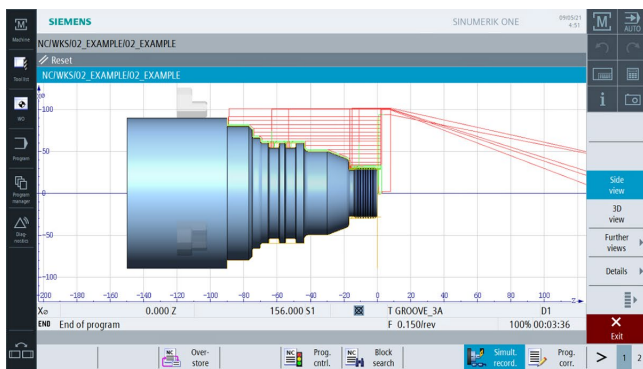


- Optimal control of the program execution, even in complex sequences or machining cycles, especially in single block mode

## 8.5 Simultaneous recording

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: P22	<input checked="" type="checkbox"/>	Option: P22	<input checked="" type="checkbox"/>	Option: P22	<input checked="" type="checkbox"/>	Option: P22

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.



**Note:** For the topic "Simultaneous recording with a machine model", see section Protect MyMachine /3D Primitives (Page 120).

### Benefit



- Machining can be monitored directly, especially when direct control of the machine room is not possible due to coolants, etc.

## 8.6 Identifying tool demand

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: M77	<input checked="" type="checkbox"/>	Option: M77	<input checked="" type="checkbox"/>	Option: M77	<input checked="" type="checkbox"/>	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.





Status	Loc.	Type	Tool name	ST	D	Length X	Length Z	Radius					
			PLUNGE_CUTTER_3 A	1	1	85.000	44.000	0.200	3.000	8.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Loaded tools													
<input checked="" type="checkbox"/>	1		ROUGHING_T80 A	1	1	55.000	39.000	0.800	95.0	80	12.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	3		FINISHING_T35 A	1	1	124.000	57.000	0.400	93.0	35	12.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	8		THREADING_1.5	1	1	100.000	0.000	0.050			6.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Unneeded tools													
<input type="checkbox"/>	2		DRILL_32	1	1	0.000	185.000	32.000				<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	4		ROUGHING_T80 I	1	1	-9.000	122.000	0.800	95.0	80	10.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	6		PLUNGE_CUTTER_3 I	1	1	-12.000	135.000	0.100	3.000		4.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	7		FINISHING_T35 I	1	1	-12.000	122.000	0.400	93.0	35	8.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	9		CUTTER_8	1	1	0.000	38.000	8.000				<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	10		DRILL_5	1	1	0.000	185.000	5.000	118.0			<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	11		BUTTON_TOOL_8	1	1	88.000	38.000	2.000				<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	12		FINISHING_T35_R	1	1	124.000	23.000	0.400	93.0	35	10.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	13		PLUNGE_CUTTER_3P	1	1	86.000	54.000	0.100	3.000		5.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### Benefit



- Quick and simple check whether all machine tools are loaded before starting the program - prevents downtimes during machining

## 8.7 Logging measurement results in automatic mode

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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



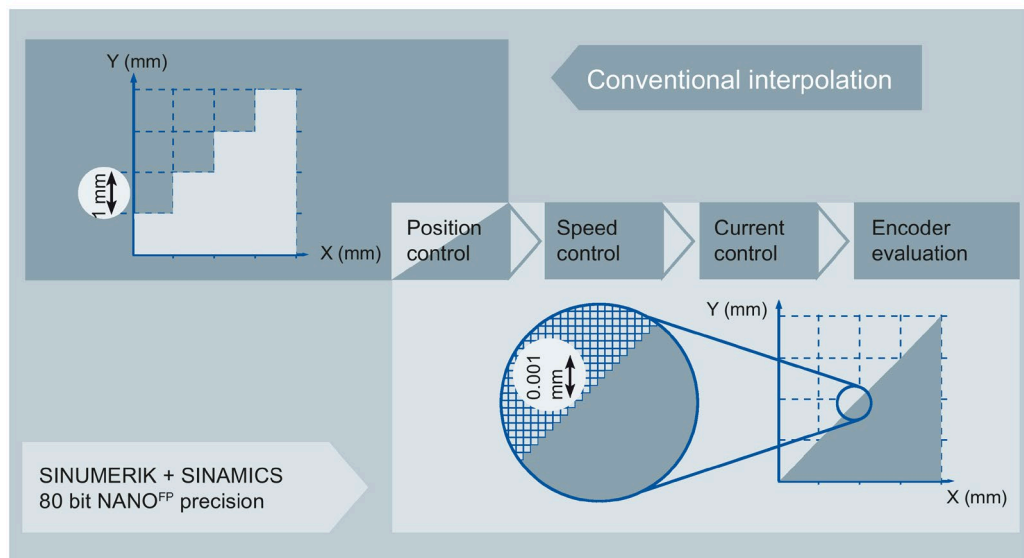
## CNC functionalities

### 9.1 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 configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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

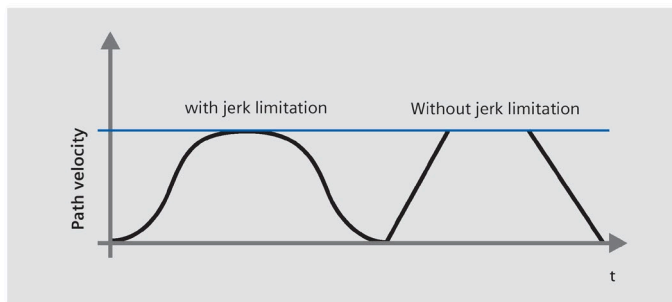


- Minimum block cycle times for the respective performance versions

## 9.3 Jerk limitation

✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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



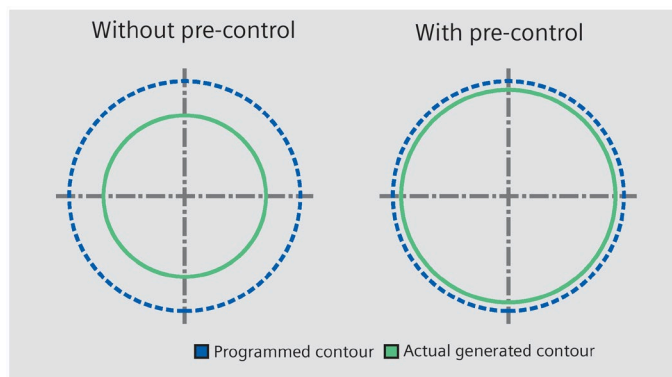
- Longer machine lifespan through protection of the mechanical components
- Higher path accuracy through softer acceleration

## 9.4 Dynamic feedforward control

✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
	Basic configura- tion		Basic configura- tion		Basic configura- tion		Basic configura- tion

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 Friction compensation

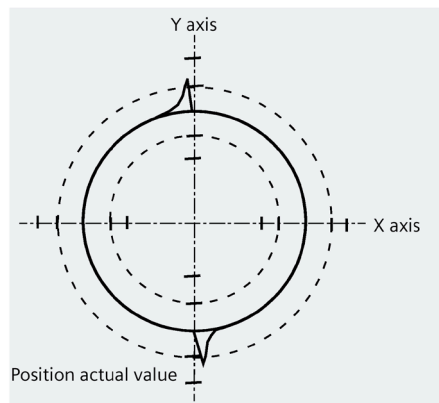
✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
⚙️	Option: S06	⚙️	Option: S06	⚙️	Option: S06	⚙️	Option: S06

The friction compensation (quadrant error compensation) leads to a significant improvement in contour accuracy, especially in circular contour machining operations.

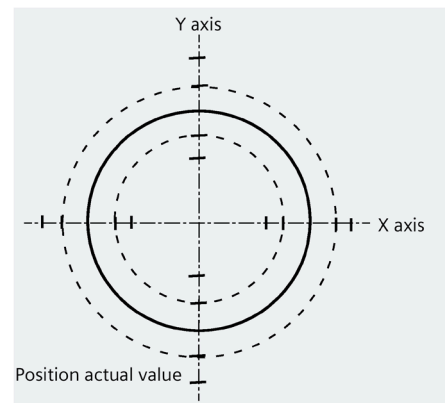
At the quadrant transitions, one axis traverses at maximum path velocity while the second axis is stationary. The different friction conditions can therefore result in contour violations.

Friction compensation reliably compensates for this behavior and produces excellent results, without contour errors, in the very first machining operation.

