

SIEMENS

SINUMERIK 840D/810D

Description of Functions

02.2001 Edition

Tool Management SINTDI

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Tool Management SINTDI

Description of Functions

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Valid for

Control
SINUMERIK 840D/810D
SINTDI
ToolSim

Software version
4.4 and later
1.5 and later
1.5 and later

SINUMERIK® Documentation

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the "Remarks" column.

Status codes in the "Remarks" column.

A New documentation.

B Unrevised reprint with new Order No.

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If factual changes have been made on a page since the last edition, this is indicated by a new edition coding in the header on that page.

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This manual is included in the documentation on CD-ROM (DOCONCD)

Edition	Order No.	Remarks
09.01	6FC5 298-6CA00-0BG1	C

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Other functions not described in this documentation might be executable in the control. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

We have checked that the contents of this document correspond to the hardware and software described. Nonetheless, differences might exist. The information contained in this document is, however, reviewed regularly and any necessary changes will be included in the next edition. We welcome suggestions for improvement.

Subject to change without prior notice.

Preface

Organization of documentation

SINUMERIK documentation is organized on 3 separate levels:

- General documentation
- User documentation
- Manufacturer/service documentation

Target group

This documentation is intended for use by machine tool manufacturers and users of SINUMERIK 840D/810D with SW options SINTDI and ToolSim.

Aim

This document describes the following functional scope of the SINTDI software and its operation :

- Tool management functions
- Tool demand analysis based on service life and number of production orders stored on a machine
- Integration of a tool setting station
- Tool plan generation

Standard scope

This publication describes the full scope of standard functions. Other functions not described in this documentation might also be executable. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

How to find information

In addition to the table of contents and indexes of figures and tables, we have provided the following information in the appendix for your assistance:

1. List of abbreviations
2. List of references
3. Index

Notes

The following special symbols and keywords have been used in this documentation:

Note

This symbol appears in this document to draw your attention to information relevant to the subject in hand.

Caution

This warning notice (without warning triangle) means that a material damage **may** result if the appropriate precautions are not taken.

Ordering data option

In this documentation, you will find this symbol with a reference to an ordering option. The function described is executable only if the control contains the designated option.

Notice

This warning notice means that an undesired event or an undesired state **may** result if the appropriate notices are not observed.

Warnings

The following warnings with varying degrees of severity appear in this document.



Danger

This warning notice means that loss of life, severe personal injury or substantial material damage **will** result if the appropriate precautions are not taken.



Warning

This warning notice means that loss of life, severe personal injury or substantial material damage **could** result if the appropriate precautions are not taken.



Caution

This warning notice (with warning triangle) means that a minor personal injury **may** result if the appropriate precautions are not taken.

Caution

This warning notice (without warning triangle) means that a material damage **can** result if the appropriate precautions are not taken.

Notice

This symbol appears in the documentation whenever a reference is made to another subject.

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Notations

The following notations and abbreviations are used in this document:

MO	Machining Operation
PO	Production Order
MMC	Man-Machine Communication: PC-supported operator interface of SIN 840D/810D
NCK	NC Kernel
OEM	Original Equipment Manufacturer
TO	Tool Offset
TSS	Tool Setting Station
WP	Workpiece
T	Tool
TM	Tool Management

Explanation of terms

NC data management: Storage directory in the SINUMERIK MMC for all data such as NC programs, user cycles, etc.

Tool offset data: Actual cutting edge data of set tools calculated by the TSS



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Introduction

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1.1 General

Machine tools are integral components of many production processes. To make optimum use of these production machines, it is absolutely essential to link them on-line into a DP environment (CAD/PPS/CAQ).

With its open SINUMERIK 840/810D control systems and the **IT Solutions** system solution, Siemens is offering a wide scope of options for increasing the productivity of production processes.

The following standard function packages are available:

SINDNC:	Transfer of NC programs to and from higher-level I&C systems
SINCOM:	Parameterizable computer link for communication between the control system and master computer
SINTDI:	Tool management functions as an expansion of the Tool Management function
WINBDE for SINUMERIK :	Acquisition and evaluation of machine data, order acquisition via online link to SAP/R3
WinTPM:	Electronic display of maintenance manual Monitoring and display of maintenance jobs pending and logging of maintenance jobs performed
Remote diagnostics:	Teleservice link to control system for diagnosis and correction of faults via network and telephone
DNC NT-2000	Integration of the entire CNC machine park for the management, archiving and supply of CNCs with NC data

For further information about individual IT Solution products, please contact your local Siemens sales office.

1.2 Brief description of SINTDI

The SINTDI system extends the scope of tool management functions available on the SINUMERIK 840D. These additional functions assist the user in supplying and handling tools on the machine and in evaluating tool operating data. Machine downtimes and unnecessary setup times caused by lack of availability of tools are significantly reduced as a result of these extra functions.

Based on the order sequence defined by the user for the next production period, SINTDI offers the following functions:

- Define order sequence
- Create tool lists by NC program simulation
- Determine gross tool requirements
- Determine net tool requirements
- Create loading lists
- Create unloading lists
- Link to tool setting station

These functions enable the machine operator to promptly supply the necessary tools in the correct quantity and to optimize the loading and unloading operations.



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2.1 System information

2.1.1 System requirements

Hardware requirements

- MMC 103 or PCU 50 and OP012, software version 1.5 or later
- SINUMERIK 840D with at least 10 MB free hard disk storage
- Internal or external floppy drive or INTERLINK cable for the serial or parallel interface
- With network connection:
 - Ethernet interface via 3COM Etherlink III Combo (3C509)
 - ISA adapter or PC/ISA adapter.
- MF2 keyboard with PS/2 (small) connector for installation
- Recommendation: Mouse for easier handling, especially if you have no experience of working in Windows using the keyboard.

Software requirements

- SINUMERIK MMC software, version 04.04.20 or later
- SINUMERIK NCK software, version 04.04.12 or later
- Optional: Tool management

SINTDI can only be added if standard tool management functions are already installed. A user tool data must be available before the SINTDI load/unload identifier can be stored.

2.1.2 Scope of supply

The SINTDI software package can run under MMC 103 (Windows 95) and OP012 (Windows NT). SINTDI is delivered on a CD. The CD also contains the online operator's guide and installation and start-up instructions.

Installation floppy disks corresponding to the directories on the CD must be created to install the software:

Disk1 → Floppy disk 1

Disk2 → Floppy disk 2...

2.1.3 Installation and start-up

Before you install the SINTDI software, you must install the Ethernet interface, load the appropriate drivers (including TCP/IP) and enter the IP address. You must then copy the SINTDI files to the MMC and configure the configuration file SINTDI.INI.

2.2 Installation procedure

2.2.1 Installation requirements for SINTDI

- Installation floppy disks must be available (if the software has been supplied on CD, you must create the floppy disks to match the CD directories, i.e.: Disk1 → floppy disk 1, Disk2 → floppy disk 2 ...)
- Connect up the keyboard
- Connect up the floppy drive or PG

Note

Specify the appropriate floppy drive during Setup (press CTRL+ALT+ESC before MS-DOS is started).

Notice

Use a standard SIEMENS floppy drive! Make the connection as described in the Operator's Guide.

- The tool management system must be installed and ready.

Note

For the purpose of automatic tool demand analysis (ToolSim), the standard simulation application must be completely installed and ready; the part programs for which the tool demand is to be calculated must work with the simulation application.

2.2.2 Starting Windows in Service mode (MMC 103 SW 04.xx.xx)

- Switch on the MMC 103 or reboot by pressing the RESET key
- While MS-DOS is booting, press key 6 on the NC keyboard once briefly when the "Starting Windows 95 ..." message appears.
- Select item 4 in the following menu:
PLEASE SELECT:
1 Install / Update MMC-System
2 Install / Update Standard Software
3 DOS Shell
4 Start Windows (Service Mode)
5 MMC System Check
6 Reboot System (Warm Boot)
7 Backup/Restore with VALITEC Streamer
8 PC Link
9 End (Load MMC)

Your Choice [1, 2, 3, 4, 5, 6, 7, 8, 9]?
- The following password prompt appears:
passwd:

Note

The password authorizes you to intervene extensively in the operation of the control system. You must be authorized to use the password for one of protection levels below:

- System
- Manufacturer
- Service

-
- Select item 2 in the following menu:
PLEASE SELECT:
1 Standard Windows (without MMC 2-Drivers)
2 Windows (Changing Environment for MMC 2)
3 MMC 2 with last saved Environment
4 Original MMC 2
5 Return to Main Menu

Your Choice [1, 2, 3, 4, 5]?

Windows will then start. Now continue installing the SINTDI software.

2.2.3 Starting Windows in Service mode (MMC 103 SW 05.xx.xx)

- Switch on the MMC 103 or reboot by pressing the RESET key
- While MS-DOS is booting, press key 6 on the NC keyboard once briefly when the "Starting Windows 95 ..." message appears.
- Select item 4 in the following menu:


```
PLEASE SELECT:
1 Install / Update MMC-System
2 MMC Tools and Options
3 DOS Shell
4 Start Windows (Service Mode)
5 MMC System Check
6 Reboot System (Warm Boot)
7 Backup/Restore with VALITEC Streamer
8 Start PC Link
9 End (Load MMC)

Your Choice [1, 2, 3, 4, 5, 6, 7, 8, 9]?
```
- The following password prompt appears:


```
passwd:
```

Note

The password authorizes you to intervene extensively in the operation of the control system. You must be authorized to use the password for one of protection levels below:

- System
 - Manufacturer
 - Service
-

- Select item 2 in the following menu:


```
PLEASE SELECT:
1 Standard Windows (without MMC 2-Drivers)
2 Windows for MMC 2 (now same as 1)
3 MMC 2 with last saved Environment
4 Original MMC 2

9 Return to Main Menu

Your Choice [1, 2, 3, 4, 9]?
```

Windows will then start. Now continue installing the SINTDI software.

2.2.4 Starting Windows NT in Service mode (PCU 50 SW 06.xx.xx)

- Switch on the PCU or reboot by pressing the RESET key
- During booting select menu item Service Menu (not visible) after the "Please select the operating system to start ..." message using the cursor down and input key.
- Select item 4 in the following menu:


```
PLEASE SELECT:
1 Install / Update SINUMERIK System
2 MMC Tools and Options
3 DOS Shell
4 Start Windows NT (Service Mode)
5 SINUMERK System Check
6 Reboot System (Warm Boot)
7 Backup/Restore
8 Start PC Link
9 Reboot (Warm Restart)

Your Choice [1, 2, 3, 4, 5, 6, 7, 8, 9]?
```
- The following password prompt appears:


```
passwd:
```

Note

The password authorizes you to intervene extensively in the operation of the control system. You must be authorized to use the password for one of protection levels below:

- System
 - Manufacturer
 - Service
-

- Select item 1 in the following menu:


```
PLEASE SELECT:
1 Standard Windows NT(without starting SINUMERIK HMI)
4 Original SINUMERIK HMI environment
3 Actual SINUMERIK HMI environment

9 Return to Main Menu

Your Choice [1, 2, 3, 4, 9]?
```
- Another password prompt appears:


```
password:
(see Note)
```

Select "**SINUMERIK Desktop**"

Windows will then start. Now continue installing the SINTDI software.

2.2.5 SINTDI setup

You must boot the MMC (PCU) in Service mode before installing the SINTDI software.

Booting MMC/PCU in Service mode

- After you have started Windows with Ctrl + Esc, click on the Start Windows icon in the taskbar.
- Open the Start menu by pressing the Return key.
- Using the cursor Up and Down keys, select menu item "Run..." (or "Execute...") and confirm with Return.
- Insert the first SINTDI Setup floppy disk in drive A:.
- Enter the text "A:\setup.exe" in the input prompt box and press Return.

Setup will now start. The remainder of the installation procedure is interactive. While the software is being installed, you will be requested to insert the appropriate floppy disks.

Setup sequence

The first screen will offer you the option of leaving Setup again to close any programs that may still be running. Confirm with "Next" to continue the Setup routine.

You must enter the task number for SINTDI in the following Setup screen. The interactive screen suggests the first free task number of the system. However, you can configure any other free task.

The Setup routine then installs SINTDI on the system.

Confirm with "Finish" once you have removed the last diskette.

You can also install the software from a network drive. To do so, you must have a network card installed in the MMC 103 (see "Installation of network card"). The PCU 50 has an integrated network connection.

The SINTDI files are copied to directory **C:\ADD_ON (F:\ADD_ON)** and to the Windows system directory. When the file copy operation is complete, the DLLs that have been copied to the Windows system directory will be registered automatically. Files **tdibil.exe**, **tdibil.reg** and **tdidata.dll** are also registered automatically. **tdibil.reg** is registered with Regedit and **tdidata.dll** with Regsvr32.

Note

Windows must be freshly started to ensure that the Setup routine is executed correctly.

Entry of task number and softkey number

The following entries for SINTDI are automatically added to the following files by the Setup program:

MMC 103**c:\add_on\regie.ini****c:\add_on\language\re_gr.ini****c:\add_on\language\re_uk.ini****PCU 50****F:\add_on\regie.ini****F:\add_on\language\re_gr.ini****F:\add_on\language\re_uk.ini**

The task number chosen for SINTDI is assigned. Details can be found under "Manual changes to task numbers and softkey numbers".

End

The following operations need only be carried out for MMC 103 (SW 04.xx.xx)

When you close Windows, you must answer the following query with Y:
Save Windows Environment for next MMC-Start [Y,N]?

Then answer the following query with N:
Do you want to backup your old environment[Y,N]?

The MMC now stores the changes you have made.

The following menu is displayed:

PLEASE SELECT:

- 1 Standard Windows (without MMC 2-Drivers)
- 2 Windows (Changing Environment for MMC 2)
- 3 MMC 2 with last saved Environment
- 4 Original MMC 2
- 5 Return to Main Menu

Your Choice [1, 2, 3, 4, 5]?

Select item 2 to restart Windows.

Note

The setup process is only completed when you restart Windows.

When you close Windows, you must answer the following query:
Save Windows Environment for next MMC-Start [Y,N]? with Y again.
You must enter N again for the following query:
Do you want to backup your old Environment[Y,N]?

Notice

In V5.2 and later of the MMC standard software, changes are automatically save when you end Windows with "Shutdown".

2.2.6 Installing the network card (for MMC 103 only)

You must switch off the MMC 103 before installing the network card. Please follow the instructions of the network card manufacturer if you are not using a 3COM Etherlink III card!

The Ethernet card recommended above is an ISA bus card which may be inserted in either of the two ISA slots.

Activate the IRQ 11 for the 3C509 ISA network card:

- During booting press the **CTRL + ALT + ESC** simultaneously to open the BIOS screen.
- Select menu item **PCI Setup** with the cursor key.
- Use the cursor up/down keys to set **NONE** instead of **IRQ=11** under **A:**.
- Save the settings.

Install and configure the Ethernet card 3COM Etherlink III COMBO:

The MMC 103 must be rebooted.

- While Windows is booting, after the "Starting Windows 95 ..." message
- press **key 6** once on the NC keyboard.
- Select **DOS Shell**
- Enter **passwd:**

The MS-DOS Shell will now start.

