UPGRADE INSTRUCTIONS

applicable for

SINUMERIK 840D
Software version 07.02.12.00

© Siemens AG, 2005. All rights reserved

1 Upgrade Requirements 4
1.1 System software 07.02.12.00 (NCK version 59.05.00) 4
1.2 Tools 4
1.3 PLC operating system 4
1.4 Machine control panel 4

2 Data Backup 4
2.1 General upgrade requirements 4
2.2 Data backup 5

3 General Information 5
3.1 General restrictions 5
3.2 Frames 6
3.3 Series start-up file 6
3.4 Restriction of the number of axes and channels 6
3.5 DMP block 7
3.6 Alarm 14132: Incorrect configuration of orientation axes 7
3.7 Alarm 10752: Local block buffer overflow during tool radius compensation 7
3.8 Alarm 380001 PROFIBUS DP: Ramp-up error cause 1002 parameter 00 7
3.9 Alarm 15150: Reloading from external sources was aborted 2
3.10 Spindle data 3
3.11 System resources of the NCU 3
3.12 Log file 07.02.12.00 31 axes 3

4 Hardware Components 8

5 Secondary Conditions 9
5.1 PLC memory capacity of NCU *.4 9
5.2 Auxiliary functions in OB40 9
5.3 Synchronous spindle 10
5.4 Coupled-axis groupings 10
5.5 NCU link 10
5.6 Gantry axes 10
5.7 High-standard and high-performance loop controller modules 10
5.8 Loadable compile cycles 11
5.9 Alarm 4185 11
5.10 Program pre-processing 11
5.11 PLC starting behavior 11

6 Overview of New Functions in Software Version 07.02.07.00 and Higher 11
6.1 Digital setpoint exchange 11
6.2 Gantry groupings 11
6.3 Prepared TANGON 11
6.4 Positioning function for TRANSMIT 11
6.5 Prog_Event extensions 11
6.6 Extension of the synchronous spindle 12
6.7 Persistent transformation 12
6.8 2D TRC with contour-cutting tools 12
6.9 Extensions of the oscillation function 12
6.10 Feedrate for rotary axes 12
6.11 Extensions of the transformations TRACYL, TRANSMIT 12
6.12 TRANSMIT / TRACYL with additional linear axis 12
6.13 Revision of the INC machine function 13
6.14 Spindle in position signal 13
6.15 Extension of the indexing axis function 13
6.16 Dynamic groups 13

© Siemens AG, 2005. All rights reserved

6.17 ROUNDUP 14
6.18 Extension of the generic transformation 14
6.19 Delay Feed Stop 14
6.20 Protection level concept for NC language commands 14
6.21 New PLC alarms 14
6.22 Drive system software 06.07.09.00 for high-standard and high-performance modules 15
6.23 Number of channels with NCU 572.4 / 572.5 / 573.4 / 573.5 and 12 axes software version. 15

7 Functional Improvements and Further Developments
compared to 07.02.07.00 3

© Siemens AG, 2005. All rights reserved

1 Upgrade Requirements

Software version 07.02.12.00 (NCK 59.05.00) is a software test version. The NCK functionality corresponds to software version 07.02.07.00 (NCK 59.01.00).

The current upgrade instructions are part of the delivery docket in Prodis Aktuell.

1.1 System software 07.02.12.00 (NCK version 59.05.00)

Export versions		
Order number	**Designation** ... on PC card	**for hardware**
6FC5250-7DY30-2AH0	NCU system software 2 axes	NCU **.4/**NCU***.5**
6FC5250-7CY30-2AH0	NCU system software 6 axes	NCU *.**4**/ NCU***.5**
6FC5250-7BY30-2AH0	NCU system software 12 axes	NCU 572.3/573.2/573.3, NCU *.**4**/ NCU***.5**
6FC5250-7AY30-2AH0	NCU system software 31 axes	NCU 572.3/573.2/573.3, NCU *.**4**/ NCU***.5**
6FC5250-7HY30-2AH0	NCU system software for 4 axes grinding	NCU *.**4**/ NCU***.5**
Standard versions (restricted to exports)		
Order number	**Designation** ... on PC card	**for hardware**
6FC5250-7CX30-2AH0	NCU system software 6 axes	NCU *.**4**/ NCU***.5**
6FC5250-7BX30-2AH0	NCU system software 12 axes	NCU 572.3/573.2/573.3, NCU *.**4**/ NCU***.5**
6FC5250-7AX30-2AH0	NCU system software 31 axes	NCU 572.3/573.2/573.3, NCU *.**4**/ NCU***.5**

1.2 Tools

- 6FC5250-6AY00-3AG0 (...-4AG0) SinuCom NC with SinuCom FFS
  For PC card programming SinuCom FFS is to be used for software version 6.4.13 and higher.
- 6FC5252-7AX21-2AG0 :tool box V 07.02.01 with basic PLC program 07.02.01
  PG/PC with STEP7 for version 5.2 and higher and the option for an online MPI connection.
- Current documentation for SW 7 with additional information on the functions.

1.3 PLC operating system

- PLC315-2DP on NCU *.3 firmware version 12.30.10
- PLC314C-2DP on NCU *.4 firmware version 10.60.22
- PLC317-2DP on NCU *.5 firmware version 20.71.22.