The intensity of the compensation pulse is set according to the characteristic as a function of the acceleration. This characteristic is determined and parameterized during commissioning with the aid of the circularity test.



Quadrant transitions without compensation



Quadrant transitions with quadrant error compensation

### Benefit



- Considerably higher contour accuracy

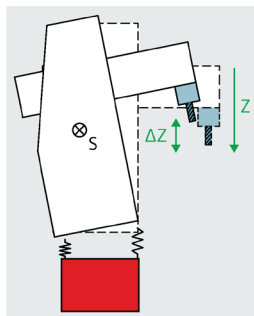
## 9.6 Nodding compensation

Nodding compensation counteracts dynamic position deviations along linear machine axes that occur due to acceleration processes along this or another linear machine axis.

The position deviation results from the mechanical compliance within the machine.

### Nodding compensation ECO

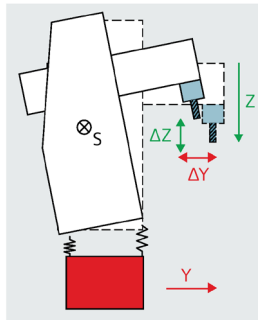
<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
	Option: S20		Option: S20		Option: S20		Option: S20



Nodding compensation ECO counteracts the relevant position deviation with correction movements along a machine axis, e.g. compensation of  $\Delta Z$ .

## Nodding compensation ADVANCED

✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
⚙️	Option: S21	⚙️	Option: S21	⚙️	Option: S21	⚙️	Option: S21











Nodding compensation ADVANCED counteracts multiple deviations with correction movements along multiple machines axes, e.g. compensation of  $\Delta Y$  and  $\Delta Z$ .

### Benefits



- Improved machining quality with simultaneously increased jerk and acceleration values
- Increased productivity can be achieved without costly mechanical reinforcement of the machine
- Saves costs because often more cost-effective than mechanical measures to increase stiffness
- Can be used, for milling, multitasking, tapping, and laser and water jet machining, for example

## 9.7 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.



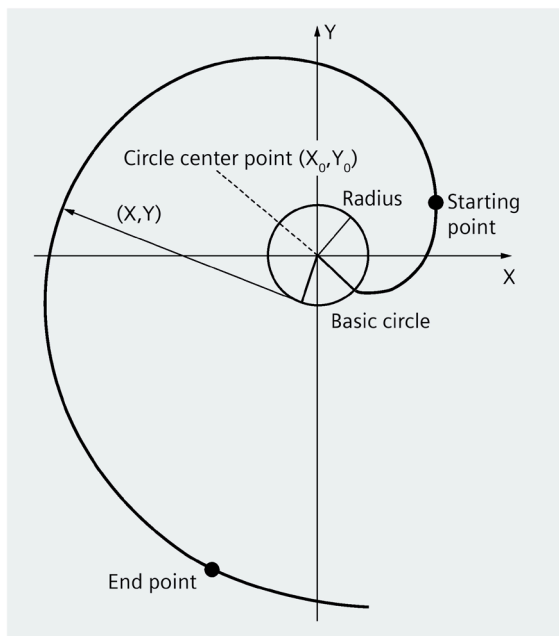
## 9.8 Involute interpolation

✓	SINUMERIK ONE PPU 1740	✓	SINUMERIK ONE NCU 1740	✓	SINUMERIK ONE NCU 1750	✓	SINUMERIK ONE NCU 1760
✓	Option: M21	✓	Option: M21	✓	Option: M21	✓	Option: M21

Using involute interpolation, you can program a spiral contour in the shape of a circular involute in one CNC block.

The exact mathematical description of the contour enables a higher path velocity to be achieved, together with a shorter machining time. Undesirable facets, which could result from coarse polygon functions, are thus avoided.

Furthermore, with involute interpolation, the end point need not lie exactly on the involute defined by the starting point. You can enter a maximum permissible deviation via machine data.



### Benefit



- Simple programming of complex spiral movements or contours.

## 9.9 Measurement level 2

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
	Option: M32		Option: M32		Option: M32		Option: M32

With axis-specific measuring, activation of the measuring process can take place in the part program or in synchronous actions. If two measuring systems are available for the axis, you can use both for the measurement.

The following measuring methods are available:

- Measuring with delete distance-to-go (MEASA) and measuring without delete distance-to-go (MEAWA)

With MEASA or MEAWA for the programmed axis, up to four measured values are acquired for each measurement and are then saved in system variables in accordance with the trigger event.

- Continuous measurement without delete distance-to-go (MEAC)

With continuous measurement with MEAC, the measurement results are stored in FIFO variables.









The measurement results can be logged in a file. You can structure the log as required.

### Benefits



- **Influencing the process during machining**
- **Ensuring machining precision**
- **Logging of the measurement results**

## 9.10 Synchronized actions stage 2

 SINUMERIK ONE PPU 1740	 SINUMERIK ONE NCU 1740	 SINUMERIK ONE NCU 1750	 SINUMERIK ONE NCU 1760
 Option: M36	 Option: M36	 Option: M36	 Option: M36









More than 24 synchronized actions can be active in the CNC block. As many as 255 parallel actions can be programmed in each channel. Using the Synchronized actions stage 2 option, you can group technology cycles together as programs. Thus it is possible, for example, to start axis programs in the same IPO cycle by scanning digital inputs.

### Benefits



- **Transfer of auxiliary functions M and H to the PLC user software and machine responses derived from this**
- **Fast, axis-specific deletion of the distance-to-go in response to input signals**
- **Manipulation of the read-in disable for the CNC block using external signals**
- **Monitoring of system variables such as velocity, power and torque**
- **Control of process variables such as velocity, speed and distance**

## 9.11 Analysis of internal drive values

 SINUMERIK ONE PPU 1740	 SINUMERIK ONE NCU 1740	 SINUMERIK ONE NCU 1750	 SINUMERIK ONE NCU 1760
 Option: M41	 Option: M41	 Option: M41	 Option: M41

The analysis of internal drive values can be used to control a second process variable depending on a measured process variable. You can, for example, influence the path-specific or axis-specific feedrate depending on the measured spindle current.

Analysis of internal drive values is a requirement for implementing Adaptive Control. You can parameterize the Adaptive Control within the part program as follows:

- Additive control  
Programmed value (F word) is corrected by adding
- Multiplicative control  
F word is multiplied by a factor (override)

The following real-time variables can be evaluated as internal drive variables:









- \$AA\_LOAD drive utilization as a %
- \$AA\_POWER drive active power in W
- \$AA\_TORQUE drive torque setpoint in Nm
- \$AA\_CURR actual axis/spindle current in A

### Benefits



- **Protecting machines and tools against overload**
- **Shorter machining times**
- **A superior surface quality of the workpieces can be achieved**

## 9.12 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

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 DIN-ISO programming with programGUIDE