- Insert the driver floppy (V5.0 or later) in the floppy disk drive
- Enter **a:\INSTALL**
- Select **Y=Agree to License**
- Select **[ENTER]=Continue**
- Select **Configuration/Diagnostic/Troubleshooting**
- Select **Configuration and Diagnostic Program**

The adapter is automatically detected and can be configured as follows:

- Select **Install → Configure Adapter**

Make the following settings:

- Select I/O Base Address: **300h**
- Select Interrupt Request Level: **11**

Important

The IRQ setting is important because IRQ 10 is already assigned.

- Boot PROM: Select **Disabled**
- Transceiver Type: Set according to connecting cable used
- e.g.: **On-Board Coax (BNC)**

Important

You must not use "Auto Select" here!

- Network Driver Optimization: Select **Windows or OS/2 Client**
- Maximum Modem Speed: Select **9600** baud
- Plug and Play Capability: Select **Disabled**
- Full Duplex: Select **Disabled**
- **Select OK.** The configuration is now saved to the Etherlink III.
- Press **3xESC** to exit the program

Exit DOS Shell by selecting **exit**.

- Select **4 Start Windows (Service Mode)**
- Enter **passwd:** eingeben
- Select **2 Windows (Changing INI-Files for MMC 2)**

Windows boots normally.

Installing the Windows 95 network drivers to the 3COM Etherlink III network card:
Configure the following by selecting **Start** (CTRL+ESC) → **Settings** → **Control Panel** → **Add New Hardware**:

- Select **Next**
- **Answer** Do you want Windows to search for new Hardware? with **No** and acknowledge with **Next**
- Select the **Network Adapter**
- Insert the "3COM EtherDisk for Etherlink III Adapter V5.0" (or later) floppy disk.
- Select **Have Disk**
- Enter **A:** under Copy Manufacturer's files from: and press **OK**
- Select "3Com EtherLink III (3C509/3C509b) in ISA mode" and press **OK**
- Accept the Windows 95 default by selecting **Next** (this will be corrected later!)
- When the message "Please insert the disk labeled 'Windows 95 CD-ROM', and then click OK." appears, select **OK**.
- Enter **C:\W95INST** under "Copy files from:" in the next input line and acknowledge with **OK**.
- Acknowledge the "Do you want to keep this file?" message for mapi32.dll and vredir.vxd with **Yes**
- Select **Finish**

Notice

It is absolutely essential that you answer the query "Do you want to shut down your computer now?" with **No**.

Restart Windows 95 to activate the network driver.

Close Windows by selecting **Start (CTRL+ESC) → Shut Down → Shut down the computer? → Yes.**

- Answer Save Windows Environment for next MMC Start [Y,N]? with **Y** (Yes). (applies only to MMC 103 SW 04.xx.xx)
- Select **2 Overwrite** your last saved Windows Environment with the current one! (applies only to MMC 103 SW 04.xx.xx)
- Select **2 Windows** (Changing Environment for MMC2) (applies only to MMC 103 SW 04.xx.xx)

Windows 95 will now start with an activated network.

If the "Enter Network Password" dialog appears, enter the following:

User name: e.g.: otto
Password: e.g.: RETURN for no password
Confirm new password: e.g.: RETURN

Correct the Windows 95 network driver configuration:

You must configure the following by selecting **Start (CTRL+ESC) → Settings → Control Panel → Network:**

- Select "**3Com EtherLink III (3C509/3C509b) in ISA mode**" and
- select the **Resources** tab under **Properties** (select the appropriate tabs with TAB or the cursor keys)
- For Configuration Type: select **Basic Configuration 0**
- For I/O address range: enter **300-30F** and confirm with **2xOK**.

Close the configuration program.

Notice

It is absolutely essential that you answer the query **Do you want to shut down your computer now?** with **No**.

Connect a Windows network drive:

If you wish to connect an external Windows 95 or Windows NT computer, then you must assign a drive on the computer so that it can be accessed by the MMC 103.

- Close Windows 95 by selecting **Start (CTRL+ESC) → Shut Down → Shut down the computer? → Yes**.
- Answer Save Windows Environment for next MMC Start [Y,N]? with **Y (Yes)**. (applies only to MMC 103 SW 04.xx.xx)
- Select **2 Overwrite** your last saved Windows Environment with the current one! (applies only to MMC 103 SW 04.xx.xx)
- Select **2 Windows** (Changing Environment for MMC 2) (applies only to MMC 103 SW 04.xx.xx)

Windows 95 now starts with an activated and correctly configured network.

- Log on as before when **Enter Network Password** appears.

You can now access the **network drive** assigned on the external computer:

- Open the Windows Explorer by selecting **(CTRL+ESC) → Programs → Windows Explorer**.
- Enter the following under **Tools → Map Network Drive**:
 - Drive: e.g.: E:
 - Path: e.g.: \\SERVER\C (\\computer name of server \ assigned path)
- Check the **reconnect at logon** box to ensure that the networked drives are automatically connected when you start the MMC 103.
- Acknowledge with **OK**.

Using the Explorer, you can now access drive E: on the hard disk of the server.

2.2.7 Operating the PCU 50 in a network under Windows NT 4.0

To operate the PCU in a network (Internet, Intranet), you need to connect the Ethernet-cable to the PCU and make the following settings:

- Computer name
- Network protocol
- IP address

Note

Please contact the responsible network administrator if you need further information about the settings for network operation.

Computer name

Open the Control Panel to set the computer name of the PCU by selecting the Windows NT taskbar **Start → Settings → Control Panel**.

Click on the Network icon in the Control Panel screen and enter the new computer name.

Dialog

Dialog: Network

Tab: Identification

Computer Name: <Computer name>

OK

TCP/IP

To configure a network link via the TCP/IP protocol, you must assign a unique IP address to the PCU.

To do this, select via the Windows NT taskbar: **Start → Settings → Control Panel**.

Open **Control Panel → Network**. In the **Protocols** tab, select the TCP/IP protocol and click on the **Properties** button to start the Properties dialog:

If the network contains a DHCP server, select:

Obtain an IP address from a DHCP server

If the network does not contain a DHCP server, select:

Specify an IP address

Enter the appropriate data (see Note).

Configure a PTP link on an external computer (PG/PC)

For a PTP link (Peer-To-Peer) to be set up between a PCU 50 and an external computer (PG/PC) under Windows 95/98, the following conditions must be fulfilled with respect to the external computer:

- The Ethernet cable is connected to the Ethernet interface on the external computer and the PCU.
- An Ethernet cable of type **Twisted Pair Crossed 10baseT/100baseTX Ethernet Cable** must be used to make a point-to-point connection.

Notice

To make a **point-to-point** connection between the PCU 50 and an external computer (PG/PC), you must use an Ethernet cable of type **Twisted Pair Crossed 10baseT/100baseTX Ethernet Cable**.

-
- The network protocol **NetBEUI** is installed on the external computer.
 - Access to files has been authorized for other users.
 - The computer name of the external computer is known.
 - The drive / directory of the external computer to be accessed is enabled for access by the PCU and the share name is known.

NetBEUI network protocol

To check whether the NetBEUI protocol is installed, select via the Windows 95/98 taskbar on the external computer **Start → Settings → Control Panel**.

Click on the **Network** icon in the Control Panel screen. The installed network components are displayed on the **Configuration** tab. If they do not include the NetBEUI network protocol, then this must be installed now.

Start dialog

Dialog: Network
Tab: Configuration
Button: Add...

Dialog: Select Network Component Type
Select from the list: Protocol
Button: Add...

Dialog: Select Network Protocol
Select from the Manufacturers list: Microsoft
Select from the Network Protocols list: NetBEUI

OK

File sharing

To grant access to your files by other users, or check that it has been granted, click on the **Configuration** tab on button **File and Print Sharing**.

Continuation of dialog

Tab: Configuration

Button: "File and Print Sharing..."

Dialog: File and Print Sharing

* I want to be able to give others access to my files.

OK

Computer name and workgroup

With a point-to-point connection, you can freely choose a computer name and workgroup name for the external computer.

To set or find out the computer name and workgroup name of the external computer, select tab: **Identification**

End dialog

Tab: Identification

Computer name: <**Computer name**>

Workgroup: <**Workgroup**>

OK

Share a drive/folder or find out the share name

To share a drive / folder or find out the share name on the external computer, start the Windows Explorer and select the drive / folder that you wish to share with the PCU.

Note

The access control is set in the Windows Explorer via the "Access Control" tab in the Properties dialog for a drive or folder.

If the **Access Control** tab is not displayed, then the computer is or was in a domain network and the system administrator has disabled display of the tab for security reasons.

You must enable display of the Access Control table to be able to make the setting for a point-to-point connection. You can do this by means of the **poledit.exe** program.

Poledit.exe is stored on the Win95-CD under: admin\apptools\poledit, or can be downloaded free of charge from <http://www.microsoft.com/windows95/downloads>. Open the Properties dialog (right mouse button → Properties) for the drive / folder and specify the share name and the access rights.

Dialog

Dialog: **Properties of <drive>/<folder>**

Tab: **Sharing**

Select tab: Shared As: anwählen

Share name: **<Share name>**

Button: **Access Type...**

Dialog: **Access by Share Permissions**

Button: Add...

Dialog: **Add Users and Groups**

Names: *Select names from the list*

*e.g. **User** or **The World***

Button: Add

OK

Access Type: **Read Only**

OK

OK

2.2.8 Printer installation (MMC 103)

Set hardware resources for printer port

- Boot MMC in Service mode: Key sequence **6,4,2**.
- The ports (COM and LPT) are displayed when you select **Start → Settings → Control Panel → System → Device Manager**.
If a yellow exclamation mark appears next to the printer port (LPT), you must select it and set the address 0378-037A under **Properties** on tab **Resources** with **Change Settings**.
- Acknowledge the change with **OK** and answer the query "Do you want to shut down" with **No**.
- Close the **System Properties** tab by selecting **Close**.
- Shut down the MMC by selecting **Start → Shut Down → Shut down the Computer**. (applies only to MMC 103 SW 04.xx.xx)
- During booting answer the query **Save Windows Environment for next MMC Start [Y,N]?** with **Y**. (applies only to MMC 103 SW 04.xx.xx)
- Answer query **Do you want to save your odd Environment [Y,N]?** with **Y** as well. (applies only to MMC 103 SW 04.xx.xx)

Printer installation

Boot Windows in Service mode:

Start the **Add Printer Wizard** by selecting **Start → Settings → Printers → AddPrinter**. Select **Local Printer** or **Network Printer**.

Local printer

- Select the printer from the **Manufacturers/Printers** list or install from the printer manufacturer's floppy disk with **Have Disk**.
- Install the printer as the **Default Printer** with the printer setup supplied by the manufacturer.
- Select parallel interface LPT1 under **Available Ports**.

Network printer

- **Network Path** or find the printers available in the network using **Browse**.
- Select and install the desired printer.
- After you have copied the files, the new printer appears in the program group.
- The printer must be activated as the **default printer** (check with right mouse button).

Alternatively, you can find the connected and activated printer via the system during control system booting. The message **New Hardware found** then appears.

2.2.9 Printer installation (PCU 50)

Printer installation

Boot Windows in Service mode:

Start the **Add Printer Wizard** by selecting **Start → Settings → Printers → AddPrinter**. Select **My Computer** or **Network printer server**.

Local printer (My Computer)

- Select parallel interface LPT1 under **Available Ports**
- Select the printer from the **Manufacturers/Printers** list or install from the printer manufacturer's floppy disk with **Have Disk**.
- Install the printer as the **Default Printer** with the printer setup supplied by the manufacturer.

Network printer (network printer server)

- Enter the printer directly under **Printer**
- Select and install the printer of your choice under Shared Printers.
- After you have copied the files, the new printer appears in the program group.
- The printer must be activated as the **default printer** (check with right mouse button).

2.2.10 Configuring SINTDI

The SINTDI software is configured in the **SINTDI.INI** configuration file under **C:\ADD_ON**. The contents of the file are as follows:

```
[CONTROL]
MDIList=sintdi\SinTDI.MDI
ControlFile=sintdi\SinTDI.ZUS

[OPTIONS]

; Nummer des Werkzeug-Anwenderdatums, dass von SINTDI als Be-/Entladekennung verwendet
; wird.
; Number of tool user data to be used as the SINTDI load/unload identifier
SOFTKEY_TO_LOADLIST=1
OEMFLAG=1
TOOLFILE=C:\data\wkz_to.ini
; Bezeichnung der Maschine bzw. des Arbeitsplatzes
; Machine or workstation name
MACHINENAME="SINUMERIK"

; Werkzeug-Katalog aktualisieren 1-Ja / 0-Nein
; Update tool catalogue 1-Yes / 0-No
UPDATE_TOOL_CATALOG=0

[TDI_IN]

; Absolute Path zum TDI_IN Verzeichnis
; The absolute path of the TDI_IN directory
PATH=C:\DH\TDI_IN.CLP

; Dateierweiterung für Dateien im TDI_IN Verzeichnis
; The file extension for files in TDI_IN directory
EXTENSION=COM

[TDI_OUT]

; Absolute Path zum TDI_OUT Verzeichnis
; The absolute path of the TDI_OUT directory
PATH=C:\DH\TDI_OUT.CLP

; Dateierweiterung für Dateien im TDI_OUT Verzeichnis
; The file extension for files in TDI_OUT directory
EXTENSION=COM

; Zusatz-Bedienmeldung bei der Funktion "Weitergabe an SEG"
; The format of the operator prompt used for the "Transfer to TSS" function
MESSAGE=""

; Ersten 5. Stellen für Dateinamen an das SEG
; First five chars of the name of the file to the TSS
NAME_START="TOSEG"

; TOOLSIM aktivieren
; Enable TOOLSIM
ENABLE_TOOLSIM=0
```

Changes can be made in the following sections:

Note

All drive designations refer to the MMC 103.
 Drive "F:" is used instead of drive "C:" on the PCU 50.
 e.g. C:\DH\TDI_IN.CLP (MMC 103) corresponds to F:\DH\TDI_IN.CLP (PCU 50)

SINTDI.INI section [OPTIONS]

Define the tool user data for the load/unload identifier

You can define in section [OPTIONS] of the configuration file which tool user data will be used by SINTDI as a load/unload identifier.

[OPTIONS]

OEMFLAG=1 ; default 1, the first tool user data is used.
To activate: Delete semicolon

Generation of the user tool data is activated by the following machine data:

18080 MM_TOOL_MANAGEMENT_MASK bit2
18094 MM_NUM_CC_TDA_PARAM

The load/unload identifier can assume the following states:

0	Indicates nothing about how the tool is used
edge 1	Load identifier, tool must be loaded to magazine
edge 2	Unload identifier, tool must be unloaded from magazine

(see also: Planning Guide for Tool Management and Handling of Load Identifier / Unload Identifier)

Note

The user must activate the user tool data; it is not activated by default. In software version 05.03.11 or later for MMC 103 and 06.xx.xx or later for PCU 50, the new status parameters **Load** and **Unload** of the tool management application are used for this purpose.

Activate softkey Update Loading List

You can also define in the **[OPTIONS]** section whether or not softkey **Update Loading List** is displayed in the result lists.

[OPTIONS]

SOFTKEY_TO_LOADLIST=0	;(default)	The softkey is not displayed
	1	The softkey is displayed

When you select option "1", the balance result is displayed as a loading list.