1.4 Machine control panel

Version 02.01.01
(version 01.02.03 enables bus address 6 only)

2 Data Backup

2.1 General upgrade requirements

Prior to upgrading the NCK it is to be assured that at least 50KB of dynamic memory space is available per channel. This can be checked in MD18050 INFO_FREE_MEM_DYNAMIC. If the memory space does not suffice, it has to be created by increasing MD18210 USER_MEM_DYNAMIC. If this is not possible, a

© Siemens AG, 2005. All rights reserved

more efficient CPU will have to be used or unused memory space is to be released. Machine data marked in the list with D-RAM are suitable for this.

Additionally, 50KB of static memory space should be free. This can be checked via MD18060 INFO_FREE_MEM_STATIC. If the memory space does not suffice, it can be released by unloading NC programs.

Set machine data 11210 UPLOAD_MD_CHANGES_ONLY = FF, 11220 INI_FILE_MODE = 1 or 2.

2.2 Data backup

- **NCK**
  Prior to upgrading the NCK, a data backup is to be executed so that the current data base of the machine can be recreated. This is achieved by creating a series start-up file.

- **PLC**
  In addition to the NCK data backup, a PLC data backup is to be created as well. This data backup is to be created in PLC stop state. Set S4 on the NCU module to position 2. The PLC will then be in stop state.

  If the basic PLC program must be upgraded, STEP7 will be required. In this case, install the new tool box via SETUP. Furthermore, the customer project of this system is required. The required modules are transferred from the new toolbox library to the customer project (or a copy). The OBs, FC12 and DB 4 (modules for creating a new user program) must not be transferred, as they were modified by the machine OEM. After the NCK software has been replaced, the modules are to be transferred to the PLC by using STEP7. A new PLC series start-up file is to be created.

- **Software replacement**
  Switch off the control system and replace the PC card. The card is retained in the control system.
  Set switch S3 to position 1 and S4 to position 3 and switch the system on. After ramp-up, state "7-segment display shows figure 6 / PLC LED PS flashes / PF red" is set automatically.
  Standard NC machine data are now loaded. NC and PLC are deleted.

  The PLC will start by following the sequence S4 from position 3 to position 0
  => S4 in position 3 => S4 in position 0. The PLC must now start to run.
  Switch S3 to position 0.
  The software version can be checked in menu *Diagnostics/Display service/Version*.

- **How to load the backups**
  After having set the OEM ID, the NCK data backup can be read in under menu *Services/Series start-up/Read in start-up archive* after selection of the backup files.
  You can read in the PLC data backup afterwards.
  After read-in of the PLC data backup, the system must be switched OFF/ON, so that all components can run up together.

3 General Information

3.1 General restrictions

- Function G643 (block-internal smoothing) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position).
  The function has not been released for applications in the machining process.
- Function G644 (smoothing at max. possible dynamics) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position).
  The function has not been released for applications in the machining process.
- The functions FCUB and FLIN in combination with compressor COMPCAD have not been released.

© Siemens AG, 2005. All rights reserved

- For NCU 573.3, ten channels and 31 axes can no longer be activated at the same time. Their number has been limited to eight channels. This limitation does not apply for the subsequent type 573.3 (6F C5357-0BB33-0AA*)
- For NCU 572.3/572.4, a 31-axis software, the number of channels is limited to six. This limitation does not apply to the subsequent types 572.3 (6F C5357-0BB23-0AA*) and 572.4 (6F C5357-0BB24-0AA*)
- PROFIBUS master-slave coupling with NCU *.4 as slave has not been released.
- NCU's nnn 4 : Lowering the PCU 50 via the EXIT button is only permitted in the EMERGENCY OFF mode, if a PLC operating system < 10.60.17 is used.
- NCU's nnn 3 : Lowering the PCU 50 via the EXIT button is only permitted in the EMERGENCY OFF mode if a PLC BESY < 12.30.10 is used.

3.2 Frames

If $MC_MM_SYSTEM_FRAME_MASK Bit 1 = 1, the work offset external will be suppressed by G153. This represents a change in behavior compared to other releases of software version 6.

The default of $MC_CHSFRAME_POWERON_MASK has changed. MD24008 is now defaulted with zero (previously "one"). The system frame for the scratching function is therefore also maintained via power ON reset

3.3 Series start-up file

The series start-up enables an easy and quick start-up of machines of the same series. These machines must have the same electrical equipment (e.g. NCU CPU, software) and the same mechanical conditions. If they do not match, the series start-up is not necessarily a suitable method for a start-up. You will then have to chose another method for data backup (e.g. separate data backups with Initial.ini etc.), as machine data might have to be adjusted.
Pay special attention to the different NCU memory limits. If they are fully utilized, the memory space might not suffice after an NCK software upgrade or replacement of an NCU.
Prior to creating the data backups, machine data $MN_UPLOAD_MD_CHANGES_ONLY is to be checked. It should be defaulted with value "0" or "FF"hex. Other values such as "1" may cause problems on reading in the data backup after software upgrades. Value FFhex is to be preferred.

