Sinumerik ONE vs. SIMATIC Technology - G-CODE

Siemens Drives Days 2022, Dolní Morava

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Kdo prezentuje

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Co je to „G-CODE“?

G-code

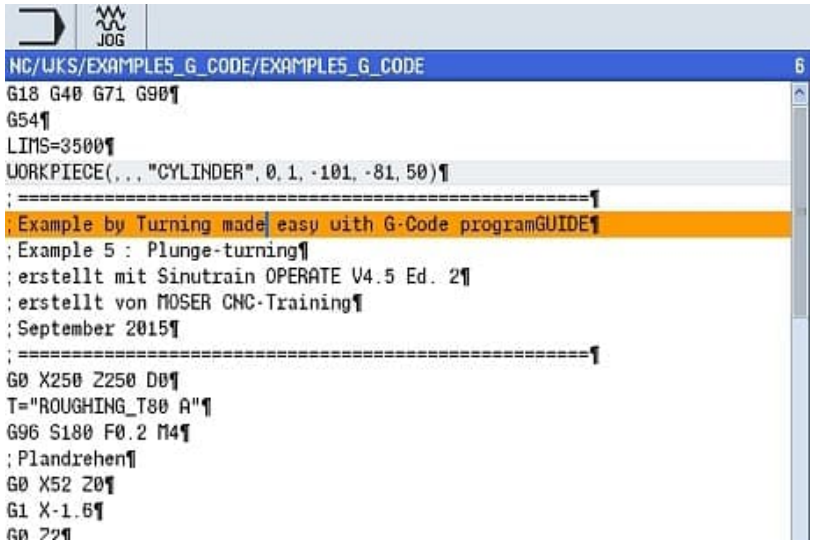
From Wikipedia, the free encyclopedia

For other uses, see G-code (disambiguation) and G programming language (disambiguation).
"RS-274" redirects here. For the photoplotter format, see Gerber format.

G-code (also **RS-274**) is the most widely used computer numerical control (CNC) programming language. It is used mainly in computer-aided manufacturing to control automated machine tools, and has many variants.

G-code instructions are provided to a machine controller (industrial computer) that tells the motors where to move, how fast to move, and what path to follow. The two most common situations are that, within a machine tool such as a lathe or mill, a cutting tool is moved according to these instructions through a toolpath cutting away material to leave only the finished workpiece and/or an unfinished workpiece is precisely positioned in any of up to nine axes[1] around the three dimensions relative to a toolpath and, either or both can move relative to each other. The same concept also extends to noncutting tools such as forming or burnishing tools, photoplotting, additive methods such as 3D printing, and measuring instruments.

https://en.wikipedia.org/wiki/G-code



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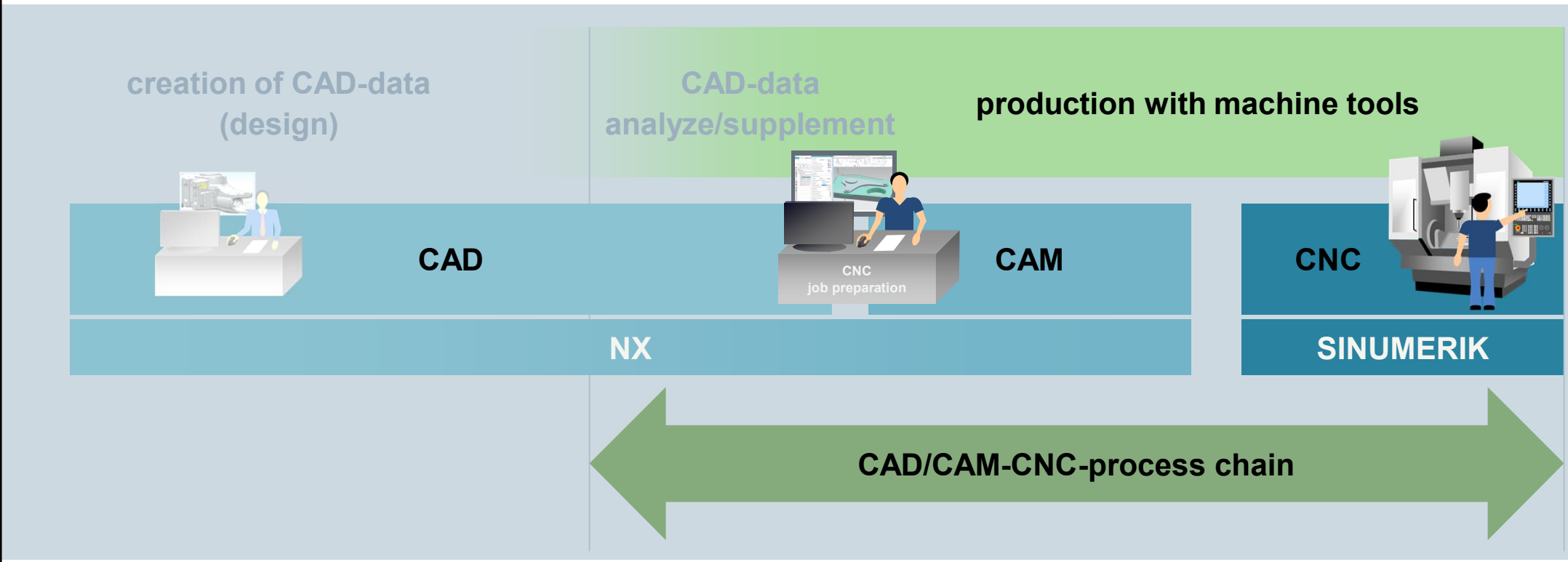
CAD/CAM-CNC-process chain
- production with machine tools



The term **CAD/CAM-CNC-process chain** primarily reflects the **production** environment **with machine tools**.