### 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.

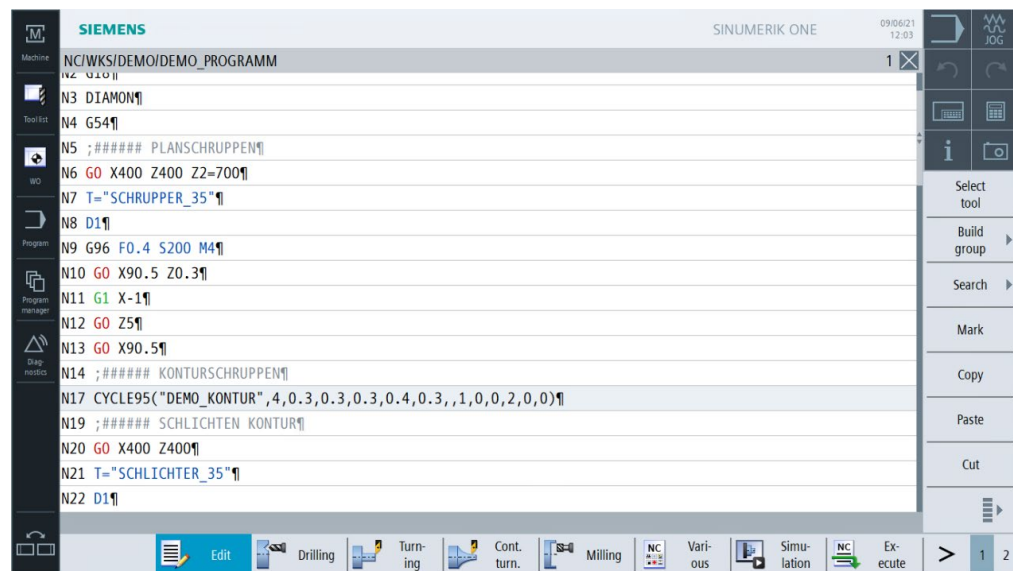


## 10.1.2 Program editor

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

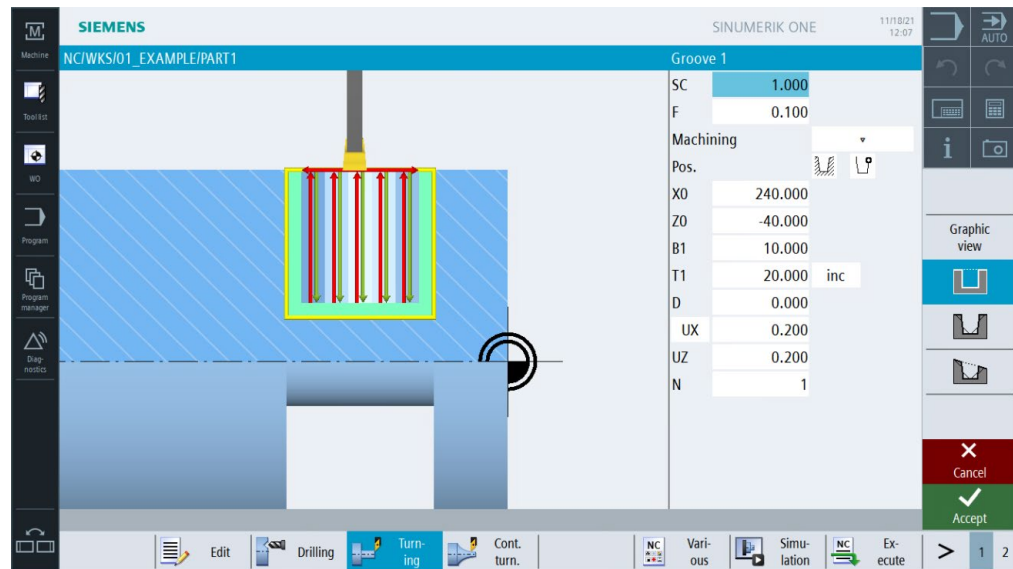


- Established programming according to DIN 66025
- Unbeatable range of commands for flexibility and time saving while programming

### 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:

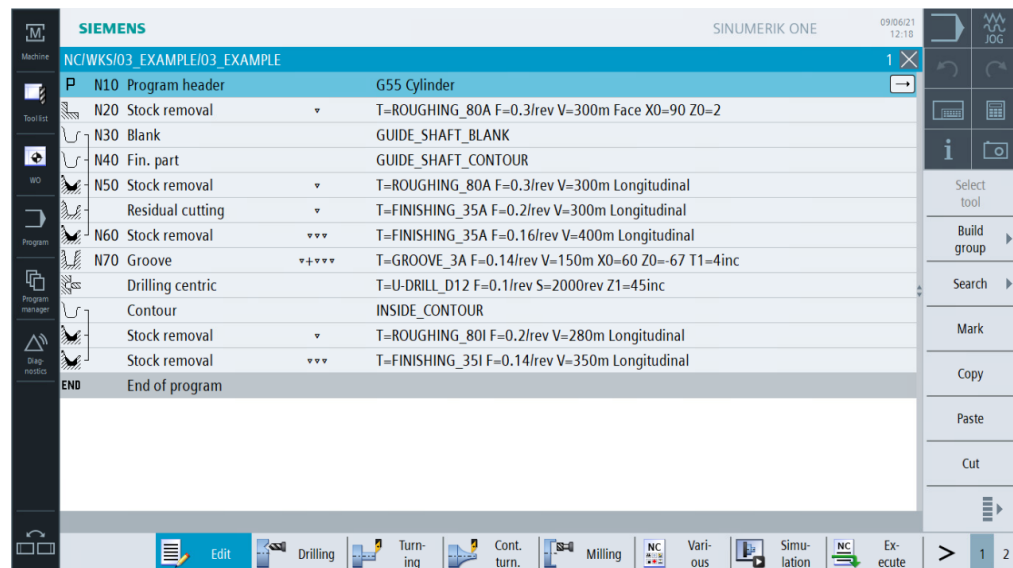
- Sequence editor
- Interlinking of sequences
- Graphic view (broken-line graphics)

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

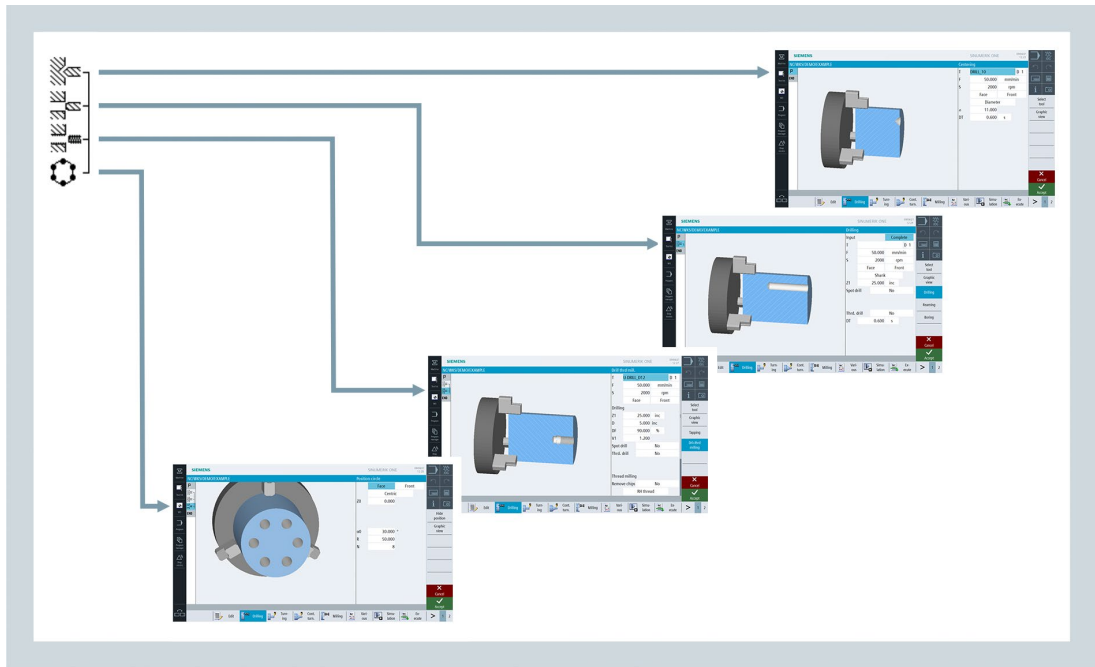


- Intuitive program input, without knowledge of DIN/ISO or Operating Manual
- Compact, clearly arranged machining programs
- Reducing the programming time by graphical input screens and copying / inserting machining steps