3.4 Restriction of the number of axes and channels

In software version 6.5.10 and higher, the different software variants (two axes...31 axes versions) can be used on all NCUs of type ***.4** and type *.**5**.
PLC programs can thus be maintained as general programs that can be used for different machine variants. This way it is possible to manage six, 12 or 31 physical axes out of 31 axes.
The restriction of the number of axes and channels is still valid.
The following combinations are possible:

HW \ SW	2A/2C	6A/2C	12A/2C	31A/10C
561.4 / 5	2A/2C	2A/2C	2A/2C	2A/2C
571.4 / 5	2A/2C	6(31)A/2C	6(12)A/2C	6(31)A/2C
572.4 / 5	2A/2C	6(31)A/2C	12(31)A/2C *)	31A/6C
573.4 / 5	2A/2C	6(31)A/2C	12(31)A/2C *)	31A/10C

A=axes, C=channel, 2(31)=two out of 31 axes
*) for software version 07.02.12 and higher: 12(31)A/4C

© Siemens AG, 2005. All rights reserved

3.5 DMP block

The number of axes including DMP block is limited to 31 axes. For example, if a DMP block is used in a 31-axes software, 30 axes will still be possible.

3.6 Alarm 14132: Incorrect configuration of orientation axes

This alarm is output in case of errors on assigning orientation axes to the machine kinematics. However, this alarm will also occur, if no position measuring system is active on an axis involved in the transformation.

3.7 Alarm 10752: Local block buffer overflow during tool radius compensation

Output of alarm 10752 can be avoided by increasing machine data $MC_CUTCOM_MAXNUM_DUMMY_BLOCKS=41.

3.8 Alarm 380001 PROFIBUS DP: Ramp-up error cause 1002 parameter 00

The alarm is output after deleting the PLC with S4 in position 3. It should no longer occur after loading of the basic PLC program.

3.9 Alarm 15150: Reloading from external sources was aborted

Output of alarm 15150 can be avoided by increasing the value of machine data $MN_MM_EXT_PROG_BUFFER_SIZE.

3.10 Spindle data

The machine data for describing the spindle dynamics must be set in such a manner that it approximately corresponds to the actual dynamics of the spindle

3.11 System resources of the NCU

The NCU load due to position regulators and interpolators should not exceed 60-65% in “reset" mode. The current load can be checked under diagnostics/system stress

3.12 Log file 07.02.12.00 31 axes

```
    07.02.12 840D 31A   AFph_km            |
System                Versionstamp      Date   Checksum Linkdate/Time                Length     at
-------------------------------------------------------------------------------------------------
Monitor Loader          59.05.00 08/11/05 081105 43787516 08/11/05 09:44:37    017D34 000140
Communic.Monitor        01.01.07 10.05.94|100594 5C080795 10/05/94 13:26:36            0030D0 017E74
Communic.System         05.06.00 04/02/26|250604 61911170 25/06/04 08:09:56            00D05C 01AF44
PLC314-FB15 SI07.02.05  07.02.06*05/11/21 231105 D11702BE 23/11/05 08:26:15        00EC0C 027FA0
PLC315-FB15 SI07.02.05  07.02.06*05/11/21 231105 88F430C9 23/11/05 08:30:55        00EEFC 036BAC
PLC314C-FB15SI07.02.05  07.02.06*05/11/21 231105 449563EC 23/11/05 08:29:44        009450 045AA8
PLC317-FB15 SI07.02.05  07.02.06*05/11/21 231105 805A5248 23/11/05 08:28:02        006F4C 04EEF8
Monitor System          59.05.00 08/11/05 081105 C6AD4703 08/11/05 09:44:26  0040D4 055E44
Operating System        59.05.00 08/11/05|081105 735BCEDF 08/11/05 09:44:43            00BD58 059F18
Numeric ContSI59.05.00  59.05.00 10/11/05|151105 286E079F 15/11/05 08:42:40            322414 065C70
VSA System  SI05.01.28  05.01.29 21/09/04 210904 705DBD67 21/09/04 07:42:43            03C250 388084
VSA Data Description    05.01.29 21/09/04 220704 821D4801 22/07/04 12:45:46            004A90 3C42D4
VSA Default Data        05.01.29 21/09/04 220704 6B296715 22/07/04 12:45:46  000BAC 3C8D64
Drive Version Info      05.01.29 21/09/04 290702 BFFB3E8B 29/07/02 08:50:50  019C4C 3C9910
HSA System  SI05.01.28  05.01.29 21/09/04 210904 E5D1D72A 21/09/04 07:44:11            03C58C 3E355C
HSA Data Description    05.01.29 21/09/04 220704 3E28B545 22/07/04 12:45:46            005CD0 41FAE8
HSA Default Data        05.01.29 21/09/04 220704 B9ABF6C5 22/07/04 12:45:46            000E84 4257B8
SLM Data Description    05.01.29 21/09/04 220704 91E39B60 22/07/04 12:45:46            004990 42663C
SLM Default Data        05.01.29 21/09/04 220704 A5170071 22/07/04 12:45:46  000BAC 42AFCC
Inverter Codes          06.07.09 19/01/05 190105 D178EBC2 19/01/05 13:39:44   0010E8 42BB78
VSA Motor Codes         06.07.09 19/01/05 190105 F54A8DD2 19/01/05 13:39:44            009AAC 42CC60
HSA Motor Codes         06.07.09 19/01/05 190105 0604427E 19/01/05 13:39:44            003530 43670C
SLM Motor Codes         06.07.09 19/01/05 190105 23710563 19/01/05 13:39:44 00376C 439C3C
VSA Inverter Data       06.07.09 19/01/05 190105 43126FE5 19/01/05 17:01:33  000518 43D3A8
VSA Motor Data          06.07.09 19/01/05 190105 67813178 19/01/05 17:01:35   0095C0 43D8C0
HSA Inverter Data       06.07.09 19/01/05 190105 6268228D 19/01/05 17:01:34  0003A0 446E80
HSA Motor Data          06.07.09 19/01/05 190105 D5420E0A 19/01/05 17:01:36            004708 447220
SLM Motor Data          06.07.09 19/01/05 190105 39B14890 19/01/05 17:01:37  002568 44B928
DriveSystem SI06.07.02  06.07.12 05/12/05 051205 7F68626F 05/12/05 10:22:28            05C708 44DE90
```