Note

If the control is not connected to a TSS, the balance result can also be displayed as a loading list if the softkey is activated.

Define the machine name

You can define the machine name in the **[OPTIONS]** section of the configuration file. This is used in printouts of gross or net demand lists.

[OPTIONS]
MACHINENAME=" " ;Specify a machine name or workstation
;default;: blank

Note

The machine name is used in transmissions to the TSS and in printouts.

SINTDI.INI section [TDI_IN]

Define directory paths for TDI_IN

The absolute paths of the internal directories needed for exchanging data are set in section [TDI_IN].

These are:

```
[TDI_IN]
PATH=C:\DH\TDI_IN.CLP ;(default) The absolute path for files from the TSS is defined in this
line.
EXTENSION=COM ;(default) The file extension is specified in this line.
```

SINTDI.INI section [TDI_OUT]

Define directory paths for TDI_OUT

The absolute paths of the internal directories needed for exchanging data are set in section [TDI_OUT].

These are:

```
[TDI_OUT]
PATH=C:\DH\TDI_OUT.CLP ;(default) The absolute path for files to the TSS is defined in this line.
EXTENSION=COM ;(default) The file extension is specified in this line.
```

Note

All drive designations refer to the MMC 103. Drive "F:" is used on the PCU 50 instead of drive "C:".
e.g. C:\DH\TDI_IN.CLP (MMC 103) corresponds to F:\DH\TDI_IN.CLP (PCU 50)

Operator prompt format

The format of the operator prompt used for the "**Transfer to TSS**" function is also defined in section [TDI_OUT].

[TDI_OUT]

MESSAGE=" " ;(default)

The standard prompt is worded:
Transfer gross demand to TSS?
File: TOSEG file name

Example:

MESSAGE="User-defined prompt"

If you formulate your own message, then the prompt is displayed as follows (example):

TOSEG001.COM
User-defined prompt

A user-defined prompt comprises the file name and the message text. The standard text **Transfer gross demand to TSS? file:** does not appear!

(see also: Interface to a tool setting station)

Define name of file to TSS

The format of the name of the file to the TSS is also defined in section [TDI_OUT].

[TDI_OUT]

NAME_START="TOSEG" ;default: TOSEG

The first five characters in the file name are predefined. The following three digits are numbered sequentially. A typical file name could be, for example:

TOSEG001.COM
TOSEG057.COM

(see Interface to a tool setting station)

Note

You can freely selected the names of files from the TSS.

In this case, the file extension is ***.COM**.

A possible file name could be, for example: SEG0001.COM

REGIE.INI section [TaskConfiguration]

Manual changes to task numbers and softkey numbers

You can, if necessary change the task number in file **c:\add_on\regie.ini** and the softkey numbers in files **c:\add_on\language\re_gr.ini** and **c:\add_on\language\re_uk.ini**.

The Setup program automatically adds the necessary entries for SINTDI to the files specified above as part of the installation routine. The Setup program identifies a free task number on the basis of the entries in file **regie.ini** and directories **c:\user**, **c:\oem**, **c:\add_on** and **c:\mmc2**.

A typical entry generated by the Setup program is shown below:

```
[TaskConfiguration]
Task6 = name := sintdi, Timeout := 30000, PreLoad := False
File : c:\add_on\language\re_gr.ini and c:\add_on\language\re_uk.ini
[HSofkeyTexts]
HSK6 = "SINTDI"
```

You can manually adjust the entries generated by the Setup program.

Note

You may need to do this, for example, if you install other applications that are preprogrammed for particular task or softkey numbers.
Do not set bit 4 in machine data MD 18080 as this will adversely affect functioning of the load identifier.

2.3 ToolSim option

2.3.1 Installing ToolSim

ToolSim is used to calculate the tool operation times from an NC part program and to generate a tool plan. ToolSim is embedded in the SINTDI application and requires a number of preset values.

ToolSim works with a special **SMAC.DEF** under C:\add_on which is based on the standard C:\DH\DEF.DIR\SMAC.DEF. ToolSim requires an additional manufacturer entry via which the tool is loaded to the spindle (e.g. M06). This matches the setting in machine data **TOOL_CHANGE_M_MODE**.

Using the **Match machine data** function, ToolSim creates a new **SMAC.DEF** to which the special function from machine data **TOOL_CHANGE_M_MODE** is transferred.

Notice

Please note that ToolSim only allows two-digit special functions for tool changes (M206, for example, cannot be used).

Original SMAC.DEF file

```
;V04.04.04 17.07.98 Sca Macro definition file
N10 DEFINE M13 AS M3 M7
N20 DEFINE M14 AS M4 M7
N30 DEFINE M15 AS M5 M9
N40 DEFINE RL AS REAL
N99 M30
```

Entry in file C:\add_on\SMAC.DEF

```
DEFINE M06 AS M00 H6=4711.06
;V04.04.04 17.07.98 Sca Macro definition file
N10 DEFINE M13 AS M3 M7
N20 DEFINE M14 AS M4 M7
N30 DEFINE M15 AS M5 M9
N40 DEFINE RL AS REAL
N99 M30
```

Note

File SMAC.DEF is copied from the Definitions directory (C:\DH\DEF.DIR) to C:\add_on, i.e. the SMAC.DEF file relevant to the machine must remain in the **Definitions** directory.

File C:\add_on\initial.ini

To allow ToolSim to work as close as possible to the control, the **initial.ini** file must be stored in directory **add_on**.

When ToolSim is called for the first time, a new **initial.ini** file is generated from the active NC data when you select softkey **Match machine data**. You can create a new file whenever necessary (e.g. when machine data are modified).

Note

The simulation application is terminated by softkey **Match machine data** and re-initialized again via softkey **Start simulation**.

File C:\add_on\to_ini.ini

When calculating the tool operation times, ToolSim works exclusively with the special tool and magazine data from **to_ini.ini**.



Warning

This file must not be altered. With respect to the simulation of NC programs in ToolSim, the boundary conditions outlined in section "Fundamentals of program simulation" must be observed!

2.3.2 Fundamentals of program simulation

Starting up the standard simulation function

The ToolSim function is based on the standard simulation settings, i.e. you must start up the standard simulation function before you can start ToolSim for the first time.

Settings

To avoid errors in the simulation of NC programs, please note the following settings:

User cycles

If user cycles with parameter passing must be called in the NC program, they must be entered in file DPCUSCYS.COM. The file is stored in subdirectory **Simulation Data** in directory **Interactive Programming** of the **Services** operating area. (Path: C:\DH\DP.DIR\SIM.DIR)

Example

Subroutine call YINC (1,2,3) is programmed in the part program.
The following entry must be made in file **DPCUSCYS.COM** for the simulation function to register the program:

```
PROC YINC(REAL POSY, REAL INCY, INT FY)
```

User-specific definition files

All user-specific definition files (Global User Data) must be copied from the definition directory (path: **C:\DH\DEF.DIR**) to the simulation directory (path: **C:\DH\DP.DIR\SIM.DIR**). The definition directory is stored in the **Services** operating area under **Definitions**.

Note

The new settings do not take effect until the standard simulation function is started (entry in C:\user\dpsimnck.ini).

Notice

Please note when writing NC programs that they cannot access the PLC when they are being simulated.

Tip: Skip any necessary PLC access operations with the request for \$P_SIM.

2.4 Configuring the tool management system

The Setup program creates an additional **S** (for SINTDI) column in the magazine and tool lists to display the load and unload identifiers (1, 2):
Setup takes the requisite configuring steps in file **c:\add_on\paramtm.ini** using the tool user data specified in **c:\add_on\sintdi.ini** (see OEMFLAG of section [OPTIONS]).

The parameterization file **paramtm.ini** is structured as follows:

```
[1_MagList]
26=TC_TPC1, 1, TC_TPC1
27=<EndOfList>

[1_ToolList]
20=TC_TPC1, 1, TC_TPC1
21=<EndOfList>

[ToolParams]
UserDataParamIO1=Type:=int, Res:=2, Min:=0, Max:=2
```

Change made in magazine list by Setup routine:

Section [1_MagList]

The OEM user data is added to section **[1_MagList]**:

Example of OEM user data 1 (OEMFLAG=1 in c:\add_on\sintdi.ini):

```
26= TC_TPC1,      1,  S
27= <EndOfList>
```

The syntax is described in detail in file **c:\mmc2\paramtm.ini**.

Change made in tool list by Setup routine:

Section [1_ToolList]

The OEM user data is added to section **[1_ToolList]**:

```
20= TC_TPC1,      1,  S
21= <EndOfList>
```

Section [ToolParams]

The format is also set in section **[ToolParams]**:

```
UserDataParamIO1=Type:=int, Res:=1, Min:=0, Max:=2
```

Sequential numbers 26 and 27 or 20 and 21 are determined by the SINTDI Setup program itself on the basis of the existing entries in **c:\mmc2\paramtm.ini**.

Reconfiguring of the OEM user data in c:\add_on\sintdi.ini:

If you subsequently alter entry **OEMFLAG=*n*** in section **[OPTIONS]** in configuration file **c:\add_on\sintdi.ini** in order to use another OEM user data, you must also remember to adapt the OEM user data correspondingly ***n*** in sections **[1_ToolList]** and **[1_MagList]** in **TC_TPC*n*** in parameterization file **c:\add_on\paramtm.ini!** **UserDataParamIO*n*** in section **[ToolParams]** must be adjusted accordingly.

Select several NC programs in ToolSim:

It is also possible to include several NC programs in the automatic generation of the tool plan file (.TOP) with ToolSim. The following entry must be made in file **ToolSim.ini** for this purpose:

[MISC]

NCPROGMULTISEL = 1 ; you can select several NC programs.

NCPROGMULTISEL = 0 ; you can select one NC program.

Note

All drive designations refer to the MMC 103. Drive "F:" is used on the PCU 50 instead of drive "C:".

e.g. C:\DH\TDI_IN.CLP (MMC 103) corresponds to F:\DH\TDI_IN.CLP (PCU 50)

2.5 Software deinstallation

Preparation

Before you start deinstalling the software, you should freshly reboot the MMC to ensure that no DLLs that are to be erased are currently being accessed.

Deinstallation

- Click on the **Add/Remove Programs (Software)** icon under **Settings → Control Panel**.
The **Add/Remove Programs Properties (Software) dialog** lists the programs that can be deinstalled automatically by Windows. Select SINTDI from the list and click on button **Add/Remove Programs (Install/Deinstall)**.
- Acknowledge the following query with OK:
Are you sure you want to completely remove "Sintdi" and all of its components?
- SINTDI will now be completely removed from the MMC 103. The progress of the deinstallation operation is displayed in screen **Remove programs from your computer**. The entries added to **regie.ini**, **re_gr.ini**, **re_uk.ini** and **paramtm.ini** during installation are removed again.



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3.1 Data structure

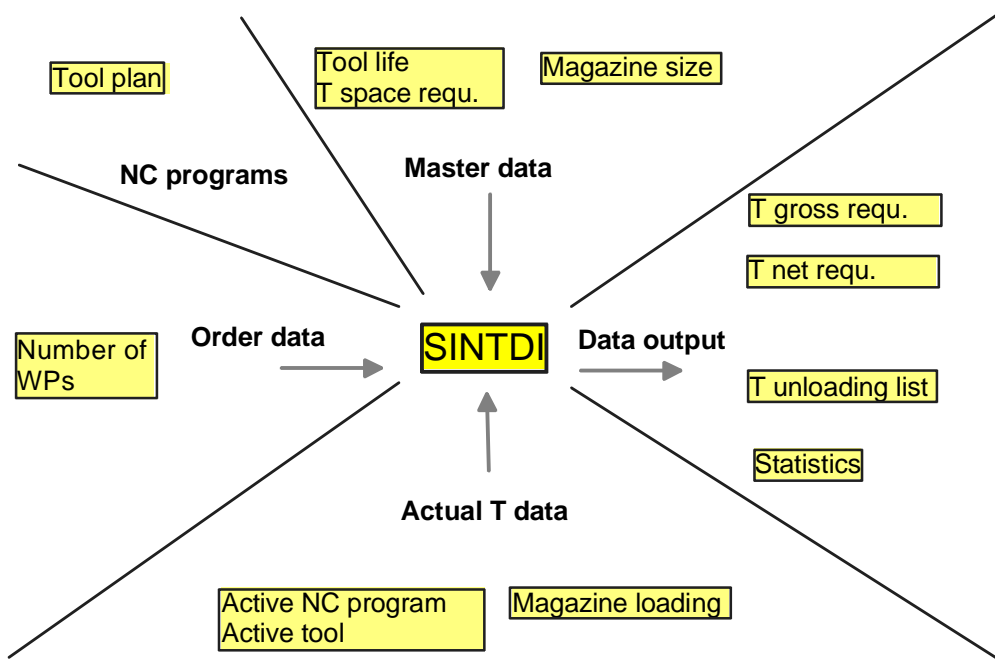


Fig. 3-1 Data structure of base data

SINTDI is based on the following data:

- Tool plan
- Workpieces (associated transmitted NC programs)
- Order data (quantity)
- Tool master data (for highest balancing level only)
- Actual tool data

3.1.1 Tool master data

SINTDI fetches the required master data for analyzing the tool demand at the highest balancing level from the tool catalog in the tool management system.

The following data from the tool management tool catalog are needed:

- Tool size
- Edge-specific set service life

All other tool master data, such as those for supplying a tool setting station, are also administered in the tool catalog of the SINUMERIK 840D tool management system.

3.1.2 Actual tool data

The status data needed for the tool balance are read from the tool plan in the SINUMERK standard tool management system. The list is accessed via the NCDDE server. The structure of the tool status data is described in:

References: /FBW/, SINUMERIK 840D/810D/FM-NC
Description of Functions, Tool Management

3.1.3 Magazine configuration

SINTDI evaluates the magazine size when analyzing the tool demand. The parameters required for this purpose are read from the SINUMERIK (NCK) configuration data.

3.2 Machining sequence

The machining sequence is a database of the balancing function. This defines the prescribed sequence of workpieces to be machined (orders) including the quantity of parts to be produced. It forms the basis for balancing calculations.

You must define the machining sequence. You can change it or adapt it to meet current requirements at any time.

SINTDI	CHAN1	Jog	\	MPF0		
Channel reset					Add operation	
Program aborted						
Machining sequence					Delete operation	
SINTDI 1.5.0					Change operation	
No.	Machining operation	Planned batch size	Actual batch size	Balance batch size		
1	GEAR	5	3	1	Operation up	
2	VMOTOR	8	6	2		
3	GEAR	10	5	1		
4	MCASING	8	6	2		
					Operation down	
					Split operation	
					Further data	
i						
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list

Fig. 3-2 Machining sequence

Balance batch size

The balance batch size specifies the number of parts still to be machined for balancing. When machining on these parts commences, the balance batch size is automatically decremented by SINTDI when the part program end identifier M30 is reached. This creates a reference to the parts already machined. The balance is always calculated on the basis of parts still to be machined.

Production order

The production order provides a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI.

Machining step

The machining step provides a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI.

Date

The deadline (data) for the production order provides a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI.