### 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

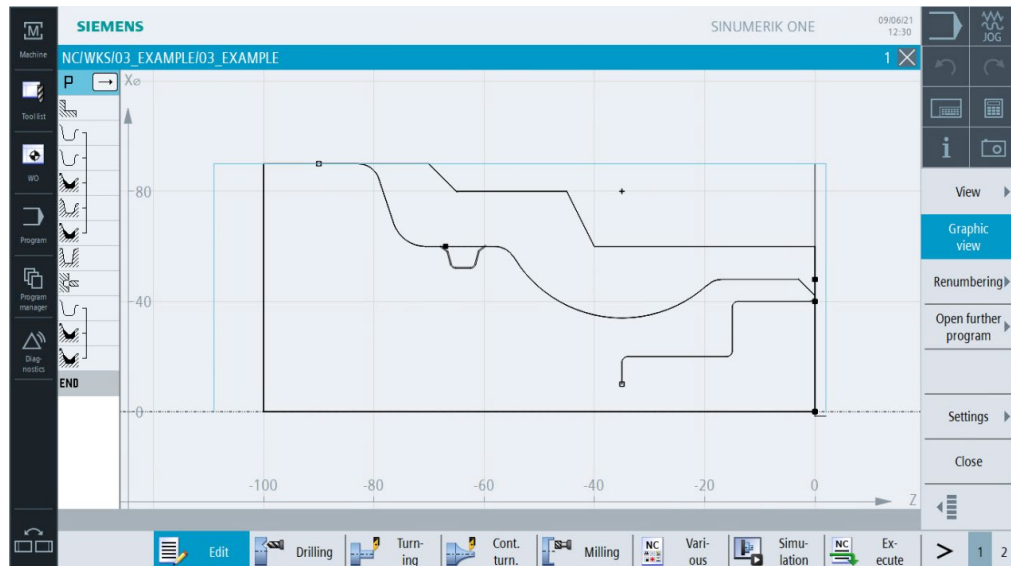


- Reduced programming time due to linking of machining steps

## 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





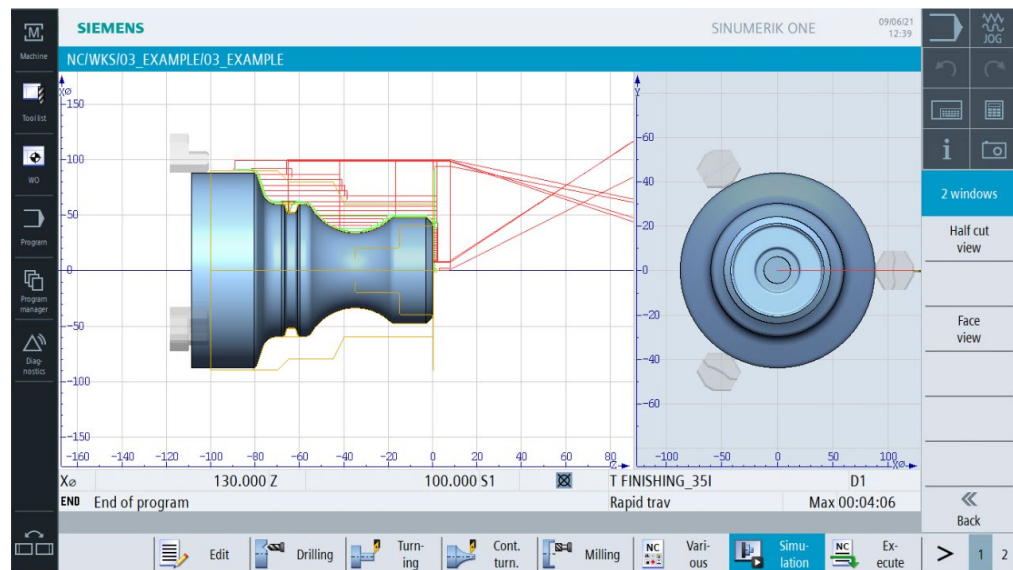
## Workpiece visualization

### 11.1 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



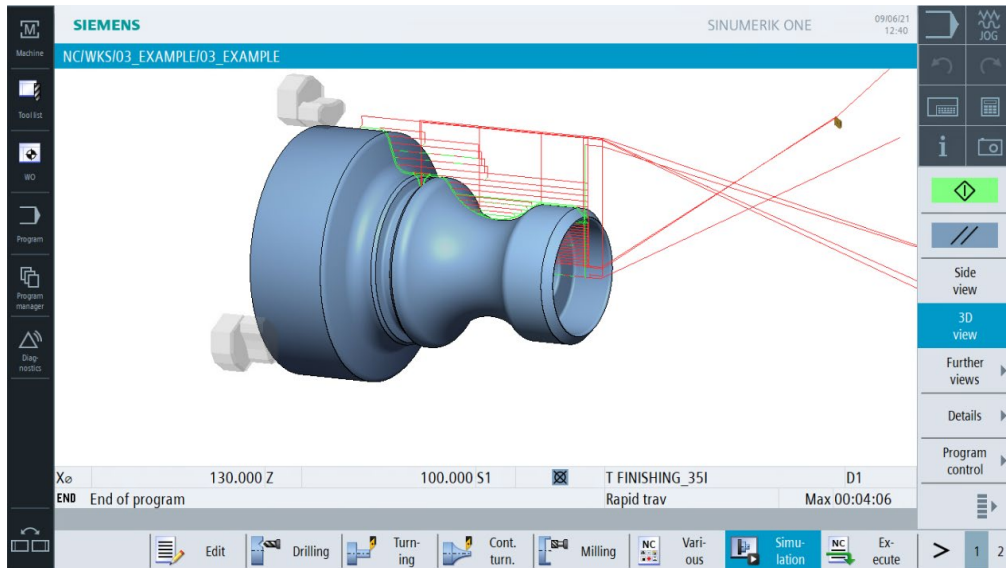
- Maximum process reliability through simulation using real geometry values
- Perfect clarity by showing the workpiece dimensions with a scale

## 11.2 3D simulation

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: P25	<input checked="" type="checkbox"/>	Option: P25	<input checked="" type="checkbox"/>	Option: P25	<input checked="" type="checkbox"/>	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

### 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



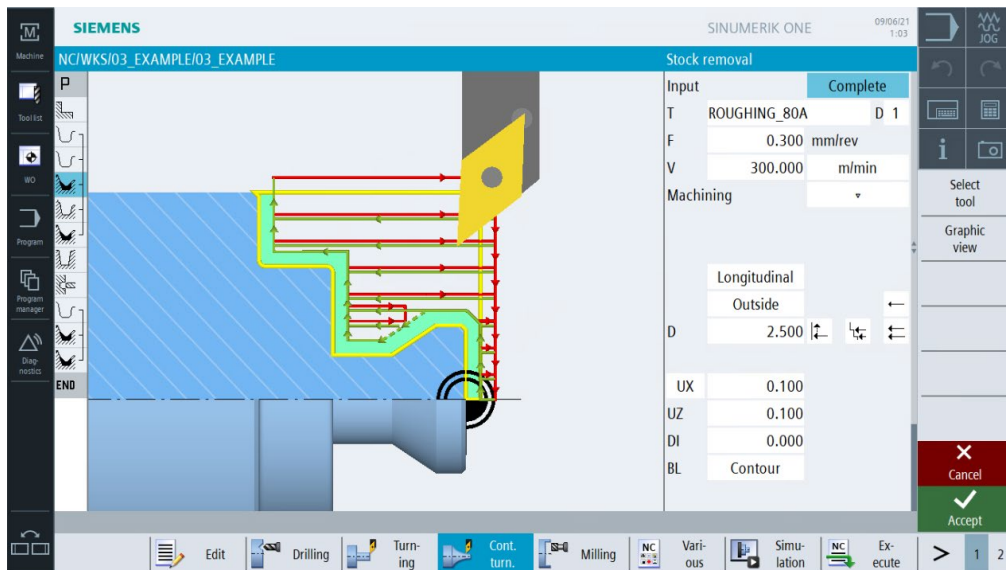
- Significant simplification of programming, even for complex jobs, using CNC technology cycles
- Continuity of cycles for programGuide and ShopTurn

## 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

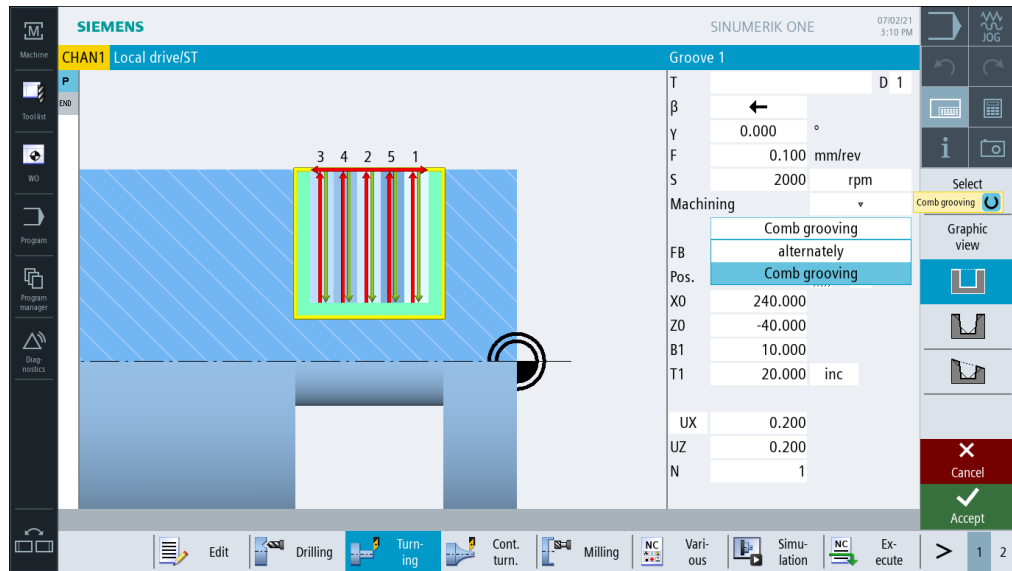


- Effective processing through orientation to the actually existing material
- Lower risk of accident and better chip disposal through feed interruption