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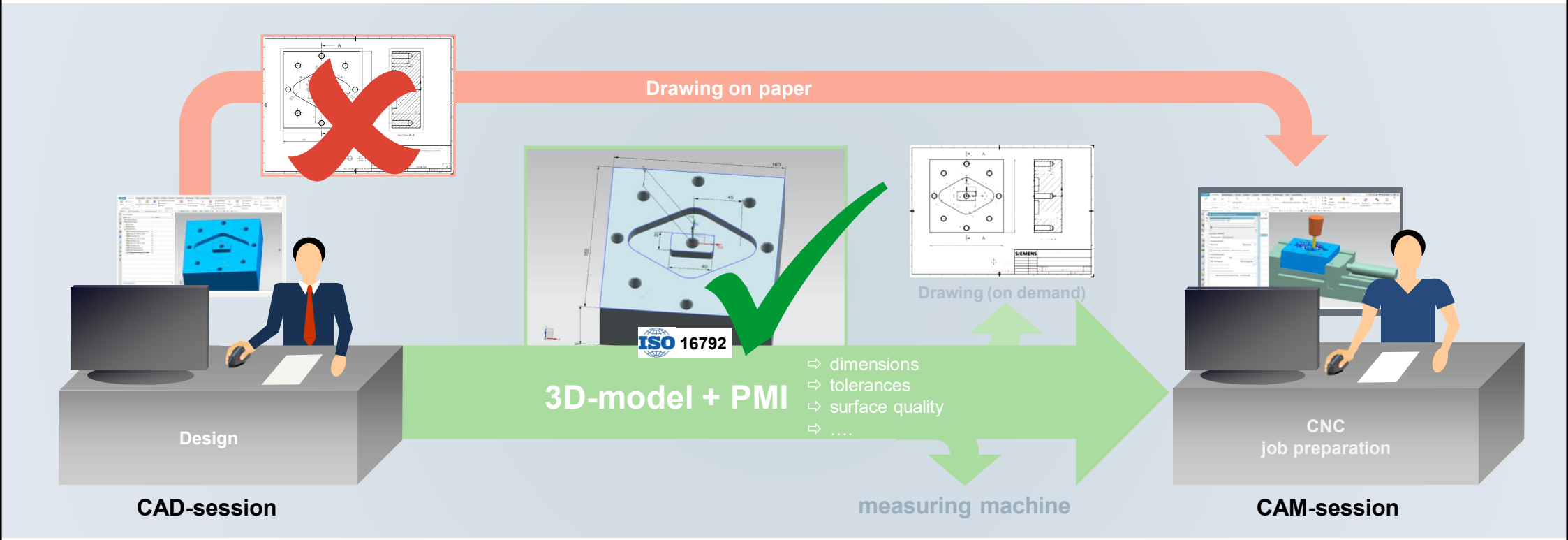
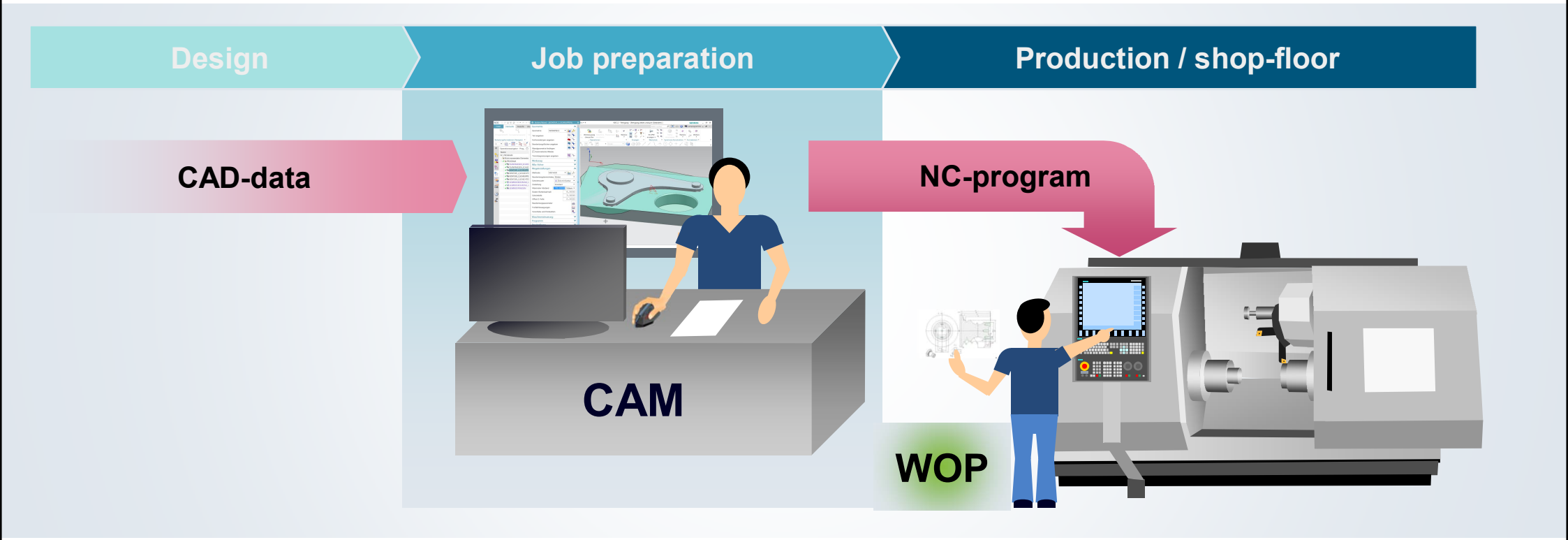
Product Manufacturing Information (PMI) in NX
- the consequent step towards paperless production



Product manufacturing information (tolerances, dimensions ...) can be **assigned to the CAD master model** in NX and are thus available in the CAM session **without detour via technical drawings**.

CAM
- Computer-aided manufacturing



Computer-aided manufacturing refers to the use of **software that is independent of the CNC** machine to generate the NC code. In contrast to workshop-oriented programming (WOP), **NC programs are created in the job preparation phase**.