© Siemens AG, 2005. All rights reserved

VSA-2 Data Description 06.07.12 05/12/05 051205 1084607B 05/12/05 10:22:10 009DD0 4AA598
VSA-2 Default Data 06.07.12 05/12/05 051205 FBBC8B6D 05/12/05 10:22:11 001ED4 4B4368
HSA-2 Data Description 06.07.12 05/12/05 051205 AAB709DD 05/12/05 10:22:10 009690 4B623C
HSA-2 Default Data 06.07.12 05/12/05 051205 DC165BB8 05/12/05 10:22:11 001EF0 4BF8CC
SLM-2 Data Description 06.07.12 05/12/05 051205 AAD35F6B 05/12/05 10:22:10 009DD0 4C17BC
SLM-2 Default Data 06.07.12 05/12/05 051205 C169457B 05/12/05 10:22:11 001ED4 4CB58C
HLA System 01.02.14 18/05/04 180504 05D5F291 18/05/04 11:37:11 03598C 4CD460
HLA Data Description 01.02.14 18/05/04 180504 C9E0F454 18/05/04 11:37:35 003390 502DEC
HLA Default Data 01.02.14 18/05/04 180504 14B3C118 18/05/04 11:37:35 000D6C 50617C
HLA Valve Data 01.02.14 18/05/04 180504 4E264A46 18/05/04 11:45:02 001E68 506EE8
Driver Module 01.01.01 14.06.94 50899 B838268F 5/08/99 18:30:36 0000C4 508D50
Serialnumber 01.01.01 24.01.95 221100 0327C431 22/11/00 11:27:40 0000D4 508E14
Joblist for IBN 02.01.00 07/29/04 151105 0ED2270F 15/11/05 08:43:24 000380 508EE8
Joblist for IBN/KOMP 02.01.00 07/29/04 151105 E43D20EB 15/11/05 08:43:26 0003BC 509268
Joblist for UPGRADE 02.01.00 07/29/04 151105 495BD87F 15/11/05 08:43:28 0003A4 509624
Link Loader 05.01.01 98/06/03 061098 F50A5D72 06/10/98 08:37:23 00029C 5099C8
Link Debugger Aequidis 05.03.01 00/11/28 281100 E5024825 28/11/00 13:42:35 0091AC 509C64
Link Software Aequid 05.02.05 02/01/07|070102 6083ACE7 07/01/02 11:05:01 008A8C 512E10
DP Software Aequid 01.00.06 02/08/13|130802 FCAE5BA2 13/08/02 10:36:01 01FC18 51B89C
NCK840d-31a10c 01.00.11 11/10/05 151105 C2429C67 15/11/05 08:43:18 0007A8 53B4B4
NCK840d-31a10c 01.00.11 11/10/05 151105 C2429C6F 15/11/05 08:43:18 0007A8 53BC5C
NCK840d-31a10c6 01.00.11 11/10/05 151105 B1D3E836 15/11/05 08:43:19 0007E4 53C404
NCK840d-2a2c 01.00.11 11/10/05 151105 3ED19425 15/11/05 08:43:16 000C30 53CBE8

4 Hardware Components

The new hardware components NCU 561.4, 571.4, 572.4, 573.4, 561.5, 571.5, 572.5 and 573.5 of SINUMERIK 840D and 840DE have been released. This completes and innovates the entire NCU product range. The new NCU components are compatible with the previous components of the same type. NCU 561.x, 571.x, 572.x and 573.4 have a higher NC power and more CNC user memory space compared to the previous versions.

Characteristics/customer benefits

NC parameter								
NCU	561 .4	561 .5	571 .4	571 .5	572 .4	572 .5	573 .4	573 .5
Processors								
Celeron 400MHz [1)]	X	X	X	X	X			
Celeron 650MHz						X[1)]	X	
Pentium III 933MHz								X
CNC user memory								
Basic version 0.5MB; max.: 2.5MB*)	X		X		X			
Basic version 2.5MB; max.: 2.5MB*)							X	
Basic version 3MB; max.: 6MB		X		X		X		X

*) With technology cycles and measuring cycles max. 1.5MB free user memory. With ShopMill/ShopTurn, 1.2MB free user memory in the basic version; consequently no additional CNC user memory options available.