## 12.2.2 Comb grooving

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: S58	<input checked="" type="checkbox"/>	Option: S58	<input checked="" type="checkbox"/>	Option: S58	<input checked="" type="checkbox"/>	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

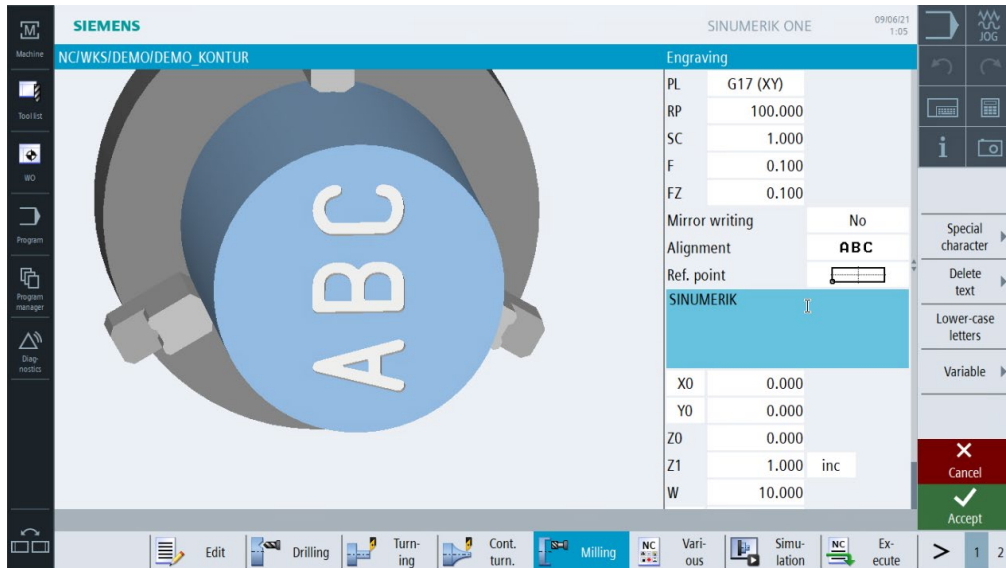
### 12.2.3 Engraving cycle

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	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



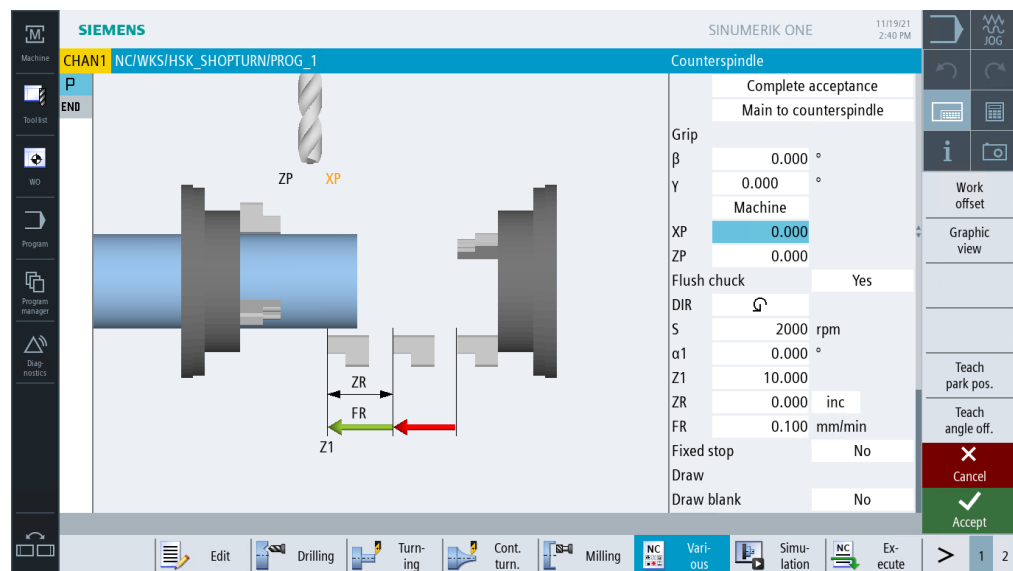
- Reduction of set-up times by complete machining on one machine
- Simple program input of engraving

## 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

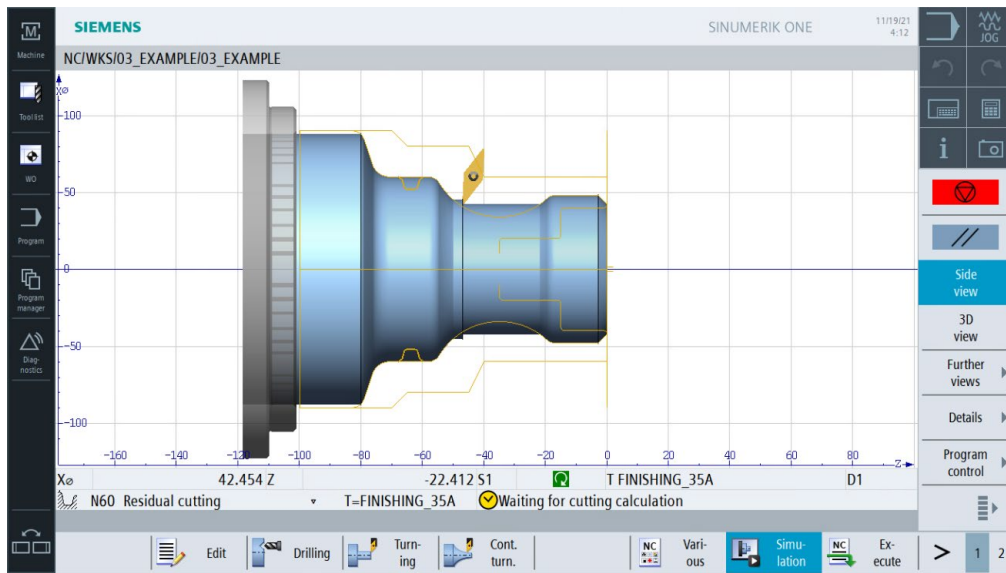


- Simple and secure programming of all counterspindle functions
- High quality of workpieces by workpiece transfer in synchronous spindle mode

## 12.3 Residual material detection for contour cycles

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: P13	<input checked="" type="checkbox"/>	Option: P13	<input checked="" type="checkbox"/>	Option: P13	<input checked="" type="checkbox"/>	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

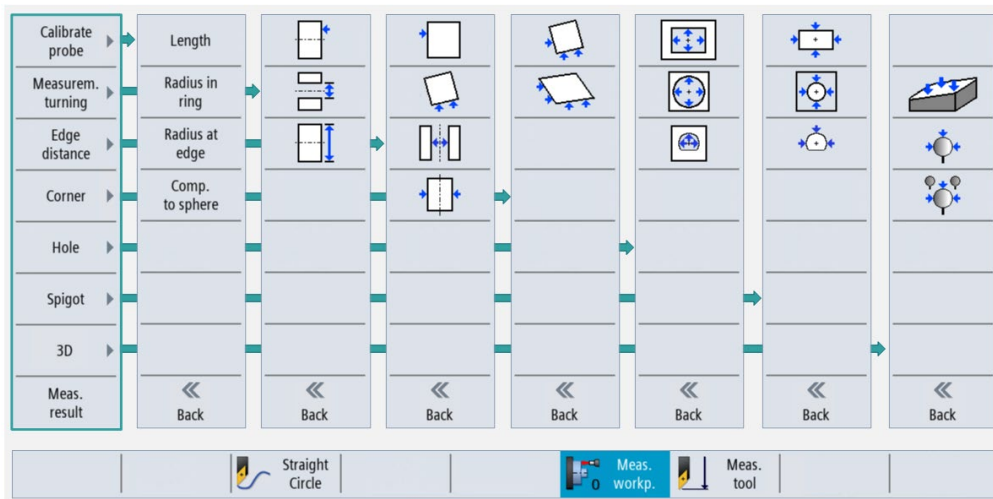


## 12.4 Measuring functions for workpieces and tools

✓	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
- Determination of the tool length of turning tools and drills
- Determination 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

### 13.1 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) .

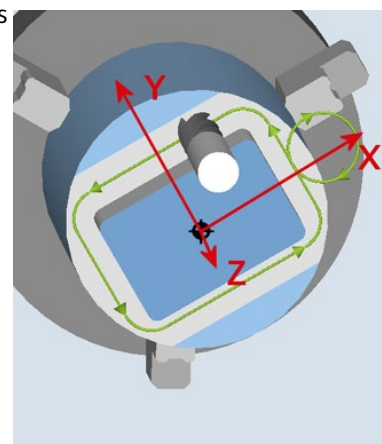
The path movements are conducted with the linear axes X / Z and the rotary axis C.