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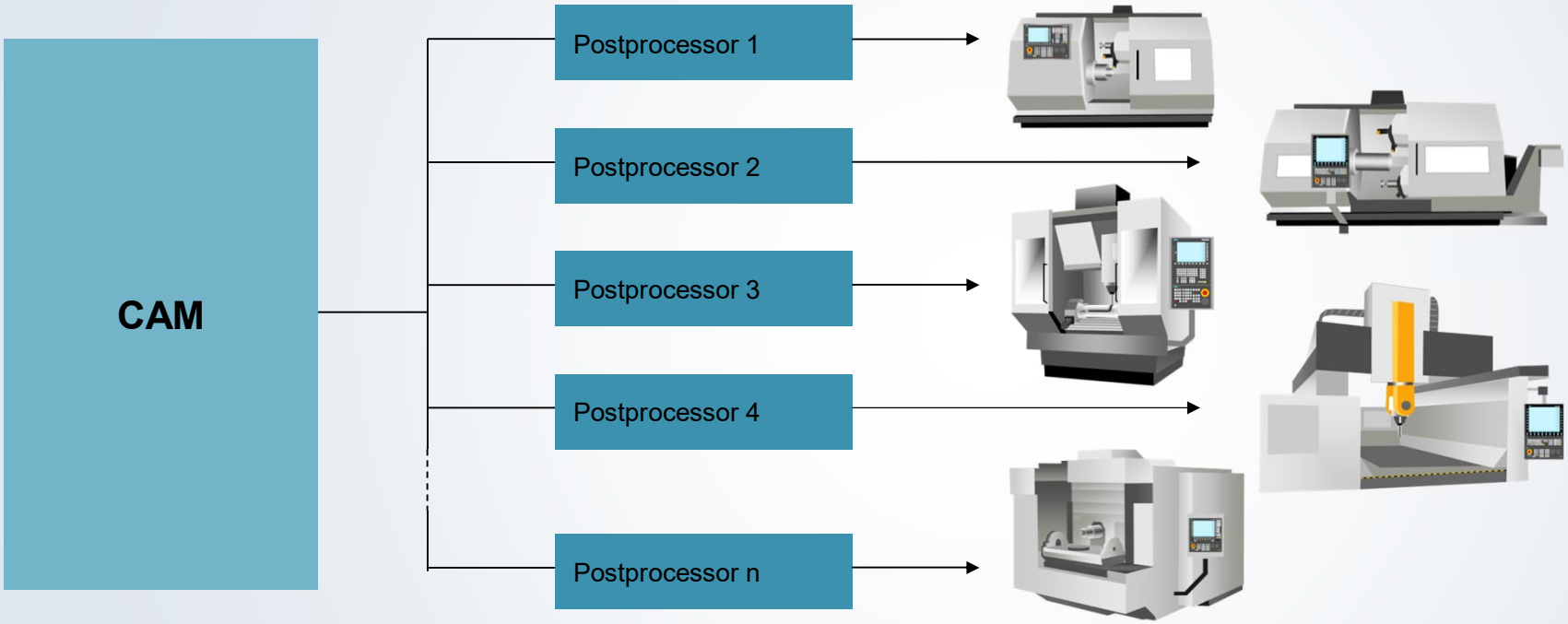
Postprocessor
- individual for each machine



Individual Postprocessors for …

- each CAM-system
- each CNC-type
- each machine type

Postprocessors of each CAM system must be **individually adapted** for the CNC type but also for each machine type.

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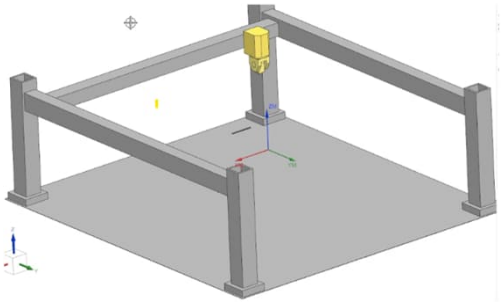
Získal jsem G-CODE, co dále?



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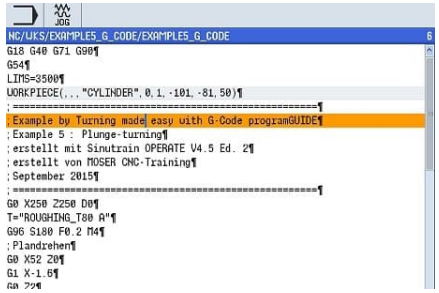


Mechanika + elektrovybavení + řízení… **Sinumerik ONE nebo? S7-1500T** + „program“ v G-CODE

U obráběcího stroje je to jasná volba – Sinumerik ONE ☺ Co ale ostatní aplikace?

Varianta SIMATIC Technology

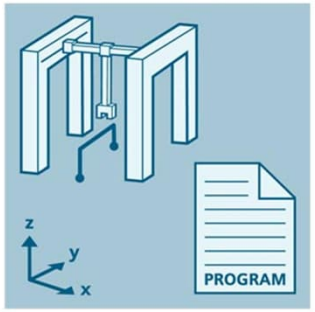
Entry type: **Application example** Entry ID: **109767009**, Entry date: **11/26/2021**

★★★★☆ (29)
> Rate

SIMATIC S7-1500T Kinematics Language

Entry | Associated product(s)

The library LKinLang enables textual motion programming of kinematics. Besides the possibility to define user-specific textual languages, the motion program can also be defined in G-Code.



Motion programming with textual languages is comfortable and widely-used in many industries. Therefore, the standard application SIMATIC Kinematics Language enables the user to easily define a motion program for kinematics using different textual languages without an engineering system.

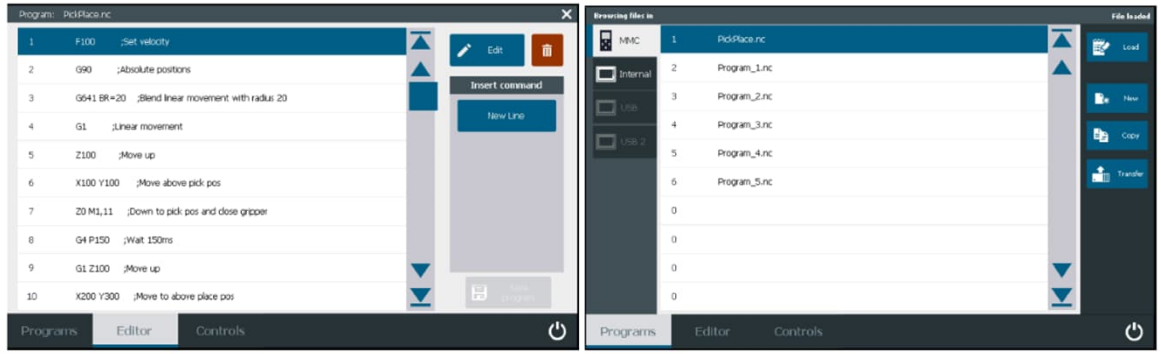
The library function blocks parse the textual program commands in a list (PathData), from where the commands are automatically executed by the function block MC_MovePath (library LKinCtrl > 109755891).