**) In the basic version free for users:
-- with technology cycles and measuring cycles max. 1.5MB
-- with ShopMill/ShopTurn 1.2MB

© Siemens AG, 2005. All rights reserved

PLC parameters	315-2DP NCU *.3	314C-2DP NCU *.4	317-2DP NCU *.5
Processing time in ms/kA (1kA = 1024 instructions, corresponds to about 3KB) - for bit commands (minimal) - for language commands (minimal) **Factor for cycle time in user programs** [1]	 0.3 1.0 **1**	 0.1 0.25 **0.35**	 0.03 0.1 **0.12**
PLC user memory in KB Basic version max. extended configuration	 96 288	 96 480	 128 768
Number of FB, FC	256 each	256 each	2048 [2]
Number of DB	399	399	2047 [2]
Number of timings	128	256	512
Number of counters	64	256	512
I/O volume for cyclic process image	128 each	128 each	256 each
I/O volume for entire logical I/O address space	1024 each	1024 each	4096 each [3]
max. number of PROFIBUS slaves	63	32	125

Remarks:

1) **The increase of output refers to the available computer performance. Depending on the technological conditions, this increased output is integrated into the total result. A faster interpolation cycle (due to faster processors) and shorter PLC cycle times partly cause considerably improved technological results; e.g. shorter part/cycle times, higher speeds in non-circular turning, higher feedrates in mold making.**
2) The indicated number is the usable upper address number; the max. number of FB, FC and DB is 2048 in total!
   Any reservations are to be considered; see the current documentation.
3) An additional 4096 I/O addresses are available; they can be viewed in STEP7, but are reserved for future applications. For reasons of compatibility, these addresses must not be used.
   The diagnostics addresses (current at the upper limit 1023, 1022) are to be assigned accordingly in the PLC project; see the current documentation.

5 Secondary Conditions

5.1 PLC memory capacity of NCU *.4

A load memory of 480KB is guaranteed for the user. It is possible to exceed this limit, i.e. to occupy more memory space. However, this may cause problems on reading in PLC series start-up files. Message: Memory full.

5.2 Auxiliary functions in OB40

Sporadically, the PLC does not recognize auxiliary functions in the following combinations:
H/T function analysis in OB40 (parameter IRAuxfuT/H =true of FB1)
In the part program:
m=qu(55)
h2=33
The H function is lost sporadically.
Remedy: Program m55.

© Siemens AG, 2005. All rights reserved

5.3 Synchronous spindle

If synchronous spindle coupling is switched on while the leading spindle is running in an acceleration phase, the following spindle will accelerate at higher acceleration rates than entered in MD. Alarms such as contour monitoring may be displayed.

When synchronous spindle coupling is switched on, all spindles involved must have the relevant releases. Otherwise a position offset between the leading spindle and the following spindle may occur on positioning during synchronous spindle operation.

5.4 Coupled-axis groupings

When coupled-axis groupings are switched on via synchronized actions or across the channels, the user is to assure that the control parameters (e.g. acceleration, velocity) of the slave axis are met. In these cases, no verification is performed in the NC.

5.5 NCU link

When NCUs are combined via the link function, NCUs of the same type will always (MLFB) have to the used.

If a link connection with different interpolation cycles is to be configured, the basic system clock rates of both systems must be the same. Otherwise alarm 4013 with error code SYSCLOCK_SAMPLE_TIME_RATIO is displayed.

Exception:
It must be considered that processors with different cycles are used in NCU 573. If a service job can only replace a module by a faster NCU, the slower NCU must be the master. It is not mandatory that all NCUs are replaced.

NCU	MRPD (component) Part no. of the component	Processor	PLC
573.2	6FC5357-0BB33-0AE1 GWE-570038.9634.36	**Pentium II 266MHz**	PLC 315-2DP
573.3	6FC5357-0BB33-0AE2 GWE-570038.9635.11	**Pentium III 500MHz**	PLC 315-2DP
573.4	6FC5357-0BB34-0AE0 GWE-570038.9635.20	**Pentium III 500MHz**	PLC 314C-2DP
573.4	6FC5357-0BB34-0AE1 GWE-570038.9635.20	**Celeron 650MHz**	PLC 314C-2DP
573.4	6FC5357-0BB34-0AA0 GWE-A5E0027301	**Celeron 650MHz**	PLC 314C-2DP

5.6 Gantry axes

If the slave axis in a gantry grouping rotates in the opposite direction (AX_MOT_DIR=1), the function generator (rectangular) must not be used.

5.7 High-standard and high-performance loop controller modules

A mixed placement of standard/performance and high-standard/high-performance loop controller modules is possible.
Requirements:
- HMI Advanced software version 06.02.12 and higher
- 611D start-up tool in software version 06.02.12 and higher
- HMI Embedded software version 06.03.27 and higher
- SinuCom NC.

The high-standard/high-performance modules are now compatible with the boot file of the standard/performance modules. The drives do not have to be started up again.

© Siemens AG, 2005. All rights reserved

5.8 Loadable compile cycles

It is possible to load a maximum of ten loadable compile cycles. They include libraries with file extension ???.ELF.

Loading of more than one technological function may cause incorrect value assignments. This effect will occur, if loadable compile cycle applications do not set up their machine data according to consistently ascending numbers within the three sections NCK, channel and axis MD.
Loading of a correct archive might cause mutual overwriting of the contents of individual CC machine data.

5.9 Alarm 4185

Assigned help functions that are not active and have not been rejected by an alarm are recognized now. Alarm 4185 is output in this case.