#### 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

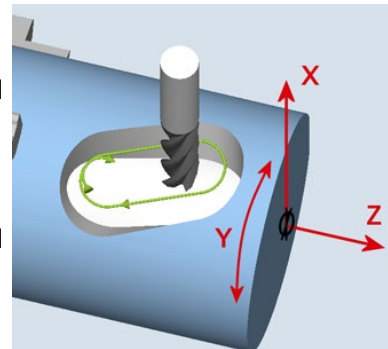
Using the peripheral surface transformation TRACYL, drilling and milling machining can be executed on the peripheral surface of workpieces in the main and counterspindle.

### 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

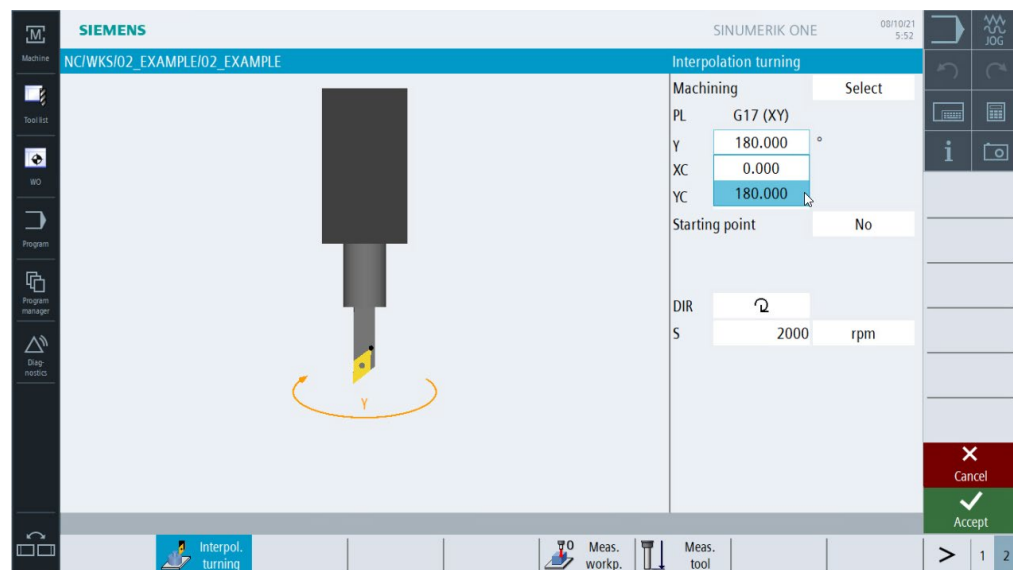
## 13.3 Interpolation turning

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
	Option: P57		Option: P57		Option: P57		Option: P57

For interpolation turning, the CNC guides the turning tool in a position-controlled way around a fixed workpiece. For this purpose, the main spindle of the machining center is switched to position-controlled mode (also called axis mode). The feed axes interpolate in a spiral/circular arrangement in the x-y/x-y-z plane, while at the same time the main spindle with the turning tool tracks the feed axes.

**Application examples:** Stock removal (longitudinal/face turning and contour turning), recessing, grooving on cubic workpieces produced on milling machines

**Examples for workpieces:** Sealing surfaces for master brake cylinder, brake caliper, hydraulic valve housing, pivot bearing, or gearbox housing







### Benefits



- Off-center turning on machining centers (milling machines) and turning machines with a B axis with reduced machining time because machining operations are completed in one clamping operation
- Reduced investment costs

## 13.4 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, spigot 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

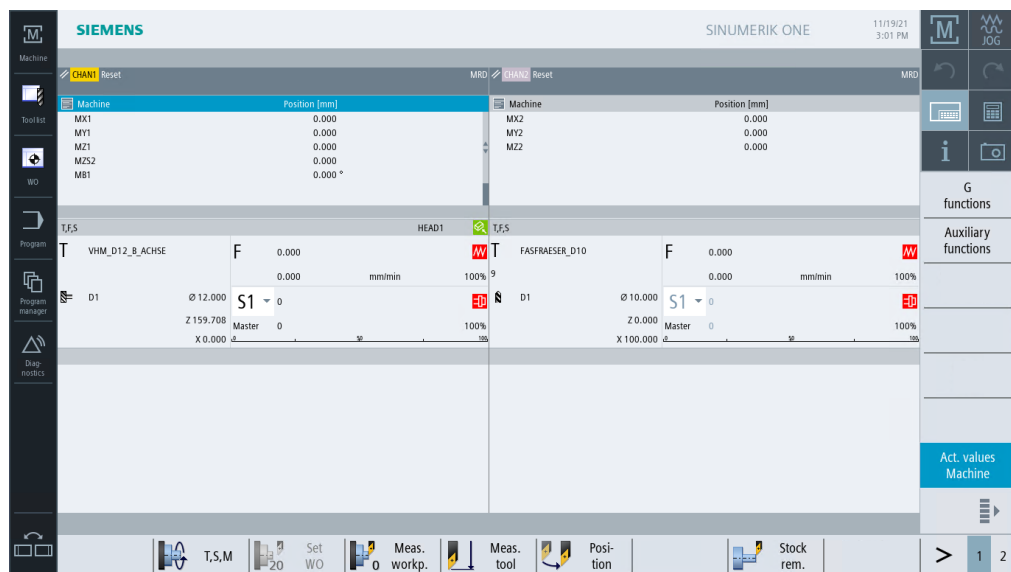
### 14.1 Overview

	<b>SINUMERIK ONE PPU 1740</b>		<b>SINUMERIK ONE NCU 1740</b>		<b>SINUMERIK ONE NCU 1750</b>		<b>SINUMERIK ONE NCU 1760</b>
	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.



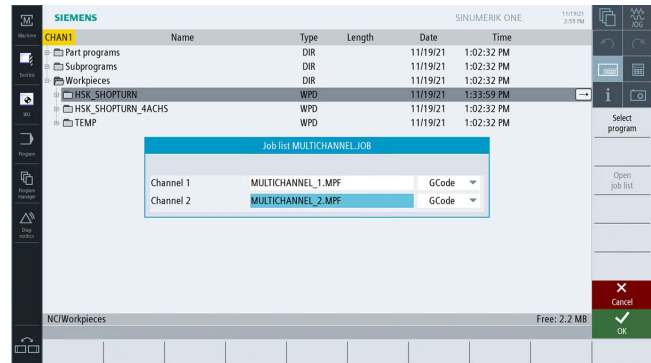
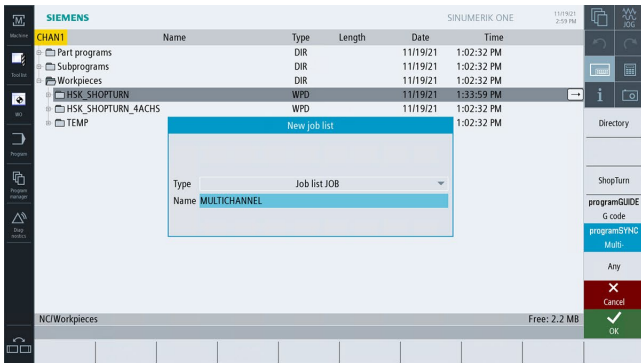
#### Benefit



- 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



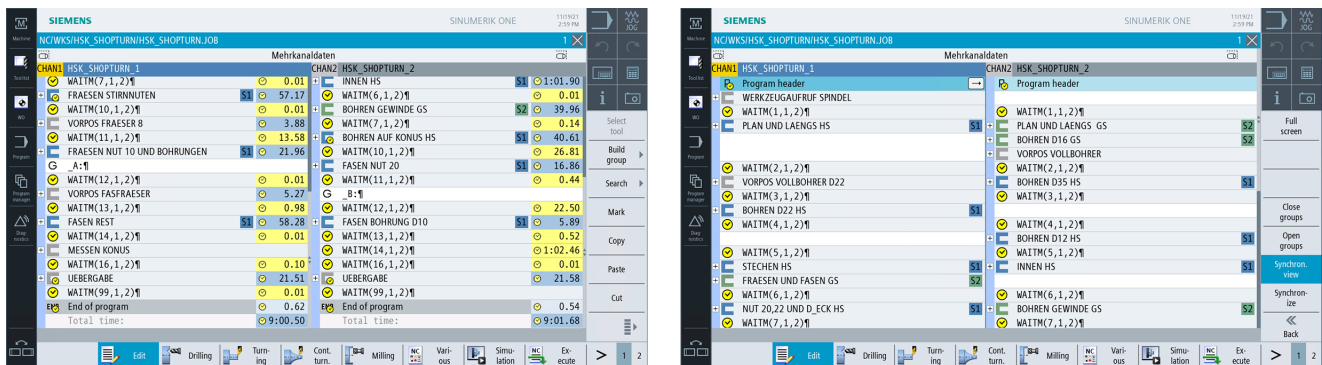
- Simple program management in Windows Explorer style