3.2.2 Operating functions relating to machining sequence

The following functions are provided to help you create a machining sequence:

Add a machining operation

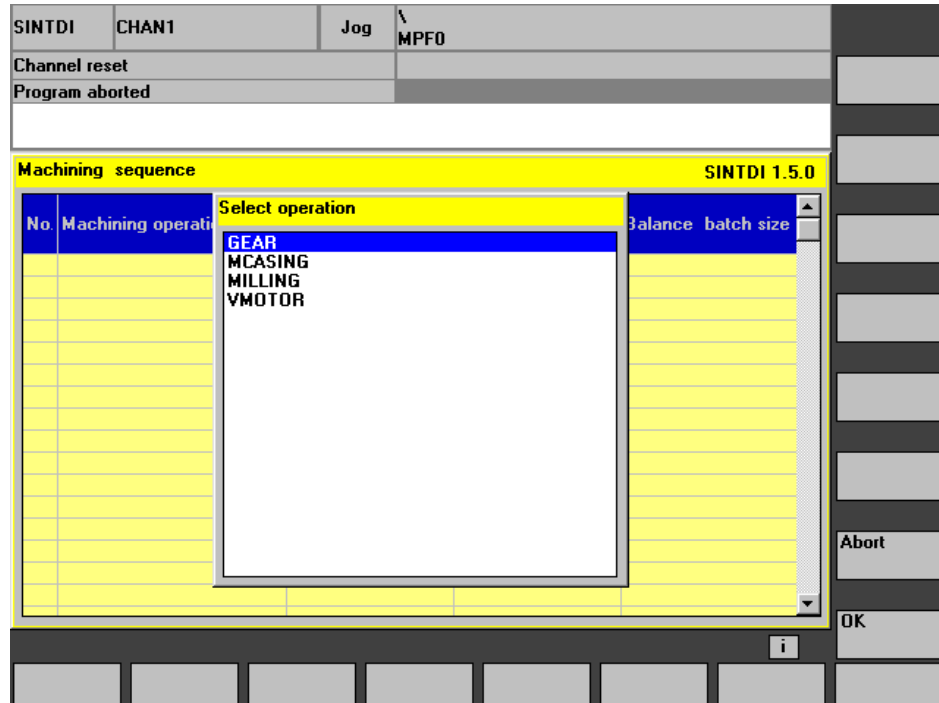


Fig. 3-4 Add a machining operation

This function adds a new operation to the machining sequence. The displayed selection list mirrors the workpieces stored on the control system. You can insert the same machining operation several times in on machining sequence.

Note

The planned and actual batch sizes for a newly added operation are initially preset to 0, and the balance batch size to 1.

Delete a machining operation

Delete machining operation removes the selected operation from the machining sequence.

Edit a machining operation

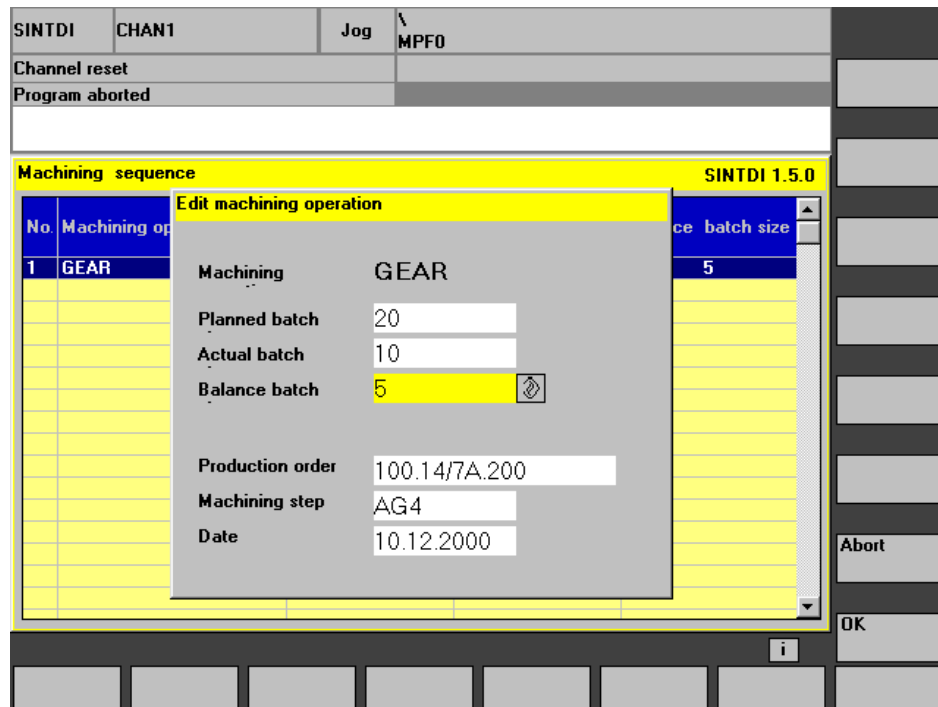


Fig. 3-5 Edit a machining operation

Edit machining operation displays a box in which you can edit the parameters of the selected operation.

Note

Only the planned, actual and balance batch sizes are relevant as regards SINTDI.

Operation Up

The selected operation is moved up one position in the machining sequence list.

Operation Down

The selected operation is moved down one position in the machining sequence list.

Split an operation

The selected operation is split into two entries. In this case, a second operation of the same name is added for which the planned, actual and balanced batch sizes are preset to 0. The original entry is not altered.

Further data

This function switches the focus in the machining sequence screenform between the following columns:

- Machining operation / Planned batch size / Actual batch size / Balance batch size
- Machining operation / Production order / Machining step / Date

3.3 Tool plan

The tool plan describes the tool requirement for one complete machining operation on a workpiece.

A tool plan can be allocated to each individual workpiece and stored in the Workpieces directory together with the associated NC program in the NC data management.

The tool plan is the basis for balancing functions. The more exact to the tool plan, the more accurate the balance result and the more detailed the loading and unloading lists.

Note

If tool plans are available in SINTDI format (.TOP), then they can be evaluated by the balancing function. The name of the tool plan file (e.g. MOTOR.TOP) matches the name of the workpiece (e.g. MOTOR).

If they are not available in SINTDI format, then the plans are used for display purposes only.

There are 3 methods by which a tool plan can be made available:

- File transfer, e.g. from a higher-level NC programming system
- Manual input / correction
- Simulation of one or several NC programs by the Toolsim program directly on the control.

SINTDI	CHAN1	Jog	\MPF0			
Channel reset				Add tool		
Program aborted				Delete tool		
Tool plan				VMOTOR		
No.	Tool name	Edge	Operation time [min]	Block number		
1	Ballheadtool	1	6.00	10	Change operation	
2	Boringbar	1	10.00	20		
3	Counterbore	1	8.00	30		
4	Threadcutter	1	12.00	40		
					Tool up	
					Select tool plan	
i						
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list

Fig. 3-6 Tool plan

3.3.1 Structure of a tool plan

There are two different options for structuring the tool plan or selecting the sequence of data records within the plan:

- **Cumulative operation time**
One data record is created per tool type with cumulative operation time over the entire NC program; the tools are sorted according to the first time they are used.
- **Sequence of operation**
One data record is created per tool operation with individual operation time; the same tool name may appear several times.

3.3.2 Operating functions for tool plan

The operating functions below allow you to display and manually edit or generate tool plans.

Select tool plan

This function enables you to select a tool plan in a dialog box. The selection of plans displayed corresponds to the plans stored in the existing workpiece directories.

Change operation (time)

This box enables you to edit the operation time of a tool.

Tool Up / Tool Down

Depending on requirements, you can change the order of tools in the plan with these functions.

Add tool / Delete tool

Depending on requirements, you can add or delete tools to or from a plan using these functions.

Generate tool plan

If you are using SINTDI with the Toolsim option, you can create a tool plan by selecting softkey **Generate tool plan**.

3.4 Balancing

3.4.1 Gross requirement

The gross requirement (demand) defines the tool requirement calculated on the basis of the machining sequence, taking into account the workpieces still to be machined, and the tool plan, without correction according to the actual situation in the tool magazine.

The calculation of the gross requirement according to operation time is based on the settings in the **Balance options** screenform and the machining sequence.

3.4.2 Gross requirement according to operation time

SINTDI	CHAN1	Jog	\ MPF0			
Channel reset						
Program aborted						
Gross requirement after operating time						Created: 14:57
No	Tool name	Made available at [hh:mm]	Planned service life [min]	Machining operation	Part	
1	Facemill	00:00	11.00	GEAR	1	
2	Twistdrill	00:08	16.00	GEAR	1	
3	Ballheadtool	00:17	10.00	VMOTOR	1	
4	Boringbar	00:23	11.00	VMOTOR	1	
5	Counterbore	00:33	9.00	VMOTOR	1	
6	Threadcutter	00:41	14.00	VMOTOR	1	
7	Ballheadtool	00:53	10.00	VMOTOR	2	
8	Boringbar	00:59	11.00	VMOTOR	2	
9	Counterbore	01:09	9.00	VMOTOR	2	
10	Threadcutter	01:17	14.00	VMOTOR	2	
11	Facemill	01:29	11.00	GEAR	1	
12	Twistdrill	01:37	16.00	GEAR	1	
13	Reamer	01:46	14.00	MCASING	1	
14	Threadcutter	01:55	14.00	MCASING	1	
15	Boringbar	02:03	11.00	MCASING	1	
16	Reamer	02:11	14.00	MCASING	2	

Transfer to tool setting

Update loading list

Calculate new list

Machining sequence | Tool plan | Balance options | **Gross requirement** | Net requirement | Unloading list | Loading list

Fig. 3-7 Gross requirement according to operation time

Function

The relevant data for balancing are stored in the machining sequence and the tool plan. It is possible to calculate the balance for part of an operation by specifying the balance batch sizes in the machining sequence screenform.

The balance is calculated as a function of the filter characteristics set in the balance options.

The tools determined using the "Gross requirement according to operation time" function are sorted according to their order of availability with time of availability.

Note

Tools whose service life is not taken into account appear only once in the gross requirement list. Only the number if entered in the **Machining operation** column.

Note

An error message is output if the tool plan for a particular workpiece is not available. The tool demand analysis operation continues regardless, but the workpiece is not taken into account in the balance calculation.

Print

The displayed list **Gross requirement according to operation time** is printed.

Transfer to tool setting station

The calculated tool requirement is transferred to the TSS (see Interface to a tool setting station). The tool requirement is output to a file. The requisite settings for this function are described in the Configuration section.

Note

With respect to the above function, the tool setpoint data must be available on the tool setting station.

Update loading list

If there is no tool setting station connected, you can accept the balance result directly as a loading list.

Calculate new list

A new list is calculated.

Print

The displayed list **Accumulated gross requirement** is printed.

Transfer to tool setting station

The calculated tool requirement is transferred to the TSS (see Interface to a tool setting station).

Note

With respect to the above function, the tool setpoint data must be available on the tool setting station.

Update loading list

If there is no tool setting station connected, you can accept the balance result directly as a loading list.

Calculate new list

A new list is calculated.

3.4.4 Net requirement

Unlike the gross requirement calculation, the net requirement takes into account the current tool complement in the magazine and also specifies the time at which the tool will be made available. This is determined by the machining sequence, the number of workpieces to be machined, the tool plan and the actual situation in the tool magazine.

The calculation of the net requirement according to operation time is based on the settings in the **Balance options** screenform and the machining sequence.

3.4.5 Net requirement according to operation time

No.	Tool name	Made available at [hh:mm]	Planned service life [min]	Machining operation	Part
1	Facemill	00:00	11.00	GEAR	1
2	Twistdrill	00:08	16.00	GEAR	1
3	Ballheadtool	00:17	10.00	VMOTOR	1
4	Boringbar	00:23	11.00	VMOTOR	1
5	Counterbore	00:33	9.00	VMOTOR	1
6	Threadcutter	00:41	14.00	VMOTOR	1
7	Facemill	00:53	11.00	GEAR	1
8	Twistdrill	01:01	16.00	GEAR	1
9	Reamer	01:10	14.00	MCASING	1
10	Threadcutter	01:19	14.00	MCASING	1
11	Boringbar	01:27	11.00	MCASING	1

Fig. 3-9 Net requirement according to operation time

Function

The relevant data for balancing are stored in the machining sequence and the tool plan. It is possible to calculate the balance for part of an operation by specifying the balance batch sizes in the machining sequence screenform.

The balance is calculated as a function of the filter characteristics set in the balance options.

The tools determined using the "Net requirement according to operation time" function are sorted according to their order of availability with time of availability.

Note

Tools whose service life is not taken into account are ignored in the net requirement calculation if they are already loaded in the magazine.

Note

An error message is output if the tool plan for a particular workpiece is not available. The tool demand analysis operation continues regardless, but the workpiece is not taken into account in the balance calculation.

Print

The displayed list **Net requirement according to operation time** is printed.

Transfer to tool setting station

The calculated tool requirement is transferred to the TSS (see Interface to a tool setting station). The tool requirement is output to a file. The requisite settings for this function are described in the Configuration section.

Note

With respect to the above function, the tool setpoint data must be available on the tool setting station.

Update loading list

If there is no tool setting station connected, you can accept the balance result directly as a loading list.

Calculate new list

A new list is calculated.

3.4.6 Accumulated net requirement

No.	Tool name	Accumulated operation time [min]	Net tool count	Magazine tool count	Machining operation
1	Facemill	16.00	2	0	GEAR
2	Twistdrill	18.00	2	0	GEAR
3	Ballheadtool	6.00	1	0	VMOTOR
4	Boringbar	10.00	1	0	VMOTOR
5	Counterbore	8.00	1	0	VMOTOR
6	Threadcutter	12.00	1	0	VMOTOR
7	Reamer	9.00	1	0	MCASING
8	Threadcutter	8.00	1	0	MCASING
9	Boringbar	8.00	1	0	MCASING

Fig. 3-10 Accumulated net requirement

Function

In the accumulated net requirement screen, the tool types needed to perform an operation are displayed with accumulated operation time and number of tools required. The tools are sorted according to the order in which they are first used.

Note

When a balance is calculated with a limited number of tools per tool identifier, all tools from a preceding machining sequence with the same name are labeled with an asterisk if the balance for one tool in this sequence has reached the limit specified for number of tools per identifier. The balancing calculation for the affected operation is discontinued.

Print

The displayed list **Accumulated net requirement** is printed.

Transfer to tool setting station

The calculated tool requirement is transferred to the TSS (see Interface to a tool setting station).

Note

With respect to the above function, the tool setpoint data must be available on the tool setting station.

Update loading list

If there is no tool setting station connected, you can accept the balance result directly as a loading list.

Calculate new list

A new list is calculated.

3.4.7 Balance options

To allow you to adapt the tool requirement lists to suit the different conditions on a machine, other balancing criteria apart from the machining sequence and specification of number of tools to be balanced can be selected in the **Balance options** screenform. These inputs apply to the calculation of gross and net requirements and to the unloading list. After you have changed the balance options, a new balance calculation is automatically performed when you select one of the result screens (gross or net requirement and unloading list).