5.10 Program pre-processing

When the program pre-processing function is used, alarms 15170 "Program could not be compiled" and 15450 "Unable to save the compiled program" are output after an upgrade to SW 6.4.
Reason:
Under SW 6.4, the compiled program is no longer stored in SRAM, but in DRAM instead.
However, via MD $MN_MM_DRAM_FILE_MEM_SIZE, sufficient DRAM memory has to be reserved for this purpose.
But there is also the option of storing the compiled program in SRAM, if the DRAM memory space does not suffice. To do so, set $MN_PREPROCESSING_LEVEL, bit 6.

5.11 PLC starting behavior

- It is impermissible to operate NCU *.4 in switch position 1 of S4. The PLC would not start the cyclic operation after reset or power OFF/ON.
- If the PLC was put to a stop state by a PI service or a PG operation (e.g. on loading a hardware configuration), it will have to be restarted by PG operation or by using switch S4. Power OFF/ON or reset will not start the cyclic operation.

6 Overview of New Functions in Software Version 07.02.07.00 and Higher

6.1 Digital setpoint exchange

The digital setpoint exchange is a component of the system software. It is activated via a new option. The function has to be started up again. The new machine data and alarms are described in the current documentation.

6.2 Gantry groupings

Eight gantry groupings are available now.

6.3 Prepared TANGON

The development of "Prepared TANGON" aims at creating a smooth tool path velocity sequence with a pre-definable error between setpoint contour and actual contour as well as between the actual tangent and the follow-up axis. Instead of optimizing the process manually, the control is to find an acceptable optimal state automatically according to the present kinematics, the permissible machine axis dynamics and the definable tolerances.

6.4 Positioning function for TRANSMIT

Positioning function PTP that was implemented for handling transformations, has been extended for the TRANSMIT transformation.

6.5 Prog_Event extensions

The Prog_Events have been extended by the following new functions:

- Display of the Prog_Event currently running in the VDI interface (DB[channel].DBB376)

© Siemens AG, 2005. All rights reserved

- Suppression of the function for single block mode and read-in disable

6.6 Extension of the synchronous spindle

Differential speed:
A differential speed is created by a signed override of two speed sources. A certain portion of the speed is thereby derived from the leading spindle via the coupling factor. In addition, a speed and direction of rotation can be programmed for the following spindle.

6.7 Persistent transformation

A transformation shall always be selected. Selection of an additional transformation causes a chaining of this permanently selected (persistent) transformation and the new transformation selected. When TRAFOOF is deselected, the chained component of the transformation is deselected as well. Selection of the persistent transformation is maintained.

6.8 2D TRC with contour-cutting tools

Tool radius compensation is normally based on a dynamically balanced tool, i.e. the tool is represented in the machining plane by a circle. This condition is fulfilled by milling tools, but not by turning and grinding tools. With these tools, the edge can be described only in parts by circle segments. Therefore, the user is responsible of selecting another edged, if required and if a contour is to be machined on the part that cannot be reached by the active edge. The 2D tool radius compensation with contour-cutting tools executes this task for the user. The tool form can be freely defined within wide limits. The software automatically determines the point of the edge with which machining has to be executed, depending on the contour to be machined.

6.9 Extensions of the oscillation function

The oscillation functions for grinding have been extended by two new subfunctions:

- Starting the oscillation with pre-selection of a starting position
- Reverse oscillation from external sources, i.e. the oscillation motion is to be aborted by an external impact and is to travel in the opposite direction. The reversal point is output as system variable.

6.10 Feedrate for rotary axes

New MD20464 PATH_MODE_MASK was introduced to enable an adjustment of the path action as per the individual case. The rotary axis velocity of path axes can be influenced via bit0. For blocks in which only rotary axes are traversed as path axes with active G700, thr programmed rotary axis velocity is
Bit0=0: [grad/min] (default)
Bit0=1: [25.4*grad/min]

6.11 Extensions of the transformations TRACYL, TRANSMIT

For turning machines with master and counterspindle (counterspindle machine), the transformations TRANSMIT and TRACYL can be parameterized for the master and the counterspindle. TRACYL can be parameterized in both variants (transformer types 512 and 513).
Four TRACON and 10 transformation records are now possible.

6.12 TRANSMIT / TRACYL with additional linear axis

For the TRANSMIT transformation, a rotary axis and a linear axis horizontal to the rotary axis will suffice. If the machine has another linear axis vertical to the rotary axis and to the first linear axis, the transformation will no longer be clear. New **transformation variant 257** uses the redundancy in order to perform an improved tool offset. The working area of the second linear axis is thereby assumed to be small so that it should not be used for returning the part program.

For the TRACYL transformation without groove side offset, a rotary axis and a linear axis vertical to the rotary axis will suffice. If the machine has another linear axis vertical to the rotary axis and to the first linear axis, the transformation will no longer be clear. New **transformation variant 514** uses the redundancy in order to perform an improved tool offset. The working area of the second linear axis is thereby assumed to be small so that it should not be used for returning the part program.