## 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

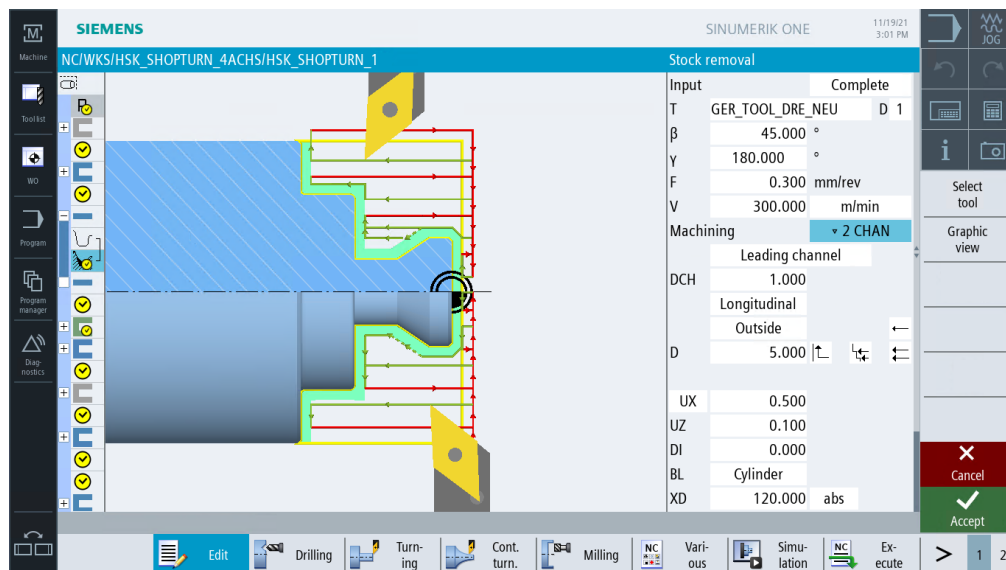
## 14.4 Balance cutting (stock removal)

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.



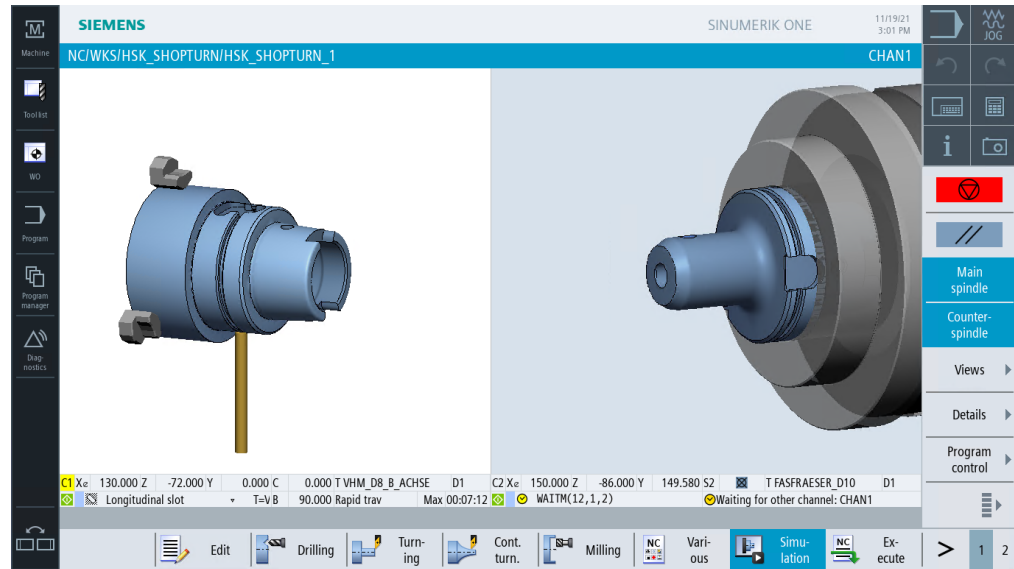
### Benefit



- Cycle 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



## 15.1 SINUMERIK Run MyRobot /Direct Handling

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
	Option: P84		Option: P84		Option: P84		Option: P84

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.**



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 98)
  - Manage MyResources /Programs (Page 99)
- Efficiency and flexibility in production
  - Analyze MyPerformance (in line) (Page 100)
  - Analyze MyPerformance /OEE Monitor (MindSphere) (Page 101)
  - Analyze MyPerformance /OEE Tuning (MindSphere) (Page 102)
  - Manage MyMachines (Page 103)
  - Manage MyMachines /Remote (Page 104)
- Machine availability
  - Analyze MyMachine /Condition (Industrial Edge for Machine Tools) (Page 111)
  - Optimize MyMachining /Trochoidal (Industrial Edge for Machine Tools) (Page 108)
  - Optimize MyMachining /Adaptive Control (Page 105)
- Improved machining processes
  - Industrial Edge for Machine Tools (Page 107)
  - Analyze My Workpiece /Capture (Industrial Edge for Machine Tools) (Page 109)
  - Analyze My Workpiece /Monitor (Industrial Edge for Machine Tools) (Page 110)
  - Analyze My Workpiece /Toolpath (Industrial Edge for Machine Tools) (Page 112)

---









## 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

The Manage MyResources /Programs application ensures centralized management as well as efficient and secure provision of NC programs. This is an important step toward paperless manufacturing and increases the clarity and transparency of NC program management.









- 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 NC program management**

## 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

	<b>SINUMERIK ONE PPU 1740</b>		<b>SINUMERIK ONE NCU 1740</b>		<b>SINUMERIK ONE NCU 1750</b>		<b>SINUMERIK ONE NCU 1760</b>
	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



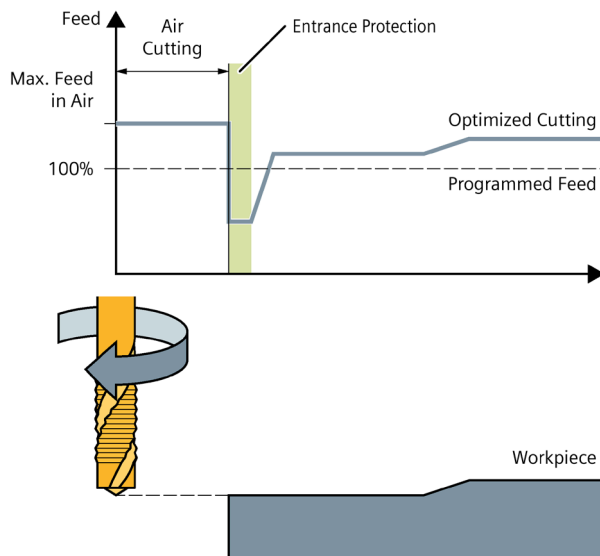
- **Faster problem solving and higher machine availability**
- **Improved service response time and quality**

## 16.8 Optimize MyMachining /Adaptive Control

✔	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 /Adaptive Control monitors the current cutting conditions in real-time and automatically adjusts the feedrate to the optimum speed.

- If an overload is detected, Optimize MyMachining /Adaptive Control 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**











- Optimize MyMachining /Adaptive Control boosts productivity, extends the machine and tool life, and ensures a stable production process.