Besides the possibility to define user-specific textual languages, the motion program can also be defined in G-Code. The program commands can be created manually using text editors or in case of G-Code by export of suitable (CAD) - software. The resulting program will be stored on the SIMATIC memory card. File transfer is possible by accessing the web server via the user files or using the file transfer tool.

Following benefits are provided with this library:

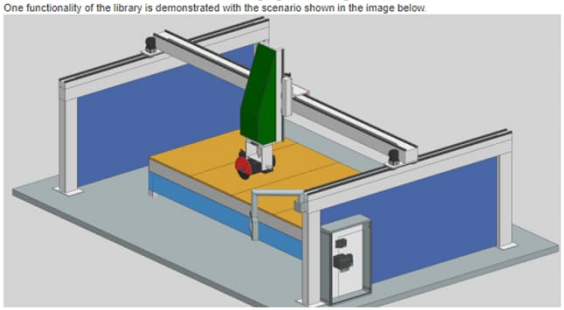
- comfortable motion programming using textual languages
- G-Code programming with limited instruction set
- user-defined language definition
- 4D path interpolation
- storage of textual program files on memory card
- program file transfer via web server or transfer tool
- mathematical functions for programming
- control structures and variables for programming

SIMATIC HMI Faceplates



SIMATIC File Transfer
The additional file transfer tool for windows enables to easily transfer files to the memory card from a computer connected to the SIMATIC PLC. Using the transfer tool the manual access to the web server can be avoided.

NX MCD / SIMIT Model for SIMATIC Kinematics Language - Machining Centers
One functionality of the library is demonstrated with the scenario shown in the image below.



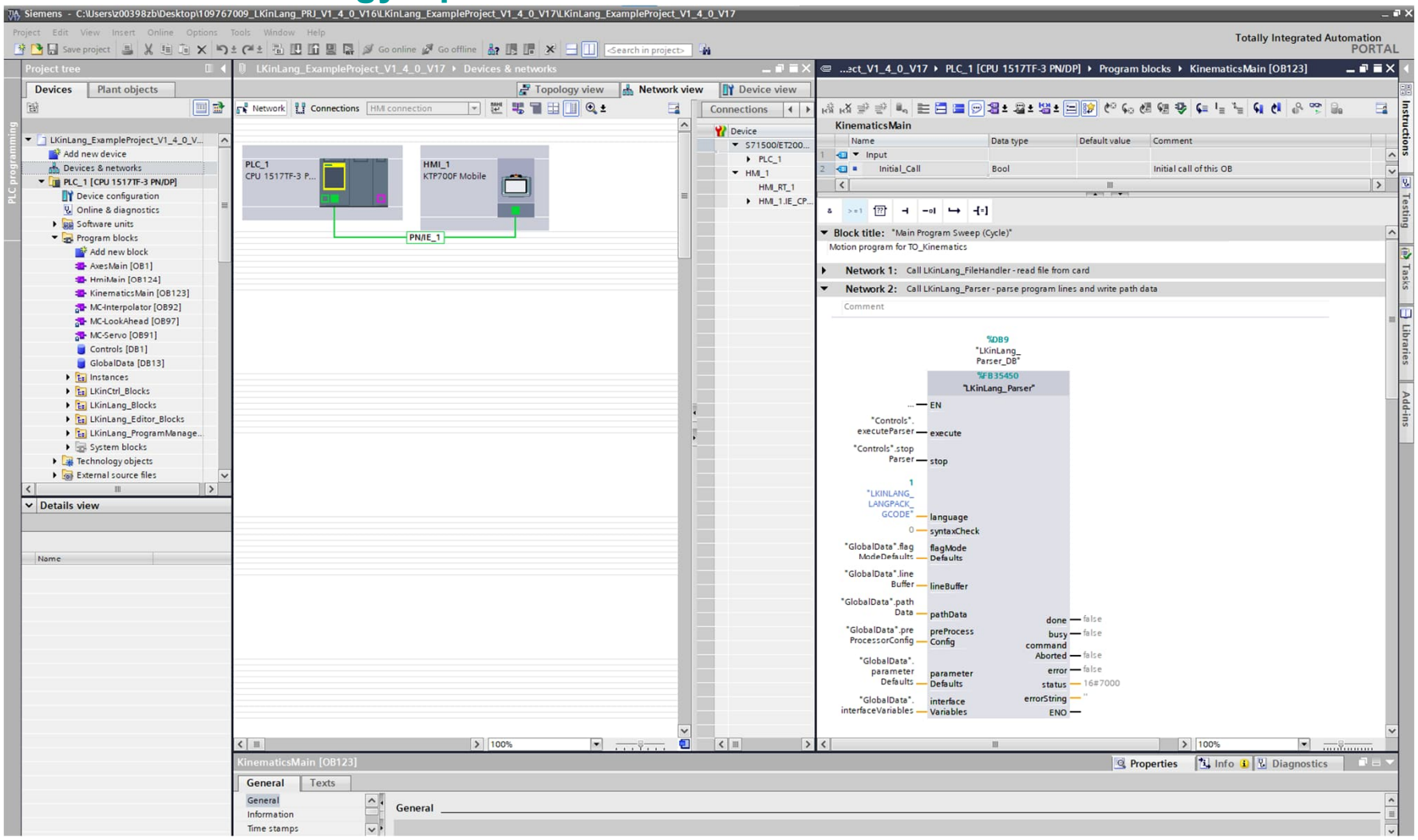
Downloads

- Documentation V1.4.0 (3,8 MB)
- Library V1.4.0 for STEP 7 V16 (7,2 MB)
- Example Project for STEP 7 V16 (11,5 MB)
- SIMATIC FileTransfer V1.1.6 (0,4 MB)

- Changelog V1.4.0 (0,5 KB)

https://support.industry.siemens.com/cs/ww/en/view/109767009 +
https://support.industry.siemens.com/cs/ww/en/view/109755891

Varianta SIMATIC Technology – praktická ukázka



Varianta SIMATIC Technology – cena v LP – bez slev

Záruka (12-60 m.) 12

EEO (6-48 m.): 0

Sestava č.1.