© Siemens AG, 2005. All rights reserved

6.13 Revision of the INC machine function

The functionality for incremental selection has been revised. The behavior in the individual operating modes and submodes is described in detail in the documentation. In general (i.e. independent of the operating mode), it behaves as follows:

When changing to a new operating mode (JOG, MDA, AUTO), an existing INC selection is deselected.
If the operating mode key is activated 'within' an operating mode (JOG, MDA, AUTO), an existing INC selection will be deselected also.
If the reset key is pressed in an operating mode, an existing INC selection will **not** be deselected.
If a DRF offset is active (MDA, AUTO), an existing INC selection will be deselected 'within' the operating mode during operating mode change or activation of the relevant operating mode key. However, the DRF offset (functionality) is still active.

6.14 Spindle in position signal

The motional sequence of a tool change, especially with milling machines, mainly consists of spindle positioning and a following approach of the tool change position with the path axes (in optimized programs also at the same time). It is a mandatory condition that the spindle position is reached prior to approaching the tool change position. If the tool change cycle is interrupted by the machine operator, e.g. with NC stop, NC stop axis + spindle, mode group stop etc., it cannot be excluded that the spindle might travel into an incorrect position of the automatic tool changer. The request for exact stop signals does not include a verified statement about the position approached.
Therefore, the new VDI interface signal DB[axis].DBX85.5 "Spindle in position" is introduced.

6.15 Extension of the indexing axis function

The display of system variable $AA_ACT_INDEX_AX_POS_NO can be influenced via machine data $MN_INDEX_AX_MODE.

$MN_INDEX_AX_MODE Bit0 = 0
(Compatible behavior) means:
The indexing position changes when the indexing position is reached (exact stop fine window) and remains unchanged until the next indexing position is reached. This means that the indexing area starts at an indexing position and ends in front of the next indexing position.

$MN_INDEX_AX_MODE Bit0 = 1
(New behavior) means:
The indexing position changes when half of the indexing position is reached. An almost symmetrical indexing area is thus put around the indexing position (symmetrical only with linear axes with equidistant division, otherwise in proportion to the distance between the indexing positions).
With modulo rotary axes, the area between the last indexing position and the first indexing position correspond to the distances between the first and the last indexing area.

6.16 Dynamic groups

The requirements for the machine dynamics differ according to the technological machining process. These include positioning (e.g. tool change), roughing, finishing and smooth-finishing. The machine operator or programmer can easily select the dynamics that match the technological process. This saves time in rough machining processes without having to dispense with a good quality of the surface at machining end. It is not necessary to re-write dynamics MD between the different machining processes.
A new modal G code group "Dynamics" is introduced as the 59th group. It provides the
G codes

- DYNNORM: normal dynamics as usual
- DYNPOS: positioning mode, tapping, etc.
- DYNROUGH: roughing
- DYNSEMIFIN: finishing
- DYNFINISH: smooth-finishing.

The following machine data are defined as determining the dynamics.

© Siemens AG, 2005. All rights reserved

- $MC_CURV_EFFECT_ON_PATH_ACCEL
- $MC_CURV_EFFECT_ON_PATH_JERK
- $MC_MAX_PATH_JERK
- $MA_MAX_AX_ACCEL
- $MA_SOFT_ACCEL_FACTOR
- $MA_MAX_ACCEL_OVL_FACTOR
- $MA_MAX_AX_JERK
- $MA_PATH_TRANS_JERK_LIM.

6.17 ROUNDUP

The ROUNDUP function provides the next higher integer for positive input values and the next lower integer for negative input values. If the input value is an integer, the value will be returned unchanged.

Syntax: real ROUNDUP (real X)

6.18 Extension of the generic transformation

For the generic five-axis transformation, a maximum of three linear axes and two rotary axes have been possible so far. The motion and direction of the tool could thus be described fully in the area, but it was not possible to describe a rotation of the tool around itself. Tool rotations like that are especially important for dynamically unbalanced tools or robots. An additional rotary axis is required to turn the tool. The generic transformations have therefore been extended by a third rotary axis.

6.19 Delay Feed Stop

With the language commands DELAYFSTON and DELAYFSTOF or via machine data $MN_STOP_MODE_MASK, program sections can be protected against an interruption caused by "Feed stop" and NC stop.
The stop delay area is implicitely defined in G331 and can be switched off through $MN_STOP_MODE_MASK BIT0 =1.

6.20 Protection level concept for NC language commands

The existing protection level concept for access to machine data, setting data and GUDs has been extended in a way that the execution of certain part program commands is linked with a corresponding execution right. A part program command is assigned to a protection level with the REDEF command. From now on this command will only be executed during part program processing, if the corresponding execution right is available. Otherwise, part program processing is aborted with alarm 14018.
Analog to the GUD definitions, special definition files that are analyzed during control ramp-up are available for programming the REDEF commands:

/_N_DEF_DIR/_N_UACCESS_DEF // definition file for protection level instructions of the end user
/_N_DEF_DIR/_N_MACCESS_DEF // definition file for protection level instructions of the manufacturer
/_N_DEF_DIR/_N_SACCESS_DEF // definition file for protection level instructions from Siemens – system applications (e.g. standard cycles, ShopMill)

6.21 New PLC alarms

The following PLC alarms have been implemented:

- Cyclic:
  400201 dbNo "Existing DB reloaded in RUN state"
  400202 dbNo "Access to DB, M, E, A incorrect"

- Tool management:
  400601 0 0 "Load location configuration incorrect"
  400602 0 0 "Spindle configuration incorrect"

© Siemens AG, 2005. All rights reserved

400603 0 0 "Turret configuration incorrect"
410141 0 0 "TOOLMAN: number of load locations too high"
410142 0 0 "TOOLMAN: number of tool holders too high"
410143 0 0 "TOOLMAN: number of turrets too high"

- mcp:
  400267 0 0 "MCP: Access to DB, M, E, A incorrect"
  400264 0 0 "Pointer parameter machine control panel 1 incorrect"
  400265 0 0 "Pointer parameter machine control panel 2 incorrect"
  400266 0 0 "Pointer parameter handheld unit incorrect".