## 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

### 17.1 DXF Reader

<input checked="" type="checkbox"/>	SINUMERIK ONE PPU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1740	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1750	<input checked="" type="checkbox"/>	SINUMERIK ONE NCU 1760
<input checked="" type="checkbox"/>	Option: P56	<input checked="" type="checkbox"/>	Option: P56	<input checked="" type="checkbox"/>	Option: P56	<input checked="" type="checkbox"/>	Option: P56

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

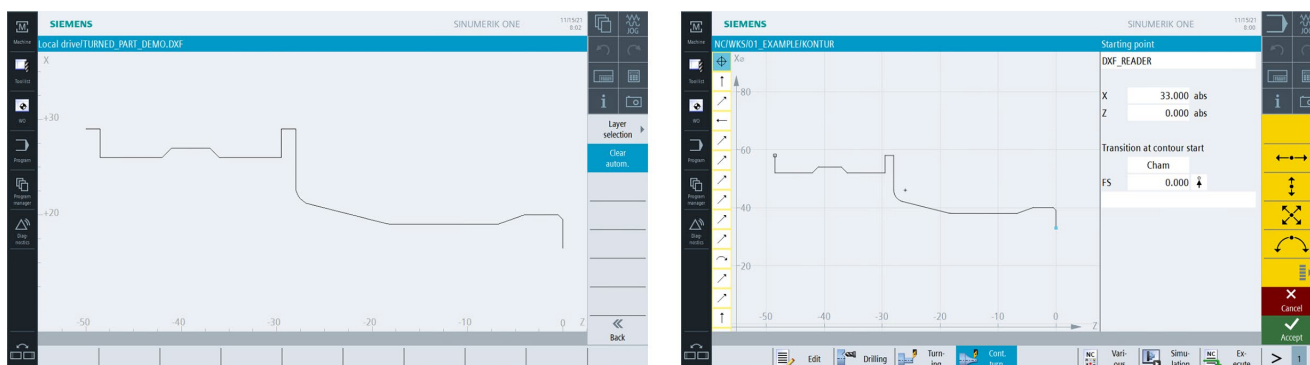
- **DXF Reader in the Program Manager**

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 Run MyScreens

	SINUMERIK ONE PPU 1740		SINUMERIK ONE NCU 1740		SINUMERIK ONE NCU 1750		SINUMERIK ONE NCU 1760
	Option: P64		Option: P64		Option: P64		Option: P64

With "Run MyScreens" you can design your own operating screens and implement user-specific function extensions. You can also implement your own cycle screen forms that can also be called from the part program editor.

Configuring examples for new screen forms, which can also be used as the basis for the user's own new screen forms, can be found in the supplied toolbox.

"Run MyScreens" is configured using ASCII files and then interprets them. The ASCII files contain the descriptions for the layout of interactive screen forms, softkey functions, and texts and images to be displayed. These configuring files are created with the ASCII editor, taking into account certain special rules of syntax.

### Benefit



- **Configuration language with simplified syntax, including do-while loops, string and file functions (reading and writing text file and drive data, string processing, password function)**
- **Integration of 3D-animated graphics with animated elements**



## 17.3 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>)

## 17.4 Video tutorials

Below you will find selected video tutorials.

- **SINUMERIK live Milling of freeform surfaces**

Milling of freeform surfaces using 3-axis milling machines

 Video tutorial (<https://youtu.be/l7Ywm6jVf8k>)

- **SINUMERIK live Dynamic 5-axis machining with SINUMERIK Operate**

Programming dynamic 5-axis machining directly in SINUMERIK Operate – Basics, possibilities, and limits

 Video tutorial (<https://youtu.be/OYVqEm7CIUU>)

- **SINUMERIK live Machine-integrated workpiece measurement / 3-axis milling**

Machine-integrated workpiece measurement for 3-axis milling – Principle and application with SINUMERIK Operate

 Video tutorial (<https://youtu.be/BR4cnKyOTjI>)

- **SINUMERIK live Cylinder surface transformation**

Cylinder surface transformation (TRACYL) with SINUMERIK

 Video tutorial (<https://youtu.be/gHcD51oBjhs>)

- **SINUMERIK live - Multi-sided machining milling (3+2 axes)**

Basics of milling and 3+2 axis milling with SINUMERIK Operate

 Video tutorial (<https://youtu.be/uPX1SIVDndQ>)

- **Interpolation turning**

With the help of the technology cycle (CYCLE959) "Interpolation turning", it is possible to perform turning processes on milling machines without rotary axes. Corners on external and internal contours can thus be beveled longitudinally and flat.

Note: Video tutorial in English only

 Video tutorial (<https://youtu.be/zt6qug4SnCY>)

- **SINUMERIK live Effective multiple clamping**

Effective multiple clamping – Principle and application with SINUMERIK Operate

 Video tutorial (<https://youtu.be/nzUnDInd-ZE>)

- **Managing tools with Manage MyTools**

If you want to operate multiple machines efficiently, you need to manage the required tools. SINUMERIK Integrate for production Manage MyTools [www.siemens.com/sinumerik-integrate](http://www.siemens.com/sinumerik-integrate) provides centralized tool data management, presetter connectivity, tool planning, and (utilization) statistics. Access is possible both on the server and in SINUMERIK.

 Video tutorial (<https://youtu.be/-IK1SFm-nos>)

- **Tool and program management for the shopfloor with Manage MyResources**

➤ Introduction and video tutorials for Manage MyResources  
(<https://new.siemens.com/global/en/markets/machinebuilding/machine-tools/cnc4you/cnc4you-videos/ttt-gen/manage-myresources-tutorials.html>)

- **Managing NC programs with Manage MyPrograms**

If you have to manage many part programs and versions before production, you need an efficient tool to organize and distribute files to machines. SINUMERIK Integrate for production Manage MyPrograms [www.siemens.com/sinumerik-integrate](http://www.siemens.com/sinumerik-integrate) enables paperless manufacturing by allowing you to easily transfer programs and production information to machines.

▶ Video tutorial (<https://youtu.be/MUvNBap7Sns>)

- **Industrial Edge for machine tools**

With Industrial Edge for machine tools, the high-frequency data streams generated during manufacturing in the CNC are analyzed and processed in an application-specific manner.

➤ Tutorials on Edge Computing on machine tools  
(<https://new.siemens.com/global/en/markets/machinebuilding/machine-tools/cnc4you/>)

- **Unique 3D tool path analysis with Analyze MyWorkpiece /Toolpath**

The PC-based software Analyze MyWorkpiece /Toolpath helps increase productivity and part quality by analyzing and optimizing NC programs and SINUMERIK trace data with modern 3D visualization. This allows errors in the NC program to be detected at an early stage and non-optimal retraction movements of the machine to be detected.

▶ Video tutorial (<https://youtu.be/sHWR8t9NohY>)

- **SINUMERIK live – Use of DXF for CNC programming**









"In the SINUMERIK live video series, we present application technology, explained in an easy and understandable way. You are introduced to the productive and professional use of SINUMERIK control functions using theoretical and practical examples. We will start with the topic "DXF application: Faster from the drawing to the component – Possibilities and limits".

▶ Video tutorial (<https://youtu.be/XGXqqJtFYNs>)



## Safety functions

### 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
- Max. number of protection area facets/up to 5000 triangles
- 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**



# Index

## 8

80-bit NANO floating-point accuracy, 51

## A

Animated Elements, 23

## B

Balance cutting, 92  
Basic block display, 47  
Block cycle times, 52  
Block processing times, 52  
Block search, 43

## C

CNC technology cycles  
    programGuide, 77  
    ShopTurn, 77  
Collision avoidance, 121  
Collision avoidance ECO, 120  
Comb grooving  
    Groove 1, 79  
    Groove 2, 79  
Configured stop, 45  
Contour stock removal cycle, 78  
Contour-grooving, 78

## D

Digital twin  
    Run MyVirtual Machine, 17  
DIN/ISO language, 68  
DIN/ISO programming, 68

## E

End face machining, 85  
Engraving cycle, 80

## F

Feed interruption, 78  
Feedforward control, 54

## G

G code editor, 67

## I

In-process measurement, 83

## M

Measuring tools, 32  
Monitoring of service life and workpiece count, 38  
Multi-channel machining  
    Blocks, 91  
    Job list, 90  
    Machine basic screen, 89  
    programSYNC, 90  
    Simulation, 93  
    Wait marks, 91  
Multi-touch operation  
    Gestures, 25

## N

Nodding compensation, 56

## O

Online Help, 24

## P

Peripheral surface machining, 86  
Plunge-turning, 78  
Positioning cycle, 34  
Program editor, 67  
Program manager, 41  
Protect MyMachine /3D Primitives, 120  
Protect MyMachine /3D STL, 121

Protect MyMachine /Open, 122

## R

Replacement tools, 39  
Residual material detection during turning, 82  
Run MyVirtual Machine  
    Digital twin, 17

## S

Safety functions, 119  
Safety Integrated, 119  
Sequence editor, 71  
Shortcuts, 28, 28  
Simulation  
    2D, 75  
    3D, 76  
    Processing time, 76  
Simultaneous recording, 48  
SINUMERIK CNC4you, 115  
Speed control, 53  
Stock removal cycle, 33

## T

Tool management, 37  
Tool requirement, 49  
TRACYL, 86  
TRANSMIT, 85  
TSM universal cycle, 29