Pozice	Počet	Objednací číslo	Popis	Zákaznická Cena/ks €	Cena €	Sleva	Ceníková Cena/ks €	Hmotnost Brutto		Rozměr obalu d x š x v	Termín vyskład. prac. dny
10	1	6ES7517-3FP00-0AB0	SIMATIC S7-1500F, CPU 1517F-3 PN/DP, Central processing unit with Work memory 3 MB for Program and 8 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 3rd interface: PROFIBUS, 2 ns bit performance, SIMATIC Memory Card required	6 082,00	6 082,00		6 082,00	2,072	KG	22,3x19,8x15,9 CM	175
20	1	6ES7954-8LL03-0AA0	SIMATIC S7, MEMORY CARD FOR S7-1X00 CPU, 3,3 V FLASH, 256 MBYTE	397,00	397,00		397,00	0,029	KG	10,6x9,4x0,7 CM	30
		HMI		0,00	0,00						
30	1	6AV2124-0UC02-0AX1	SIMATIC HMI TP1900 Comfort, Comfort Panel, Touch operation, 19" widescreen TFT display, 16 million colors, PROFINET interface, MPI/PROFIBUS DP interface, 24 MB configuration memory, WEC 2013, configurable from WinCC Comfort V14 SP1 with HSP	4 317,00	4 317,00		4 317,00	6,63	KG	66x52x22 CM	200
		CU320-2PN		0,00	0,00						
40	1	6SL3040-1MA01-0AA0	SINAMICS CONTROL UNIT CU320-2 PN WITHOUT COMPACT FLASH CARD	794,76	794,76		794,76	2,5	KG	226x50x300 MM	230
50	1	6SL3054-0FC31-1BA0	SINAMICS S120 CompactFlash card incl. performance expansion incl. licensing (Certificate of License, stored on the card) V5.2 Service Pack 3	531,99	531,99		531,99	0,012	KG	0x0x0	5
				0,00	0,00						
			Součet zákaznických cen v EUR:		12 122,75						
			Součet prodloužené záruky EEO (jednotek EEO/EUR)	0	0,00						
			Celková cena sestavy EUR:		**12 122,75**						
			Orientační cena v Kč:		**297 189,22**						

SINUMERIK ONE

Entry type: **Manual** Entry ID: **109812272**, Entry date: **07/20/2022**

☆☆☆☆☆ (0)
> Rate

SINUMERIK ONE works steps for configuring and commissioning

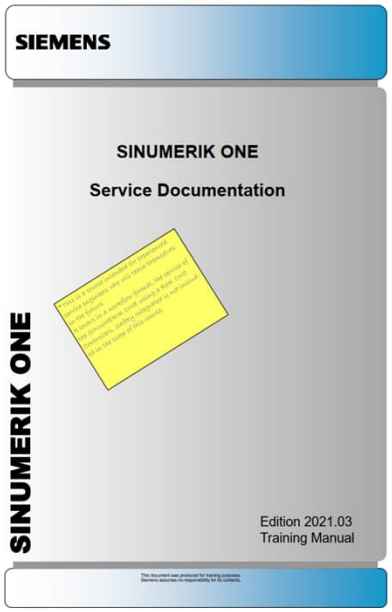
Entry | Associated product(s)

Edition:
07/2022

Commissioning Manual
Document ID number: A5E47490947B AE

Display
Configure
Download (5473 KB)
Download as html5, only PC (19 MB)

https://support.industry.siemens.com/cs/ww/en/view/109812272



Entry ID: **109807400**, Entry date: **03/02/2022**

★☆☆☆☆ (2)
> Rate

Technical Documentation for SINUMERIK ONE, Version 6.15 SP1

The following compilation is intended for manufacturers and users of SINUMERIK machine tools with SINUMERIK ONE, version 6.15 SP1. To make it easier to find the right contents, we have divided our documentation selection into the following categories:

User: Operating
User: Programming
Manufacturer/Service: Functions
Manufacturer/Service: Hardware
Manufacturer/Service: Configuring/commissioning
Manufacturer/Service: Safety Integrated
Information and Training
Manufacturer/Service: SINAMICS