General balance options:

SINTDI	CHAN1	Jog	\	MPF0		
Channel reset						
Program aborted						
Balance options						
<input checked="" type="radio"/> standard balance (tool lifetime from catalogue) <input checked="" type="checkbox"/> Limit tool number per type to : 5						
<input type="radio"/> List of differences <input checked="" type="checkbox"/> calculation with service life evaluation						
<input type="checkbox"/> Limit period of use (in hours) 1						
<input checked="" type="checkbox"/> Limit total tool number to : 40						
Options for net requirement only						
<input type="checkbox"/> Consider unloaded tools <input checked="" type="checkbox"/> Consider provided tools						
Output requirement after:						
<input checked="" type="radio"/> Operating time <input type="radio"/> Accumulated						
i						
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list

Fig. 3-11 Balance options

Balancing type: You can select one of two balancing levels in the balance options screen:

<input checked="" type="radio"/> standard balance (tool lifetime from catalogue) <input checked="" type="checkbox"/> Limit tool number per type to : 5
<input type="radio"/> List of differences <input checked="" type="checkbox"/> calculation with service life evaluation

Standard balance

The standard balance calculates the number of tools required per tool type applying the setpoint service life from the tool catalog. By selecting the option **Limit tool number per type to**, you can restrict the maximum number of tools of one type, i.e. the balancing calculation for this operation will be aborted if this limit is exceeded. Balancing continues for other machining operations which do not use this type of tool.

List of differences

The List of Differences balancing option is available for performing quick comparisons. In contrast to the standard balance option, the list of differences is calculated without reference to the setpoint service life. This setting calculates the tool type missing in the magazine.

To obtain additional information about the total service life required for missing tool types, you can select the **Calculation with service life evaluation** option. The tool plan also lists tools with insufficient residual service life and the service life they need for the operation.

Limit period of use

This function enables you to specify the time horizon for the balancing calculation. The NC program runtime in the tool plan and the quantity of parts to be produced serve as the basis for the calculation.

Limit period of use (in hours)

When you set this option, only the tool requirement for the specified time period is calculated (in hours).

Note

The balancing calculation is performed only for the specified time period. The tool requirement extending beyond this time period is not calculated.

If you do not set the option, the requirement calculation is performed for the full time period required to machine the part.

Limit total tool number to

The balancing calculation is terminated when the number of tools to be loaded equals this setting (e.g. option allows limited transport capacities to be taken into account).

<input checked="" type="checkbox"/> Limit total tool number to :	40
--	----

Note

The tool type is not taken into account.

Options for net requirement

Options for net requirement only	
<input type="checkbox"/>	Consider unloaded tools
<input checked="" type="checkbox"/>	Consider provided tools

These options allow you to take account of tools that are included in the tool list, but are not assigned a magazine location. They are treated as if they were already loaded in the magazine.

Consider unloaded tools

Unloaded tools are those that have already been used, but are still entered in the NCU tool list.

Consider available (provided) tools

Available tools are those that have been transferred from the loading list to the tool list, but have not yet been loaded into the machine magazine.

Representation of balance results

Output requirement after:

- Operating time
- Accumulated

Output requirement according to operation time

The gross / net demands sorted according to operating time, contains the tools in order of availability plus time at which tool will be available. The time of availability is specified in relation to the balance calculation time, making it possible to estimate at what time which tools need to be made available for machining.

This option can also be selected for the supply of replacement tools. If the tool plan contains accumulated operation times, the "available at time" for all tools in an NC program is set to the time at which execution of the program commences.

Output requirement accumulated

The required tool types are summed and output with the required tool number in the accumulated gross / net requirement display. The tools are sorted in the list in the order in which they are first used.

3.5 Unloading list

No.	Tool name	Duplo no.	Remaining service life [min]	Magazine / Location	Size	Unload
1	Ballheadtool	1	10.00	1/15	1/1/1/1	Yes
2	Counterbore	1	9.00	1/16	1/1/1/1	Yes
3	Facemill	2	11.00	1/13	1/1/1/1	Yes
4	Twistdrill	2	16.00	1/12	1/1/1/1	Yes
5	Threadcutter	2	14.00	1/11	1/1/1/1	Yes

Fig. 3-12 Unloading list

General

The unloading list contains magazine tools that are not needed for the balancing calculation, as well as disabled and broken tools. The unloading list contains the names of tools which can be unloaded from the magazine since they are no longer needed for the machining operation in hand. The calculation of these data is based on the settings in the **Balance options** screenform and the machining sequence.

3.5.1 Operating functions for unloading list

Unload yes/no

The **Unload bit** is set in the unloading list for the selected tool. More than one tool can be selected.

Unload all

The **Unload bit** is set in the unloading list for all tools.

Accept unloading list

The unload identifier is set in the NCK tool list for the tools with set **Unload bit**.

Calculate new list

A new list is calculated.

To tool list

When you select softkey "To tool list", you can transfer the list to the tool management system. If you do so, the tools transferred from SINTDI are labeled with an identifier in the tool list. You can then identify the tools in the tool list and execute the standard unload dialog.

3.5.2 Handling the unload identifier

PI	P	P	P	P	P	P	P	Tool ID	Dupl	TNo	L	R	T	B	Mpt	T	T	T	T	T	T	S
1	-	-	-	-	-	-	-	Ballheadtool	2	12	1	1	1	1	1	1	P	-	-	-	-	0
2	-	-	-	-	-	-	-	Counterbore	2	13	1	1	1	1	1	1	P	-	-	-	-	0
3	-	-	-	-	-	-	-	Facemill	3	14	1	1	1	1	1	1	P	-	-	-	-	0
4	-	-	-	-	-	-	-	Twistdrill	3	15	1	1	1	1	1	1	P	-	-	-	-	2
5	-	-	-	-	-	-	-	Threadcutter	3	16	1	1	1	1	1	1	P	-	-	-	-	0
6	-	-	-	-	-	-	-	Boringbar	3	17	1	1	1	1	1	1	P	-	-	-	-	0
7	-	-	-	-	-	-	-	Facemill	1	18	1	1	1	1	1	1	P	-	-	-	-	1
8	-	-	-	-	-	-	-	Boringbar	1	21	1	1	1	1	1	1	P	-	-	-	-	2
9	-	-	-	-	-	-	-	Threadcutter	1	23	1	1	1	1	1	1	P	-	-	-	-	1
10	-	-	-	-	-	-	-	Reamer	1	26	1	1	1	1	1	1	P	-	-	-	-	1
11	-	-	-	-	-	-	-	Threadcutter	2	27	1	1	1	1	1	1	P	-	-	-	-	2
12	-	-	-	-	-	-	-	Twistdrill	2	25	1	1	1	1	1	1	P	-	-	-	-	1
13	-	-	-	-	-	-	-	Facemill	2	24	1	1	1	1	1	1	P	-	-	-	-	1
14	-	F	-	-	-	-	-															

Fig. 3-13 Magazine list with load/unload identifier in the SINTDI column

The unload identifier is displayed in the S column in the **Tool Management Magazine List**.

The tool with a set unload identifier are labeled with **2**.

Note

SINTDI enters the unload identifier in the magazine list for tools that are labeled with **YES** in the **Unload** column when the unload list is transferred.

When requested, SINTDI updates the unload identifier for tools to be unloaded in the tool lists of the standard tool management system.

Tools to be unloaded are labeled with an identifier in the OEM data up to **version 4**. In **version 5** and later, the unload identifier is displayed via the **to unload** bit in the tool status. As an alternative, it is still possible to parameterize an identifier in the OEM data. The old entries are overwritten on every list transfer.

Accept data from tool setting station

If your device is networked to the tool setting station via TCP/IP, you can transfer the data to SINTDI after the tool has been set.

Note

The data content of the tool setting is determined by the mode of operation on the tool setting station (i.e. are the tools for a workpiece, a shift, etc. set). For this reason, you must clarify the tool setting scope with the machine operator.

The TSS data of the individual settings are stored in the directory defined in the configuration file (SINTDI.INI). The file name convention must be assigned by the setter (e.g. SEG001.com, SEG002.com etc.). You can select the file with the required tool setting data in the **Accept TSS data** selection box. The data are transferred to the SINTDI loading list. Here you can label some or all of them for loading (softkeys **Load...**) and then transfer them to the tool list.

Note

Tools that have been transferred to the tool list are deleted in the TSS data files.

Display balance result as a loading list

You can generate the loading list directly from the balance screenforms (net/gross requirements) by selecting **Update loading list**.

Note

The tool data in the balances are not available in complete form.

The loading operation must be supported manually in this instance. The tool setter sets the tools according to the printout of the loading list generated from the balance. The selected tools are then marked for loading in the tool list. The tool data available in the tool list are linked with the data from the balance.

Note

Data that are still missing, e.g. actual geometry data, etc., must be entered directly by the setter.

3.6.1 Operating functions for loading list

Accept TSS data

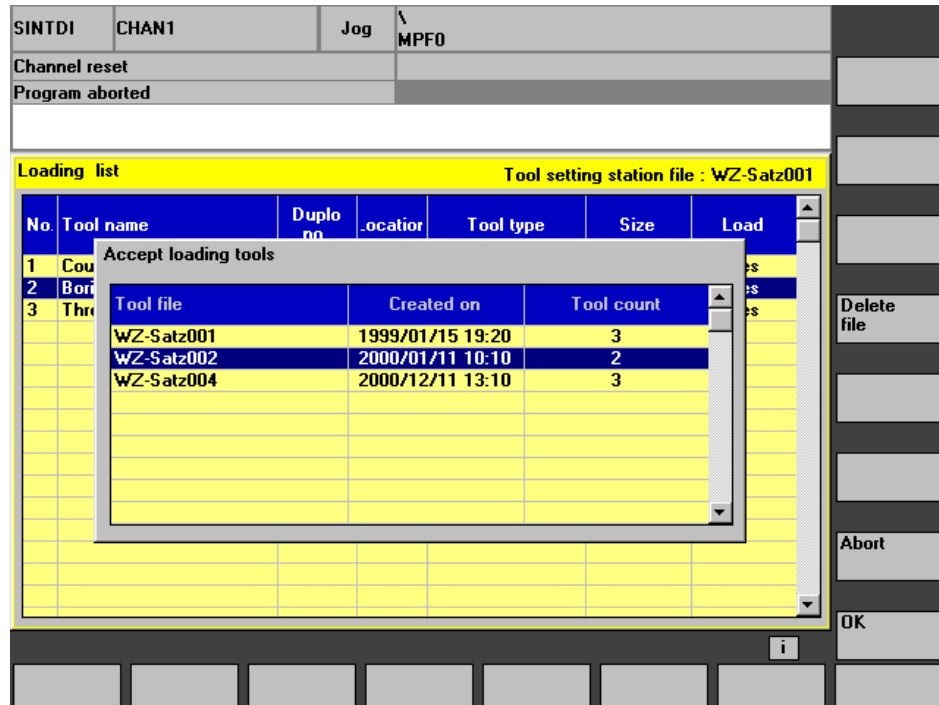


Fig. 3-15 Loading list screen with open "Accept TSS data" box

This function enables you to select TSS data files available on the tool setting station for display in the loading list.

Tool data

The data of the selected tool are displayed when you select this function.

SINTDI	CHAN1	Jog	\ MPF0
Channel reset			
Program aborted			
Tool data			
Tool name:		<input type="text" value="Boringbar"/>	Duplo no.:
Tool type:		<input type="text" value="210 Boring bar"/>	No. cutting edges:
Tool set:		<input type="text" value="Tool setting station file : WZ-Satz001"/>	Loc. no.:
Location		<input checked="" type="radio"/> variable <input type="radio"/> fixed location	Tool size:
Monitoring type:		<input type="radio"/> None <input checked="" type="radio"/> Tool life <input type="radio"/> Batch size	Loc. type:
Status:		<input checked="" type="checkbox"/> enabled <input type="checkbox"/> disabled <input type="checkbox"/> was in use	<input type="checkbox"/> measured <input type="checkbox"/> active tool <input type="checkbox"/> Prewarning limit reached
			<input type="text" value="1"/>
			<input type="text" value="1"/>
			<input type="text" value="31"/>
			<input type="text" value="1 1 1 1"/>
			(left, right, top, bottom)
			<input type="text" value="NORMAL"/>
i			

Fig. 3-16 Tool data

Load yes/no

The load identifier is set or reset in the loading list for the selected tool. More than one tool can be selected.

Load all

The load identifier is set in the loading list for all tools.

Load none

The load identifier is reset in the loading list for all tools.

To tool list

By executing this function, you write the tools labeled with **YES** in the loading list to the NCU tool list. For this purpose, the tools are set up again based on the data from the tool setting station and the load identifiers for the tools set in the NCK tool list. If the tool to be loaded has duplo number 0, a duplo number is automatically allocated to it by SINTDI. If the tool has a fixed duplo number, this is transferred to the NCK. If a tool with the same duplo number already exists, the tool is not loaded and an error message is output.

3.6.2 Handling the load identifier

More Tools CHAN1 Jog \ MPF0

Channel reset

Program aborted

Tool list 1

Tool list 2

Tool list 3

Tool details

Tool from cabinet

Delete tool

New tool

Row	Magr	PI	Tool ID	Dupl	TNo	L	R	T	B	T	T	T	T	T	T	Mpt	S
1	1	1	Ballheadtool	2	12	1	1	1	1	-	P	-	-	-	-	1	0
2	1	2	Counterbore	2	13	1	1	1	1	-	P	-	-	-	-	1	0
3	1	3	Facemill	3	14	1	1	1	1	-	P	-	-	-	-	1	0
4	1	4	Twistdrill	3	15	1	1	1	1	-	P	-	-	-	-	1	2
5	1	5	Threadcutter	3	16	1	1	1	1	-	P	-	-	-	-	1	0
6	1	6	Boringbar	3	17	1	1	1	1	-	P	-	-	-	-	1	0
7	1	7	Facemill	1	18	1	1	1	1	-	P	-	-	-	-	1	1
8			Twistdrill	1	19	1	1	1	1	-	-	-	-	-	-	1	1
9			Ballheadtool	1	20	1	1	1	1	-	-	-	-	-	-	1	1
10	1	8	Boringbar	1	21	1	1	1	1	-	P	-	-	-	-	1	2
11			Counterbore	1	22	1	1	1	1	-	-	-	-	-	-	1	1
12	1	9	Threadcutter	1	23	1	1	1	1	-	P	-	-	-	-	1	1
13	1	13	Facemill	2	24	1	1	1	1	-	P	-	-	-	-	1	1
14	1	12	Twistdrill	2	25	1	1	1	1	-	P	-	-	-	-	1	1
15	1	10	Reamer	1	26	1	1	1	1	-	P	-	-	-	-	1	1
16	1	11	Threadcutter	2	27	1	1	1	1	-	P	-	-	-	-	1	2

Magazine list Tool list Load Unload Relocate

Fig. 3-17 Load identifier

General

The load/unload identifier is displayed in the Tool Management Tool list screen. The tools with set load identifier are labeled with **1** in column S.

Note

SINTDI enters the load identifier in the tool list for tools that are labeled with **YES** in the **Load** column when the load list is transferred. In response to an operator request, SINTDI updates the load identifier for tools to be loaded in the tool lists of the standard tool management system.

Tools to be loaded are labeled with an identifier in the OEM data up to **version 4**. In **version 5** and later, the load identifier is displayed via the **to load** bit in the tool status. As an alternative, it is still possible to parameterize an identifier in the OEM data. The old entries are overwritten on every list transfer.