6.22 Drive system software 06.07.09.00 for high-standard and high-performance modules

The new functions are described in the documentation for SIMODRIVE 611 digital / SINUMERIK 840D/810D drive functions (FBA) edition 10.2004 under the following key words:

- Synchronous motor switchover
- APC level 2
- Fine synchronization
- Additional torque/force limitation at setpoint value zero.

6.23 Number of channels with NCU 572.4 / 572.5 / 573.4 / 573.5 and 12 axes software version.

Since software version 07.02.12 and higher for the a. m. NCU's the following application is possible: 12(31)A/4C.

Functional Improvements and Further Developments

7 Compared to 07.02.07.00

BRKdb09925	BRKdb10126				
BRKdb10197	CHMdc09262	CHMdc09429	CHMdc09531	CHMdc09774	CHMdc09861
ERLde57573	ERLde59947	ERLde60053	ERLde61231	ERLde66407	ERLde66494
ERLde66578	ERLde67115	ERLde67147	ERLde67398	ERLde67804	ERLde68023
ERLde68594	ERLde68955	ERLde69127	ERLde69223	ERLde69225	ERLde69538
ERLde70754	ERLde70995	ERLde71058	ERLde71196	ERLde71475	ERLde71788
ERLde71872	ERLde72073	ERLde72139	ERLde72182	ERLde72314	ERLde72349
ERLde72390	ERLde72484	ERLde72624	ERLde72662	ERLde72682	ERLde72803
ERLde72821	ERLde72842	ERLde72848	ERLde72856	ERLde72941	ERLde72958
ERLde72966	ERLde73088	ERLde73129	ERLde73327	ERLde73335	ERLde73407
ERLde73446	ERLde73477	ERLde73573	ERLde73611	ERLde73625	ERLde73632
ERLde73717	ERLde73733	ERLde73766	ERLde73840	ERLde73854	ERLde73876
ERLde73884	ERLde73950	ERLde74017	ERLde74052	ERLde74053	ERLde74059
ERLde74076	ERLde74083	ERLde74100	ERLde74109	ERLde74119	ERLde74124
ERLde74137	ERLde74167	ERLde74193	ERLde74205	ERLde74206	ERLde74247
ERLde74270	ERLde74448	ERLde74469	ERLde74561	ERLde74571	ERLde74573
ERLde74575	ERLde74576	ERLde74582	ERLde74585	ERLde74588	ERLde74651
ERLde74654	ERLde74671	ERLde74686	ERLde74755	ERLde74788	ERLde74830
ERLde74866	ERLde74903	ERLde74975	ERLde74990	ERLde75001	ERLde75002
ERLde75016	ERLde75146	ERLde75160	ERLde75169	ERLde75200	ERLde75210
ERLde75213	ERLde75259	ERLde75308	ERLde75332	ERLde75345	ERLde75354
ERLde75400	ERLde75413	ERLde75426	ERLde75521	ERLde75524	ERLde75562
ERLde75575	ERLde75602	ERLde75645	ERLde75668	ERLde75712	ERLde75766
ERLde75827	ERLde75830	ERLde75917	ERLde75995	ERLde76073	ERLde76076
ERLde76224	ERLde76349	ERLde76426	ERLde76504	ERLde76527	ERLde76822
ERLde77103	ERLde77284	ERLde77435	ERLde77516	ERLde77518	ERLde77571
ERLde77587	ERLde77588	ERLde77701	ERLde77729	ERLde77844	ERLde77851
ERLde77862	ERLde77960	ERLde78003	ERLde78011	ERLde78070	ERLde78092

© Siemens AG, 2005. All rights reserved

ERLde78178	ERLde78278	ERLde78353	ERLde78400	ERLde78450	ERLde78514
ERLde78518	ERLde78538	ERLde78578	ERLde78581	ERLde78586	ERLde78646
ERLde78742	ERLde78838	ERLde79004	ERLde79125	ERLde79212	ERLde79268
ERLde79308	ERLde79315	ERLde79461	ERLde79466	ERLde79499	ERLde79554
ERLde79577	ERLde79594	ERLde79597	ERLde79764	ERLde79820	ERLde79821
ERLde79898	ERLde79922	ERLde79962	ERLde79973	ERLde80015	ERLde80072
ERLde80148	ERLde80178	ERLde80197	ERLde80354	ERLde80545	ERLde80658
MGLdm00884	MGLdm00998	MGLdm01004	MGLdm01024	MGLdm01072	MGLdm01093
MGLdm01126	MGLdm01128	MGLdm01131	MGLdm01139	MGLdm01141	MGLdm01164
MGLdm01236	MGLdm01254	MGLdm01268	MGLdm01281	MGLdm01314	MGLdm01332
MGLdm01342	SWBds06083				

© Siemens AG, 2005. All rights reserved