User: Operating

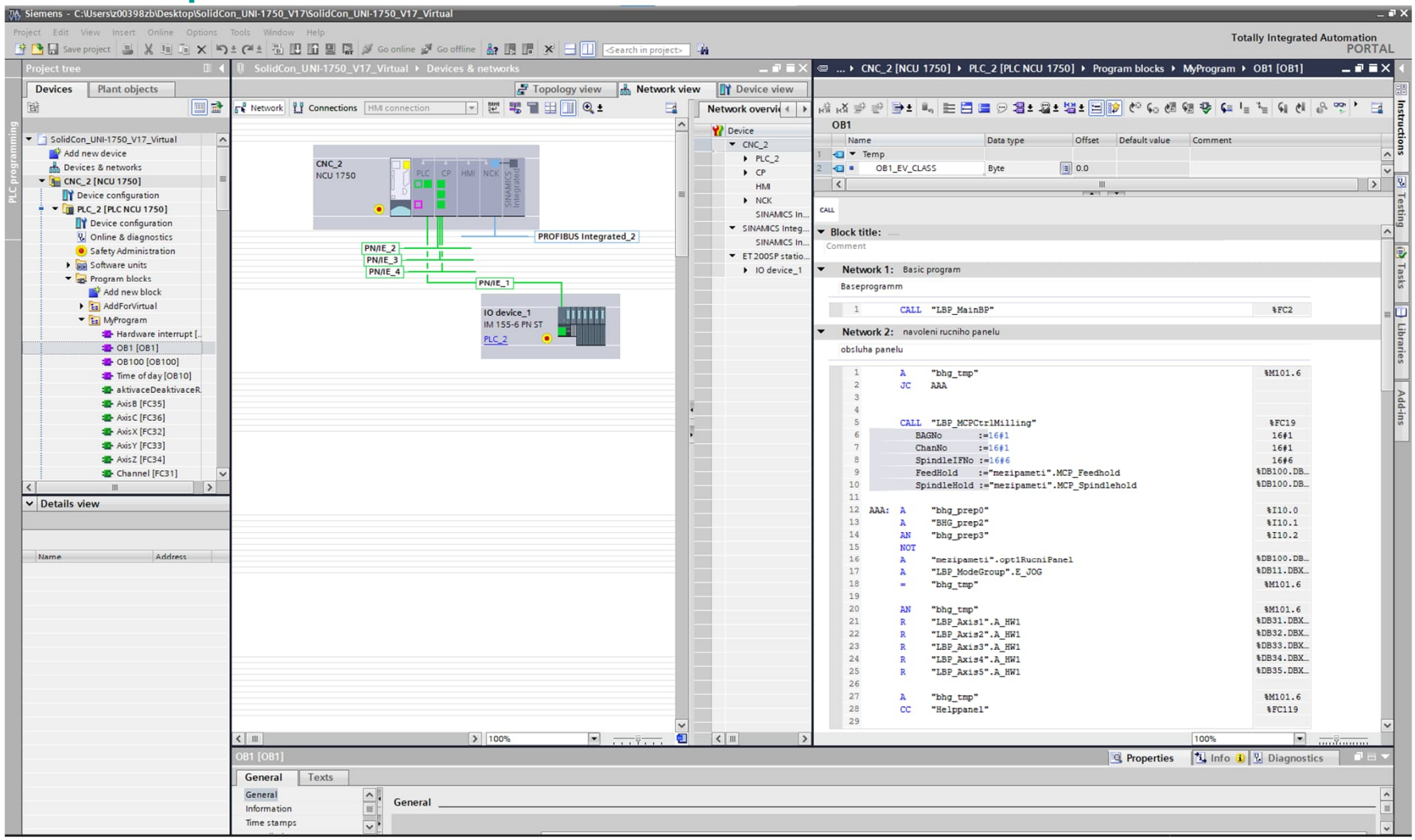
Operating

In our Operating Manuals, you will find information on the operator commands and operator controls of SINUMERIK Operate, tailored to the different processing technologies.

> Operating Manual SINUMERIK ONE Universal
> Operating Manual SINUMERIK ONE Turning
> Operating Manual SINUMERIK ONE Milling
> Operating Manual SINUMERIK ONE Grinding
> Operating Manual SINUMERIK Access MyMachine /P2P (PC)
> Operating Manual SINUMERIK Industrial Edge for Machine Tools Operating Protect MyMachine /3D Twin
> Diagnostics Manual SINUMERIK ONE SINAMICS S120 Alarms

https://support.industry.siemens.com/cs/ww/en/view/109807400

Sinumerik ONE – praktická ukázka



Varianta Sinumerik ONE – cena v LP – bez slev

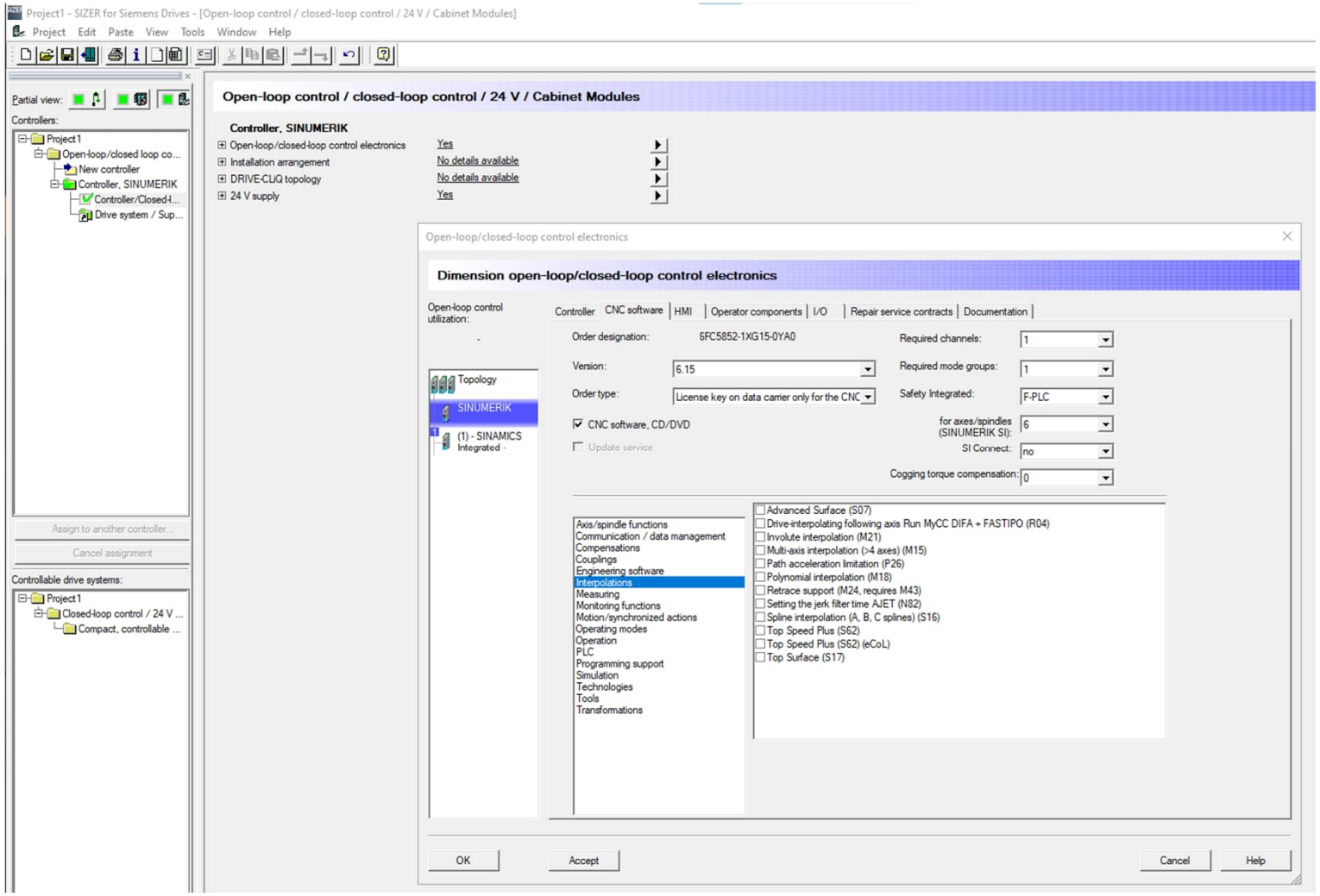
Záruka (12-60 m.) 12

Sestava č.1.