3.6.3 Display balance result as a loading list

SINTDI	CHAN1	Jog	\	MPF0	
Channel reset					
Program aborted					
Gross requirement after operating time					Created: 16:19
No.	Tool name	Made available at [hh:mm]	Planned service life [min]	Machining operation	Part
1	Facemill	00:00	11.00	GEAR	1
2	Twistdrill	00:08	16.00	GEAR	1
3	Facemill	00:17	11.00	GEAR	2
4	Twistdrill	00:25	16.00	GEAR	2
5	Ballheadtool	00:34	10.00	VMOTOR	1
6	Boringbar	00:40	11.00	VMOTOR	1
7	Counterbore	00:50	9.00	VMOTOR	1
8	Threadcutter	00:58	14.00	VMOTOR	1
9	Ballheadtool	01:10	10.00	VMOTOR	2
10	Boringbar	01:16	11.00	VMOTOR	2
11	Counterbore	01:26	9.00	VMOTOR	2
12	Threadcutter	01:34	14.00	VMOTOR	2
13	Facemill	01:46	11.00	GEAR	1
14	Twistdrill	01:54	16.00	GEAR	1
15	Reamer	02:03	14.00	MCASING	1
16	Threadcutter	02:12	14.00	MCASING	1

Transfer to tool setting

Update loading list

Calculate new list

Machining sequence | Tool plan | Balance options | **Gross requirement** | Net requirement | Unloading list | Loading list

Fig. 3-18 Gross requirement acc. to operation time with active **Update loading list** function

Update loading list

This function is available in all balance result screens.

Note

Since the data from the TSS must generally be used, the function is not normally active. It can be selected optionally, however, in file **SINTDI.INI** (see Configuration).

If your device is not coupled to the TSS, you also have the option of displaying the balance result as a loading list in SINTDI by selecting function **Update loading list**. **Update loading list** ensures that the tool data from the tool catalog are used to generate the loading list.

Note

These data are not the default settings.

3.7 Interface to a tool setting station

General

SINTDI is capable of exchanging data via file transfer with a networked (via Ethernet) tool setting station (TSS). To allow transfer of tool (offset) data from the tool setting station and specification of the tools to be set, a data exchange has been defined between SINTDI and the TSS manufacturers.

Data exchange

This exchange of data is implemented through the exchange of TSS files. Directories **TDI_IN.CLP** and **TDI_OUT.CLP** are defined in the control for this purpose. Logical directories **TDI_IN.CLP** and **TDI_OUT.CLP** are assigned to the directories in the file system through the configuration in **SINTDI.INI**.

Transfer requirement to TSS

The net or gross requirement is stored in an ASCII file (e.g. TOSEG001.COM) "Transfer to TSS" function. The ASCII file is stored in logical directory TDI_OUT. The tools required can be made available on the tool setting device based on the data in this file.

TDI_OUT.CLP

SINTDI makes available the tool requirement for the TSS in this directory.

Note

Logical directory TDI_OUT need not be physically present on the MMC, but can also be a directory in the network. The offline link of the TSS is an exception. The directory for this must be stored on the MMC itself.

Accept actual data from TSS

The actual data (SEG_001.COM) of the TSS are transferred from directory TDI_IN to the loading list by means of the **Accept TSS data** function.

TDI_IN.CLP

SINTDI expects to receive the tool data (offsets) generated by the TSS in this directory.

Note

Logical directory TDI_IN need not be physically present on the MMC, but can also be a directory in the network. The offline link of the TSS is an exception. The directory for this must be stored on the MMC itself.

Configurations

You can use the following configurations:

3.7.1 Offline data exchange

You can exchange data offline using either the MMC operating function Services → Floppy Disk or Services → V24 (serial interface) or by means of **SINDNC** into directory TDI_IN or TDI_OUT.

Note

Directory TDI_IN or TDI_OUT must be physically present on the MMC. The file type of the TSS data file need not be made known to the data management system.

This configuration is employed as standard after SINTDI has been installed.

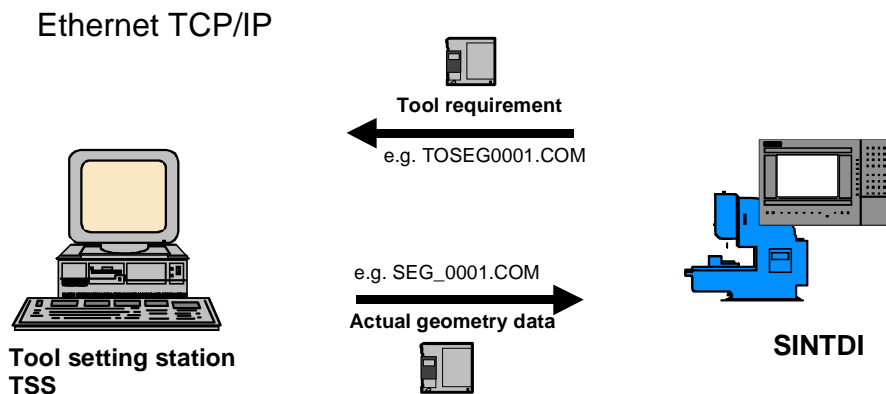


Fig. 3-19 Offline data exchange between SINTDI and TSS

Printed balance result

The transfer of data from SINTDI to the TSS can also take the form of a hardcopy, i.e. a printout of a balancing result can be forwarded to the TSS. You can generate a printout of this type by selecting the **Print** button in the balancing screenform.

3.7.2 Online data exchange

The online data exchange is the standard method of exchanging data between tool setting station and SINTDI. For online exchanges, the TSS must be connected to the same network (Ethernet) as the SINTDI. An installed network is thus a basic prerequisite for online data exchanges. The TSS data files are exchanged via file transfer between the networked computers.

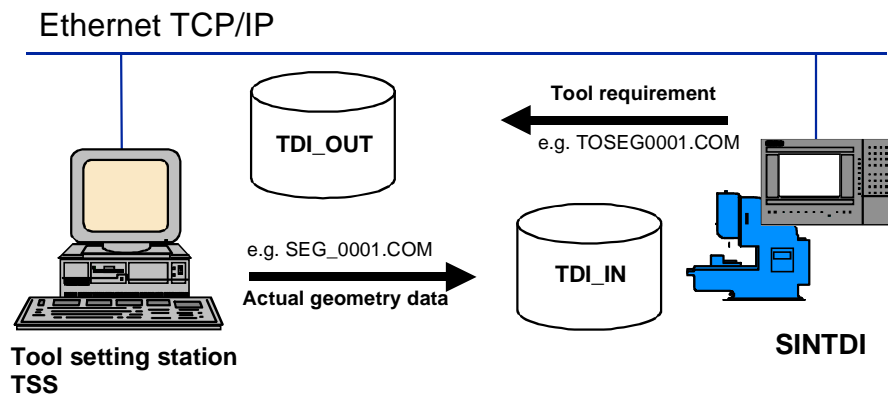


Fig. 3-20 Online data exchange between SINTDI and TSS

3.8 Data formats

3.8.1 Storage of machining sequence

Storage location

There is only one SINTDI machining sequence. It is stored in file **WORKSEQ.WPP** in data storage directory **Machining sequence** on the MMC. The complete file path is: **C:\DHPDA.DIR\WORKSEQ.WPP**

Name	Type	Loaded	Length	Date	Enable
Data-managemnt	DIR			25/09/1998	X
MSD-data	DIR	X		01/01/1980	X
Start-up	DIR	X		01/01/1980	X
MBDDE-Alarm-Texts	DIR			25/09/1998	X
Part-programs	DIR	X		01/01/1980	
OEM-data	DIR			25/09/1998	X
Machining-sequence	DIR			25/09/1998	X
WORKSEQ	WPP		306	15/03/2001	
Subprograms	DIR	X		01/01/1980	
System	DIR	X		01/01/1980	
TDI_IN	CLP			13/03/2001	X
SEG0001	COM		1358	15/03/2001	
SEG0002	COM		1198	15/03/2001	
SEG0004	COM		1358	15/03/2001	
TDI_OUT	CLP			13/03/2001	X
TOSEG001.COM	---		61	15/03/2001	X

Free memory: Hard disk : 1,381,957,632 NCU : 1,437,648

V24, diskette, archive -> Control

Data in | Data out | Manage data | Data selection | Interface

Fig. 3-21 Storage location of machining sequence (Services operating area)

Storage format

The machining sequence data are stored line by line; the line end character string is <CR><LF>.

Sequence data are stored in the following ASCII format:

Machining sequence format

1st line: Contains a predefined vocabulary word: **#MACHINING SEQUENCE**.

2nd line: Contains the name of the machining sequence (max. 24 characters). This name need not be specified, but a blank line must then be inserted instead. If the machining sequence is created by SINTDI, then the name is set to SINTDI.

1. #MACHINING SEQUENCE
2. SINTDI Name of machining sequence (max. 24 characters)

Machining operation format

The data of the individual machining operations are then defined:

1st line in machining operation: Contains a predefined vocabulary word:

OPERATION

2nd line in machining operation: Contains the name of the machining operation (max. 24 characters).

3rd line in machining operation: Contains the planned batch size. This quantity provides a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI (max. 9 digits).

4th line in machining operation: Contains the actual batch size (max. 9 digits).

5th line in machining operation: Contains the balance batch size (max. 9 digits).

6th line in machining operation: Contains the name of the production order. This provides a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI. This name need not be specified, but you must then enter a blank link instead (max. 30 characters).

7th line in machining operation: Contains the name of the machining step. This name is a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI. This name need not be specified, but you must then enter a blank link instead (max. 9 characters).

8th line in machining operation: Contains the date (deadline) for the production order. This data provides a useful cross-reference to the production data in the production planning department, but is irrelevant as regards the operation of SINTDI. This name need not be specified, You must then enter a line containing the date 30.12.1899 00:00:00 instead (format DD.MM.YYYY 00:00:00).

1. #MACHINING OPERATION

2. Threadcutter

3. 400

4. 20

5. 40

6. 1234-1234123-ABC

7. AG20

8. 24.12.2000 00:00:00

Name of machining operation (max. 24 characters)

Planned batch size (max. 9 digits)

Actual batch size (max. 9 digits)

Balance batch size (max. 9 digits)

Production order (max. 30 characters)

Machining step (max. 9 characters)

Date (format DD.MM.YYYY 00:00:00)

Example

```
#MACHINING SEQUENCE
SINTDI
# OPERATION
GEAR
20
10
5
100.14/7A.200
AG4
10.11.2000 00:00:00
OPERATION
VMOTOR
40
17
20
221.4/AS3.4
AG44
13.12.2000 00:00:00
```

The corresponding machining sequence screen in SINTDI looks like this:

SINTDI	CHAN1	Jog	\ MPF0			
Channel reset					Add operation	
Program aborted						
Machining sequence SINTDI 1.5.0					Delete operation	
No	Machining operation	Planned batch size	Actual batch size	Balance batch size	Change operation	
1	GEAR	20	10	5		
2	VMOTOR	40	17	20		
					Operation down	
					Split operation	
					Further data	
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list

Fig. 3-22 Machining sequence for an ASCII file (Services operating area)

3.8.2 Tool plan storage

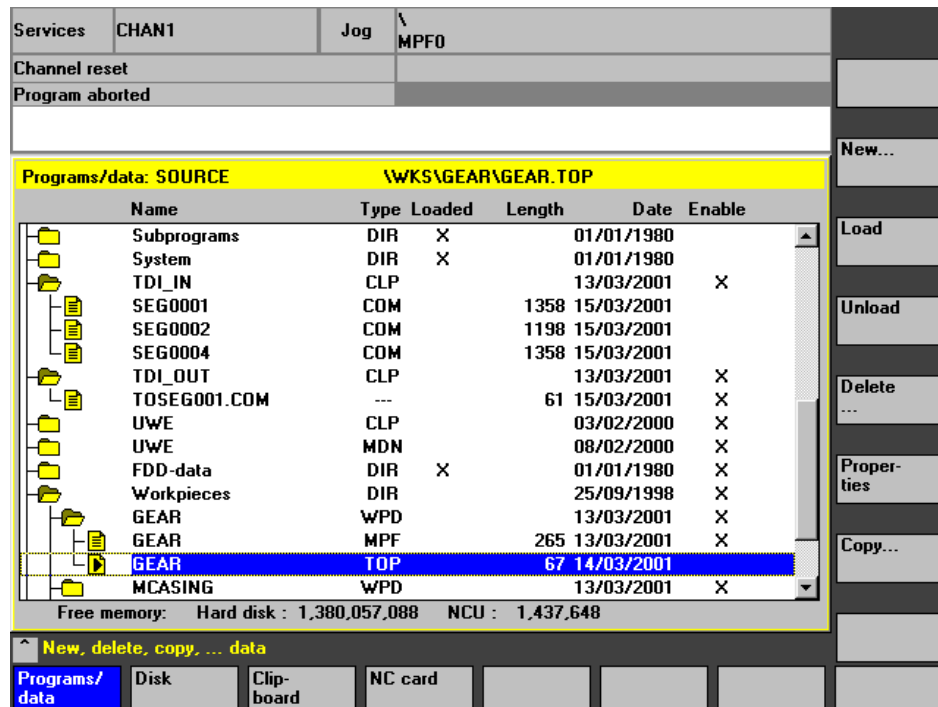


Fig. 3-23 Storage location of tool plan (Services operating area)

Storage location

Tool plans are stored in the workpiece directory of the relevant machining operation.

The complete file name of tool plans is formed using the following system:
C:\DH\WKS.DIR\workpiece name.WPD\workpiece name.TOP

Note

In the case of workpiece names with more than eight characters, the name is truncated to eight characters, e.g. **C:\WKS.DIR\MOTORBLO.WPD\MOTORBLO.TOP**

Storage format

The data are stored line by line; the line end character string is <CR><LF>. Tool plan data are stored in the following ASCII format:

Tool plan format

1st line contains a predefined vocabulary word: **#TLPLAN**.

2nd line contains the name of the tool plan. This name need not be specified, but you must then enter a blank link instead. In the case of tool plans generated by SINTDI, the tool plan is assigned the same name as the workpiece file (max. 24 characters).

3rd line contains the total runtime of the NC program in seconds. If the total runtime is not known, then 0 can be entered here instead. In this case, SINTDI calculates an approximate total runtime based on the sum of all tool operating times. The total runtime of the NC program is not displayed on the operator interface in the current SINTDI SW version.

4th line contains the number of parts to be machined during one NC program pass. This value is set to 1 in tool plans generated by SINTDI. The number of parts per NC program is not displayed on the operator interface in the current SINTDI SW version.

- | | | |
|----|---------|--|
| 1. | #TLPLAN | |
| 2. | GEAR | Name of the tool plan (max. 24 characters) |
| 3. | 0 | Total runtime of NC program in seconds |
| 4. | 1 | Number of finished parts per NC program |

Tool format

The data of the individual tools are then defined:

1st line in the tool data contains a predefined vocabulary word: **#TL**.

2nd line in the tool data contains the name of the tool (max. 24 characters).

3rd line in the tool data contains the block number in the NC program that calls the tool. This quantity provides a useful cross-reference between the tool plan and the NC program, but is irrelevant as regards the operation of SINTDI.