EEO (6-48 m.): 0

Pozice	Počet	Objednací číslo	Popis	Zákaznická Cena/ks €	Cena €	Sleva	Ceníková Cena/ks €	Hmotnost Brutto		Rozměr obalu d x š x v	Termín vysklad. prac. dny
10	1	6FC5317-4AA00-0AA0	SINUMERIK ONE NCU 1740 with PLC-1500F	5 094,02	5 094,02		5 094,02	3	KG	0x0x0	80
20	1	6FC5852-1XG15-0YA0	SINUMERIK ONE CNC software 31-3 software 6.15 6 languages (en,de,fr,it,sp,zh-CHS) on SD card with electronic license (PDF)	2 184,27	2 184,27		2 184,27	0,01	KG	0x0x0	5
30	1	6FC5852-1XC15-0YA8	SINUMERIK ONE CNC software 31-3 with SINUMERIK Operate software 6.15 6 languages (en,de,fr,it,sp,zh-CHS) on DVD, without license	228,83	228,83		228,83	0,03	KG	0x0x0	5
40	1	6FC5800-0BA00-0YB0	SINUMERIK ONE 1 axis/spindle in addition software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	1 571,54	1 571,54		1 571,54	0,01	KG	0x0x0	5
50	2	6FC5800-0BB00-0YB0	SINUMERIK ONE additionally 1 positioning axis/ auxiliary spindle software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	559,70	1 119,40		559,70	0,01	KG	0x0x0	5
60	1	6FC5800-0BS60-0YB0	SINUMERIK ONE Safety Integrated - F-PLC software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	578,92	578,92		578,92	0,01	KG	0x0x0	5
70	6	6FC5800-0BK00-0YB0	SINUMERIK ONE Safety Integrated - axis/spindle software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	160,81	964,86		160,81	0,01	KG	0x0x0	5
80	1	6FC5800-0BN00-0YB0	SINUMERIK ONE additional languages software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	336,39	336,39		336,39	0,01	KG	0x0x0	5
90	1	6FC5800-0BM02-0YB0	SINUMERIK ONE pair of synchronous axes (gantry axes) software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	2 012,72	2 012,72		2 012,72	0,01	KG	0x0x0	5
100	1	6FC5800-0BM55-0YB0	SINUMERIK ONE sag compensation multi-dimensional software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	1 419,92	1 419,92		1 419,92	0,01	KG	0x0x0	5
110	1	6FC5800-0BP12-0YB0	SINUMERIK ONE additional HMI user memory on SD card of the NCU software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	272,97	272,97		272,97	0,01	KG	0x0x0	5
120	1	6FC5800-0BP77-0YB0	SINUMERIK ONE expanded CNC user memory software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	621,29	621,29		621,29	0,01	KG	0x0x0	5
		HMI		0,00	0,00						
130	1	6AV6646-1BA18-0NA0	SIMATIC ITC1900 V3, Industrial Thin Client, 19" widescreen TFT display, capacitive touch sensor, Supported protocols: RDP, VNC, SMARTSERVER HTML5 et. al., Neutral Design, panel mount	2 057,00	2 057,00		2 057,00	7,26	KG	62x40x14 CM	200
140	1	6FC5800-0BS00-0YB0	SINUMERIK ONE SINUMERIK Operate/NCU software option delivery of an electronic license (PDF) ********** email address for delivery is absolutely essential	312,24	312,24		312,24	0,01	KG	0x0x0	5
				0,00	0,00						
			Součet zákaznických cen v EUR:		18 774,37						
			Součet prodloužené záruky EEO (jednotek EEO/EUR)	0	**0,00**						
			Celková cena sestavy EUR:		**18 774,37**						
			Orientační cena v Kč:		**457 719,14**						

Varianta Sinumerik ONE – opce

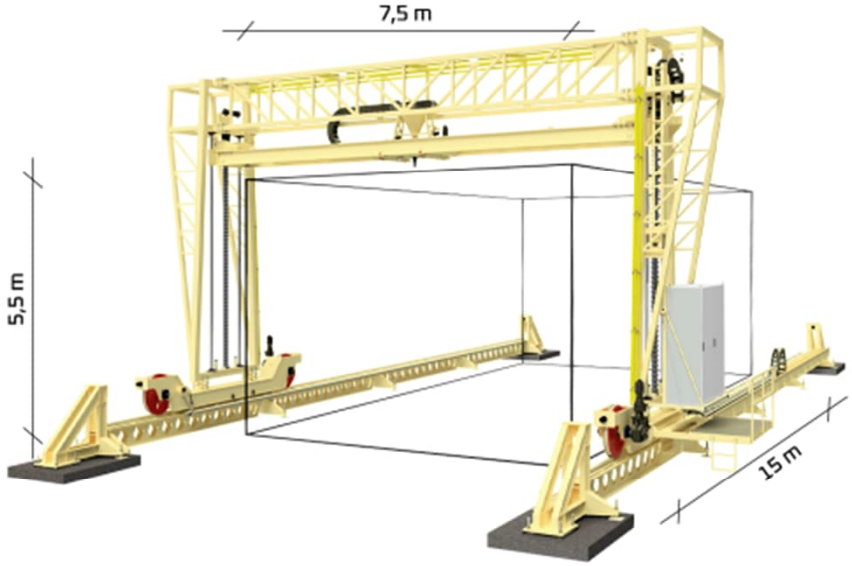


Reference

PODZIMEK 4.0

PARAMETRY 3D TISKÁRNY

Pracovní prostor tiskárny má
půdorys 15 m × 7,5 m
a výšku 5,5 m.