The operation times (in seconds) of the individual cutting edges are listed **from line 4 onwards in the tool data**. A maximum of nine cutting edges may be specified. If, for example, the tool is used with its second cutting edge, then only the operation time for the second edge may be entered. The operation time for the first edge must be specified as 0. There is no need in this case to enter the edges three to nine.

- | | | |
|----|------------|---|
| 1. | #TL | |
| 2. | Facingtool | Name of the tool (max. 24 characters) |
| 3. | 10 | Block number in NC program |
| 4. | 0 | Tool operation time of 1st cutting edge [seconds] |
| 5. | 30 | Tool operation time of 2nd cutting edge [seconds] |

Example

```
#TLPLAN
GEAR
0
edge 1
# TL (tool)
Facemill
10
360
# TL (tool)
Counterbore
20
600
# TL (tool)
Facemill
30
480
# TL (tool)
Twistdrill
40
720
# TL (tool)
Threadcutter
50
720
```

The corresponding tool plan screen in SINTDI looks like this:

SINTDI	CHAN1	Jog	\ MPF0			
Channel reset					Add tool	
Program aborted						
Tool plan					VMOTOR	
No.	Tool name	Edge	Operation time [min]	Block number	Change operation	
1	Ballheadtool	1	6.00	10		
2	Boringbar	1	10.00	20		
3	Counterbore	1	8.00	30		
4	Threadcutter	1	12.00	40		
					Tool down	
					Select tool plan	
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list

Fig. 3-24 Tool plan corresponding to ASCII file

3.8.3 Format of data from TSS

General

The tool offset data calculated by the tool setting station are copied in file form to directory **TDI_IN.CLP**. Directory **TDI_IN.CLP** is stored in path **C:\ADH**. This path is the same as directory **TDI_IN** in the **Services** operating area.

You can change the assignment of directory **TDI_IN.CLP** in the file system in configuration file **SINTDI.INI**.

(See Configuration)

The tool offset data file copied to directory **TDI_IN.CLP** must have extension COM. The name of the file is optional. A file transferred from the tool setting station could be named, for example, SEG_001.COM. (See Configuration)

If the TSS supplies new data at a later point in time, the existing files must not be overwritten. For this reason, the new data are then stored in another file if the original file has not yet been deleted.

Note

SINTDI deletes the files supplied by the TSS as soon as the tools have been loaded.

Data format

The format of the file data is as follows:

<code>%_N_SEG_001_COM</code>	Program header (optional with on-line link)
<code>;\$PATH=/_N_TDI_IN_CLP</code>	
<code>CHANDATA (1)</code>	Selection of channel (SINTDI supports only channel 1 optionally)
<code>\$TDI_SETNAME=</code>	Name of tool data record
<code>\$TDI_SETDATE=</code>	Date for tool data record (optional selection)
<code>Data of 1st tool</code>	General data of first tool
<code>1st tool 1st edge</code>	Edge parameters for first tool
<code>1st tool 2nd edge</code>	Edge parameters for second tool
<code>Data of 2nd tool</code>	General data of second tool
<code>2nd tool 1st edge</code>	Edge parameters for first tool
<code>2nd tool 2nd edge</code>	Edge parameters for second tool
<code>...</code>	
<code>M17</code>	End of subprogram (optional)

The parameters belonging to the individual sections are listed below as examples.

<code>\$_N_SEG_001_COM</code>	Program header of a tool offset data file
<code>;\$PATH=/_N_TDI_IN_CLP</code>	(optional for online link)
<code>CHANDATA (1)</code>	Channel selection (option)
<code>\$TDI_SETNAME=</code>	Name of the tool block (optional)
<code>\$TDI_SETDATE=</code>	Date for tool block (optional)
<code>\$TC_TP1 [1] =0</code>	Duplo number T 1
<code>\$TC_TP2 [1] ="drill1012"</code>	Tool name T 1
<code>\$TC_TP3 [1] =2</code>	Size to left in half locations T 1
<code>\$TC_TP4 [1] =2</code>	Size to right in half locations T 1
<code>\$TC_TP5 [1] =2</code>	Size above in half locations T 1
<code>\$TC_TP6 [1] =2</code>	Size below in half locations T 1
<code>\$TC_TP7 [1] =1</code>	Magazine location type T 1
<code>\$TC_TP8 [1] =2</code>	Status T 1
<code>\$TC_DP1 [1, 1] =140</code>	Edge parameter 1 T 1 edge 1
<code>\$TC_DP3 [1, 1] =048.020</code>	Edge parameter 3 T 1 edge 1
<code>\$TC_DP6 [1, 1] =059.921</code>	Edge parameter 6 T 1 edge 1
<code>\$TC_MOP1 [1, 1] =99</code>	Prewarning limit service life in minutes T 1 edge 1
<code>\$TC_MOP2 [1, 1] =111</code>	Residual service life in minutes T 1 edge 1
<code>\$TC_DP1 [1, 2] =140</code>	Edge parameter 1 T 1 edge 2
<code>\$TC_DP3 [1, 2] =011.020</code>	Edge parameter 3 T 1 edge 2
<code>\$TC_DP6 [1, 2] =022.921</code>	Edge parameter 6 T 1 edge 2
<code>\$TC_MOP1 [1, 2] =99</code>	Prewarning limit service life in minutes T 1 edge 2
<code>\$TC_MOP2 [1, 2] =111</code>	Residual service life in minutes T 1 edge 2
<code>M17</code>	End of subprogram (optional)

Program header

The first two lines from the program header in the tool offset file.

The file name is specified by parameter **\$_N_SEG_001_COM**. In this example, the file is named SEG_001.COM.

The directory in which file SEG_001.COM must be stored is specified by parameter **;\$PATH=/_N_TDI_IN_CLP**. In this example, the file is stored in path **C:\DH\TDI_IN.CLP**.

A program header is mandatory when data are transferred via an off-line link.

Headers are optional for transmission via the network. In this case, the directory is defined by the configuration.

Channel

Parameter **CHANDATA(x)** contains the selected channel. SINTDI only accepts channel 1.

Name

Parameter **\$TDI_SETNAME** offers you the option of displaying the name of the tool data record on the interface instead of the file name.

Note

The parameter does not have a default setting. It is used only by SINTDI and is not evaluated by the NCK.

Date

Parameter **\$TDI_SETDATE** contains a freely selectable date for the tool block. The date is formatted as follows: "YYYY/MM/DD HH:MM"

Note

The parameter does not have a default setting. It is used only by SINTDI and is not evaluated by the NCK.

End of subroutine

Parameter **M17** defines the end of a subprogram. The output of the parameter is optional in SINTDI.

Data format of interface

The data format of the interface between SINTDI and the TSS corresponds to the tool data format (defined in: **to_ini.ini**).

Conventions

Comments and block numbers are ignored.

```
N10 $TC_TP1 ...
```

All lines which do not contain one of the following partial strings are ignored.

```
"% N <Programmname>_MPF"
"$TDI_"
"$TC_"
```

All magazine and location information is ignored.

```
$TC_MPPx = ...
```

The use of a variable tool number is supported.

```
DEF INT TNR
TNR = NEWT ("W2", 1)
$TC_TP1[TNR] = 1
$TC_TP2[TNR] = "W2"
```

M30 instead of **M17** is supported.

3.8.4 Format of data to TSS

General

The tool requirement data calculated by SINTDI are written in file format to directory **TDI_OUT.CLP**. Directory **TDI_OUT.CLP** is stored in path **C:\DH**. This path is the same as directory **TDI_OUT** in the **Services** operating area. You can change the assignment of directory **TDI_OUT.CLP** in the file system in configuration file **SINTDI.INI**.

(See Configuration)

Files output by the TSS have a parameterizable name assignment. The first 5 characters of the file name can be parameterized under **NAME_START** in configuration file **SINTDI.INI**. The default setting is **TOSEG** followed by a consecutive number. The default file extension is **COM**, but this can also be parameterized in **SINTDI.INI**. A file generated by the tool setting station could be named, for example, **TOSEG001.COM**.

The data stored in the file are structured as follows:

%_N_TOSEG001_COM	Program header of a tool demand file (optional)
;\$PATH=/_N_TDI_OUT_CLP	Header data
\$TDI_MACHINE="Machine manufacturer"	
\$TDI_SETDATE="1999/01/14 15:49"	
\$TC_TP2[1]="drill012"	First tool
\$TDI_WORK[1]="Engine block"	
\$TDI_PART[1]=7	
\$TDI_ACCESS[1]="1999/01/14 15:50"	
\$TC_TP2[2]="drill02"	Second tool
\$TDI_WORK[2]="Gear case"	
\$TDI_PART[2]=7	
\$TDI_ACCESS[2]="1999/01/14 15:52"	
...	

Header data:

The file name is specified in parameter **%_N_TOSEG001_COM**. In this example, the file is named **TOSEG001.COM**.

Parameter **;\$PATH=/_N_TDI_OUT_CLP** defines the target directory for file **TOSEG001.COM**. In this example, the file is written to path **C:\DH\TDI_OUT.CLP**

The machine name is stored in parameter **\$TDI_MACHINE**.

Parameter **\$TDI_SETDATE** contains the balancing time. The time is formatted as follows: "YYYY/MM/DD HH:MM".

Tool data:

All the following information is generated for each tool. The value stored in [] is the serial number of the tool.

The tool identifier is entered in parameter **\$TC_TP2[x]**.

Parameter **\$TDI_WORK[x]** contains the designation from the machining sequence.

Parameter **\$TDI_PART[x]** contains the workpiece counter.

The planned operation time of the tool is specified in parameter **\$TDI_ACCESS[x]**.

The time is formatted as follows: "YYYY/MM/DD HH:MM".

3.9 ToolSim

3.9.1 Automatic tool plan generation

General

ToolSim is an add-on module to SINTDI for the purpose of generating tool plans. You will need ToolSim if, for example, you edit the content of the NC program (different tools or operation times) on the control or if no tool plan can be made available by the NC programmer.

ToolSim calculates the tool operation times from an NC program using the standard NC program simulation function and then compiles a tool plan for the appropriate machining operation.

Function

ToolSim is called from the tool plan via softkey **Generate tool plan**.

SINTDI	CHAN1	Jog	\MPF0		
Channel reset				Select program	
Program aborted					
Tool plan				Save tool plan	
\WKS.DIR\MOTOR.WPD\MOTOR.MPF					
No.	Tool name	Edge	Action time	Block number	Simulation settings
					Start simulation
					Abort simulation
					Suspend simulation
					Match mach. data
Machining	<input type="text"/>	min	Current tool	<input type="text"/>	D <input type="text"/>
Idle time	<input type="text"/>	min	Current	<input type="text"/>	N <input type="text"/>

Fig. 3-25 ToolSim

Select program

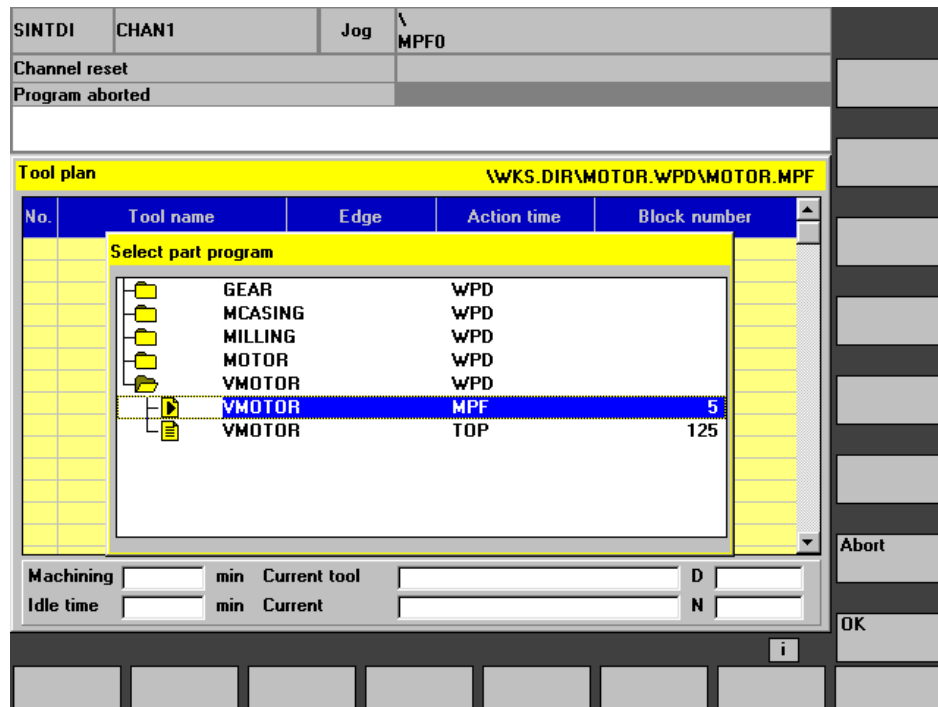


Fig. 3-26 Selection of ToolSim program

The NC programs of available workpieces are stored in the workpiece directory of the data management. The Wpd file contains the NC programs required to machine the workpiece (e.g. wks.dir \ MOTORBLOCK.wpd). To select the program to be simulated, press softkey **Select program**.

All available workpieces (*.wpd) are listed in the selection box which opens. Use the cursor keys to select the workpiece you want and open it by pressing the Enter key. Select the program to be simulated with the cursor keys and confirm with softkey **OK**.

Calculate tool plan

SINTDI	CHAN1	Jog	\	MPF0	
Channel reset					Select program
Program aborted					
Tool plan					Save tool plan
\WKS.DIR\VMOTOR.WPD\VMOTOR.MPF					
No.	Tool name	Edge	Action time	Block number	
1	Ballheadtool	1	6.00	N10	Simulation settings
2	Boringbar	1	10.00	N20	
3	Counterbore	1	8.00	N30	Start simulation
4	Threadcutter	1	12.00	N40	
					Abort simulation
					Suspend simulation
					Match mach. data
Machining	<input type="text"/>	min	Current tool	<input type="text"/>	D <input type="text"/>
Idle time	<input type="text"/>	min	Current	<input type="text"/>	N <input type="text"/>

Fig. 3-27 Tool plan calculation by ToolSim

The program is now automatically selected in simulation mode. ToolSim calculates the tool plan when you select softkey **Start simulation**. This means that it lists each tool operation it finds with the appropriate operation time and block number.

Machining time

The machining time is the cumulative operation time (feed).

Idle time

The idle time equals the total period of time required by the tool e.g. to travel round the workpiece, etc.

Store result

When you select softkey **Save tool plan**, the result of the ToolSim simulation run is stored in file *workpiece directory name.top* in the selected workpiece directory.