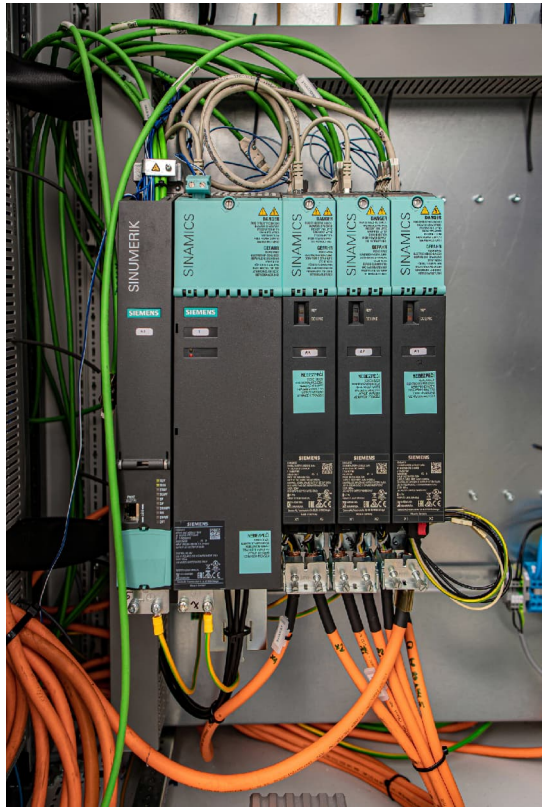

```
M11
M5
;BEFORE_BLOCK_CHANGE
G0 Z1860
;UKONČENÁ HLADINA (1840)
;BEFORE_LAYER_CHANGE
;AFTER_LAYER_CHANGE
;ACT_TIME:840,018887145097
```

Koncepce portálu, pojíždějícího po kolejnicích, s vertikálně se pohybujícím příčníkem, který nese tiskovou hlavu. Ovládání je založeno na průmyslovém řešení s využitím systému Sinumerik. Činnost tiskárny, včetně nástupu tuhnutí tiskové hmoty, řízena pomocí G-kódu.

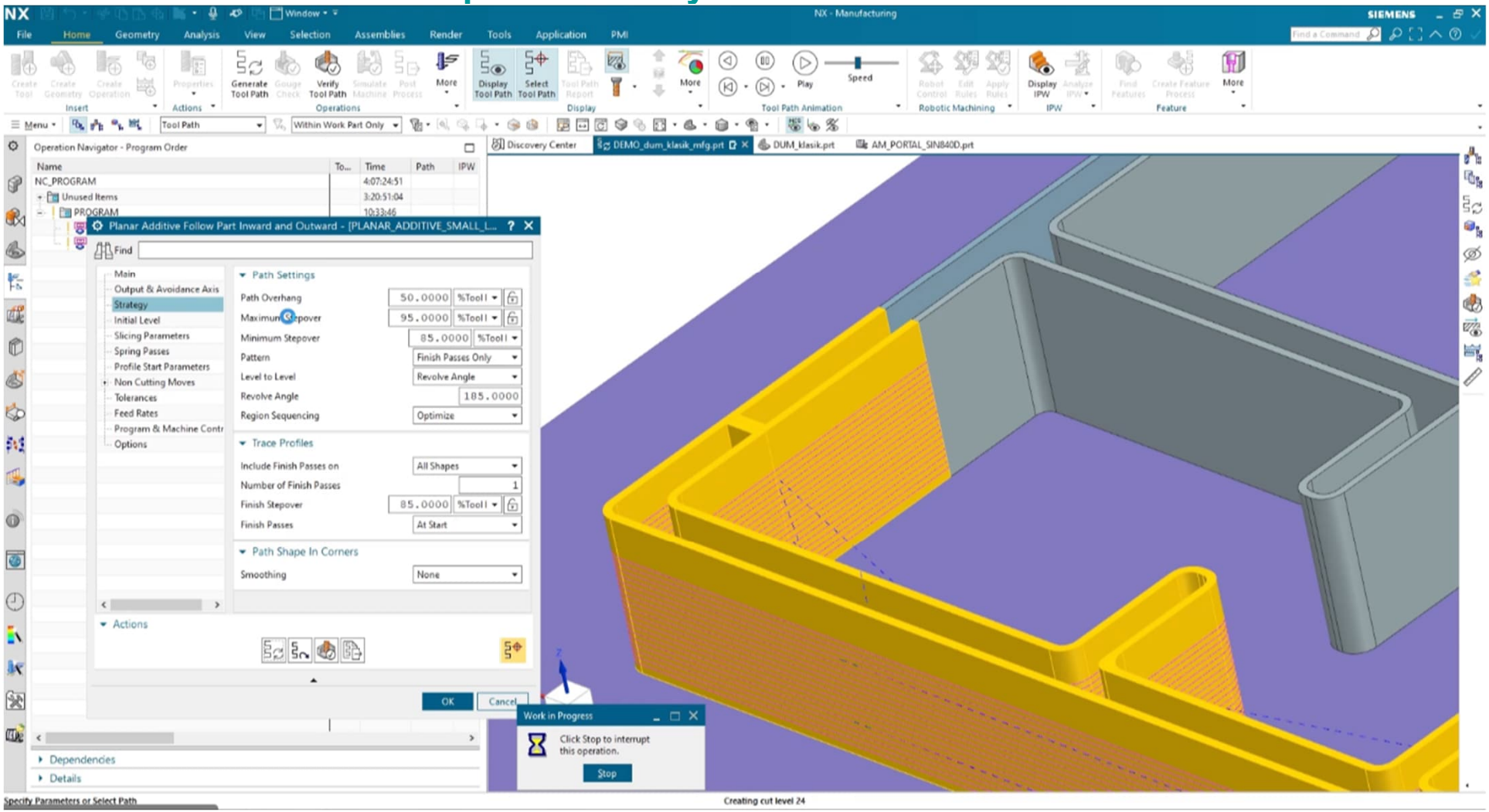
https://www.podzimek3d.cz/

Reference

PODZIMEK 4.0



Reference – co dál? - NX CAM pro aditivní výrobu



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