Simulation settings

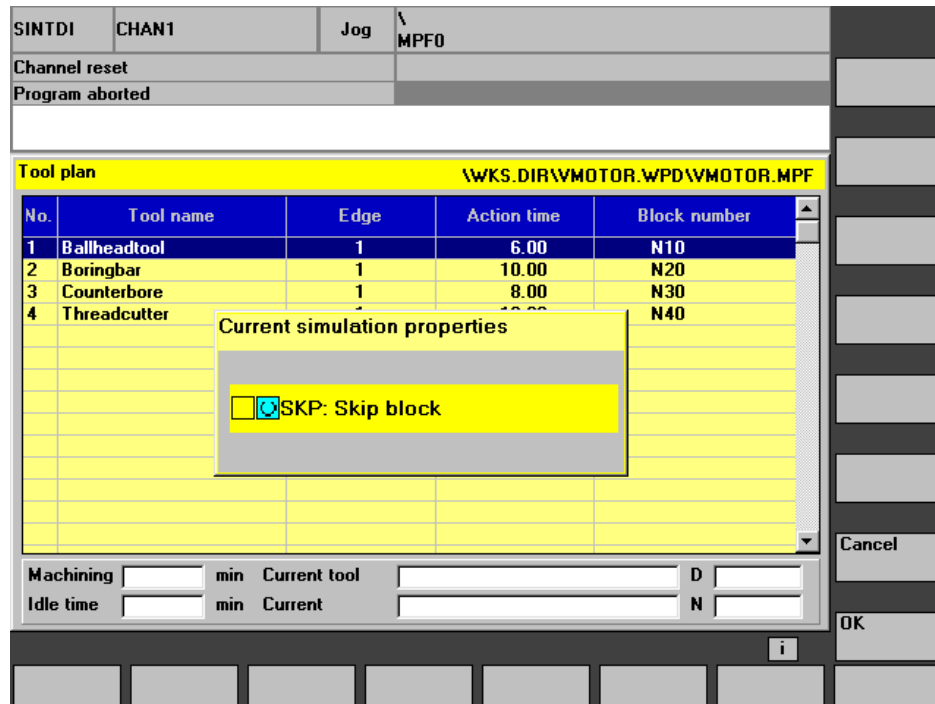


Fig. 3-28 Settings for simulation with ToolSim

The **Simulation settings** softkey opens a box in which you can set the simulation properties as regards skip blocks. In the simulation operation activated by ToolSim, the following presettings apply:

- F override = 100%
- M01 is deactivated
- Single block mode is deactivated

3.9.2 Procedure for a workpiece directory containing several NC programs (clampings)

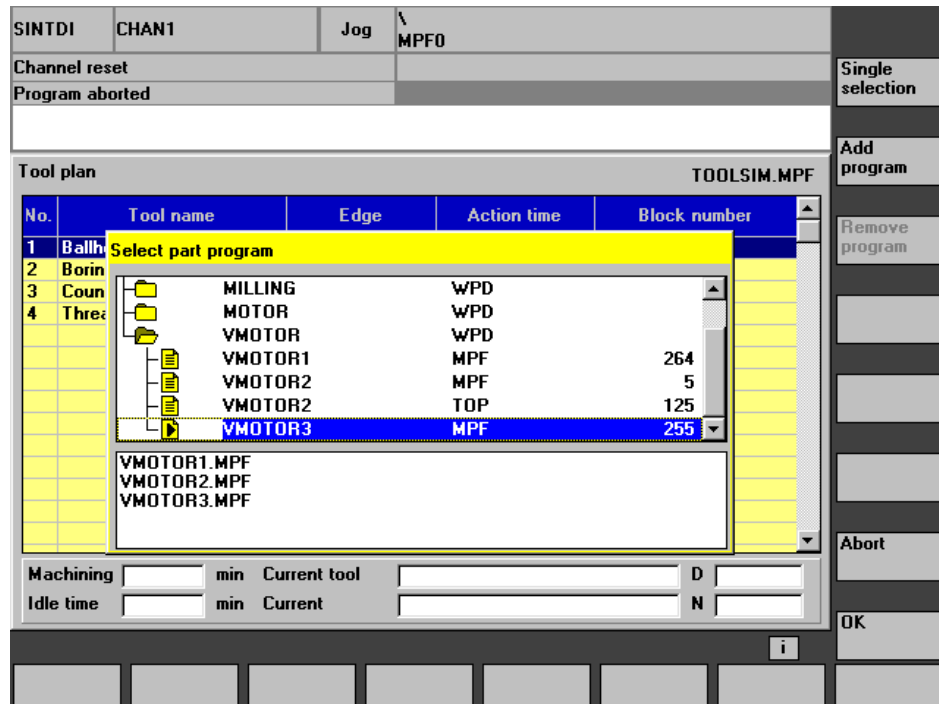


Fig. 3-29 ToolSim: "More" softkey

In cases where several NC programs are required to machine one workpiece, you can select softkey **More** to insert an additional field. Using softkey **Add Program**, you can transfer the selected NC programs to this field.

ToolSim only generates one Top file in a workpiece directory; any subsequently simulated NC programs simply overwrite the old Top file. In order to retain the data of all selected NC programs, ToolSim automatically creates a new NC program containing all the NC programs you need. After simulating this **tool plan coordination program**, ToolSim generates a tool plan that can be used for all the original NC programs.

Note

With multiple selection of NC programs, no block numbers are entered in the tool plan. The **Multiple selection** function is not included in the standard scope of supply of SINTDI.



4

Getting Started

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4.1 Tool requirement analysis

4.1.1 Define the machining sequence

Add a machining sequence

To get started in SINTDI you need to create the first machining sequence. You can set up a new machining operation by selecting function **Add machining sequence**. A selection list containing machining operations is then displayed. The operations listed in the box correspond to the workpieces stored on the SINUMERIK control.

Note

The name of a **machining operation** always matches the name of a **workpiece**. If the list does not contain any entries, you must create an appropriate workpiece directory in the **Program** or **Services** operating area.

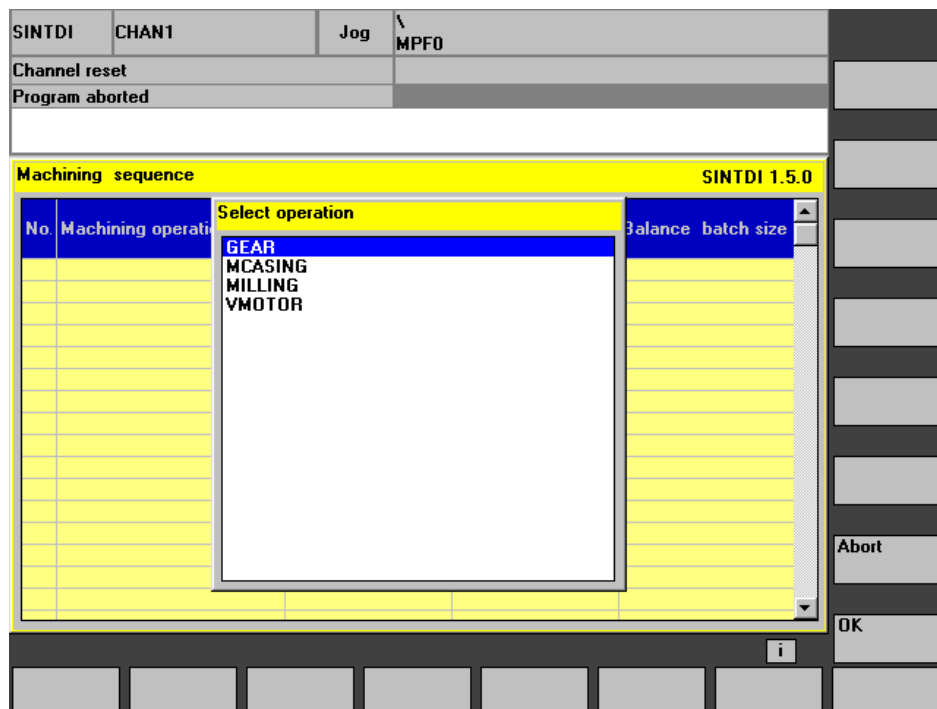


Fig. 4-1 Selecting workpiece as machining operation

Edit operation

With the **Edit operation** function you can enter the machining operation data.

Note

The data **Planned batch size**, **Production order**, **Machining step** and **Date** are a useful cross-reference to the production data in the production planning department, but are irrelevant as regards the operation of SINTDI.

The actual batch size of 10 in this example means that 10 parts have already been machined. The balance batch size 5 means that balancing is based on 5 parts.

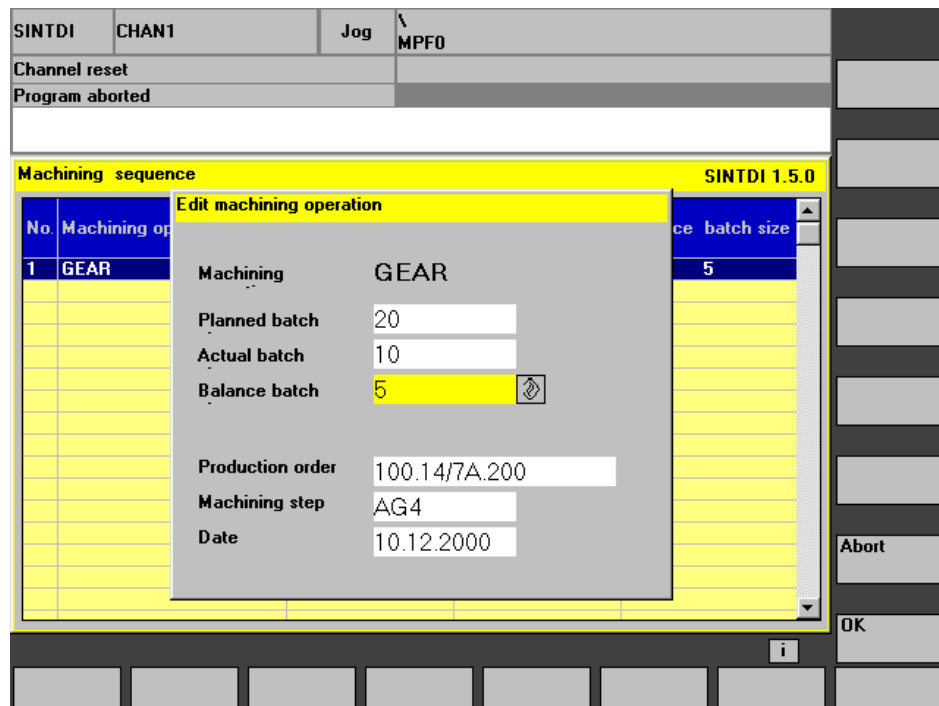


Fig. 4-3 Edit a machining operation

4.1.2 Define a tool plan

Create a tool plan

Your next step in SINTDI is to create a tool plan. To do this, open the **Tool plan** screen. The name of the currently displayed tool plan is displayed at the top right of the Tool Plan screen. You can choose a tool plan for display for selecting function **Select tool plan**.

Select tool plan

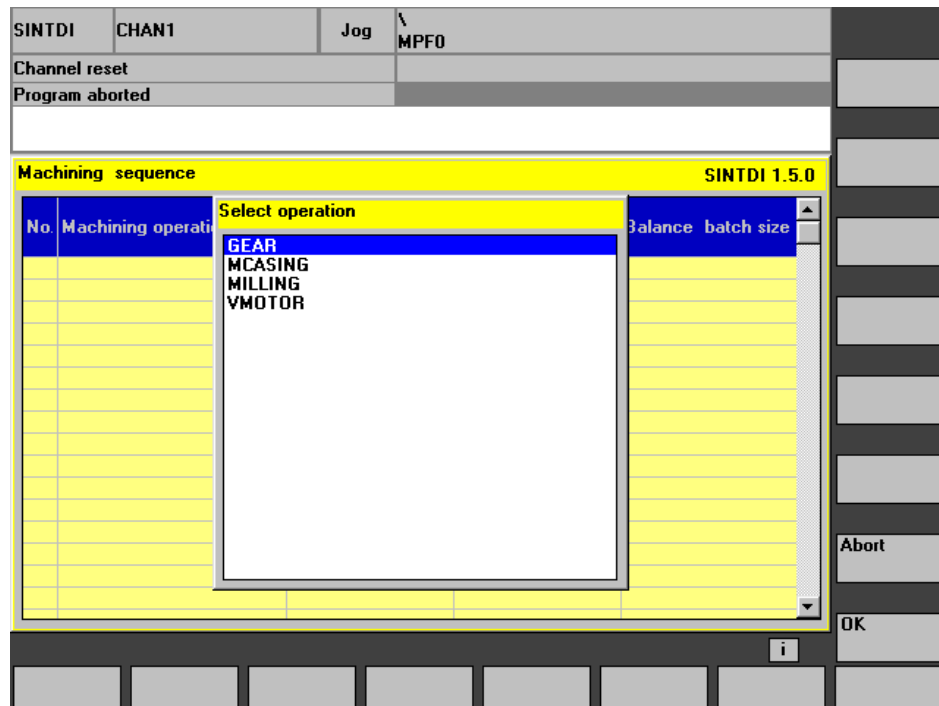


Fig. 4-4 Selecting a tool plan

A list of available tool plans is displayed when you press softkey **Select tool plan**. The names of the tool plans match the names of the machining operations and thus have the same names as the workpieces stored on the control. By checking box **Only tool plans in machining sequence** you can restrict this list to those tool plans that have been used in the machining sequence. When you select a plan with **OK** it is displayed in the screen.

Add a tool

You can add tools using the **Add tool** function.

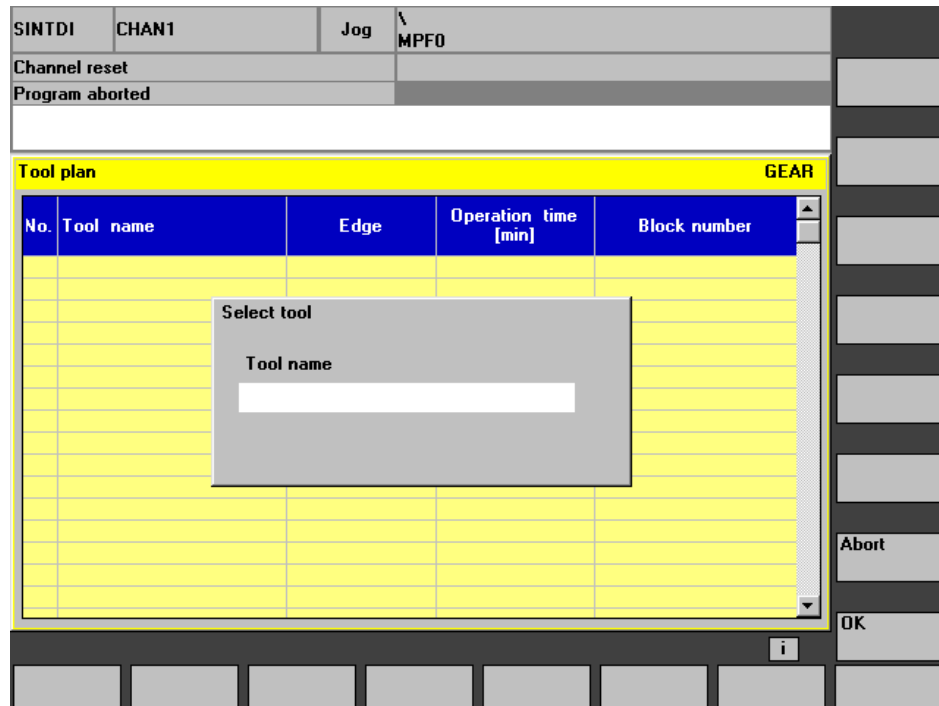


Fig. 4-6 Entering the tool name

To do this, you need to enter the tool name (identifier). A new entry is made in the tool plan when you select **OK**.

Edit a tool

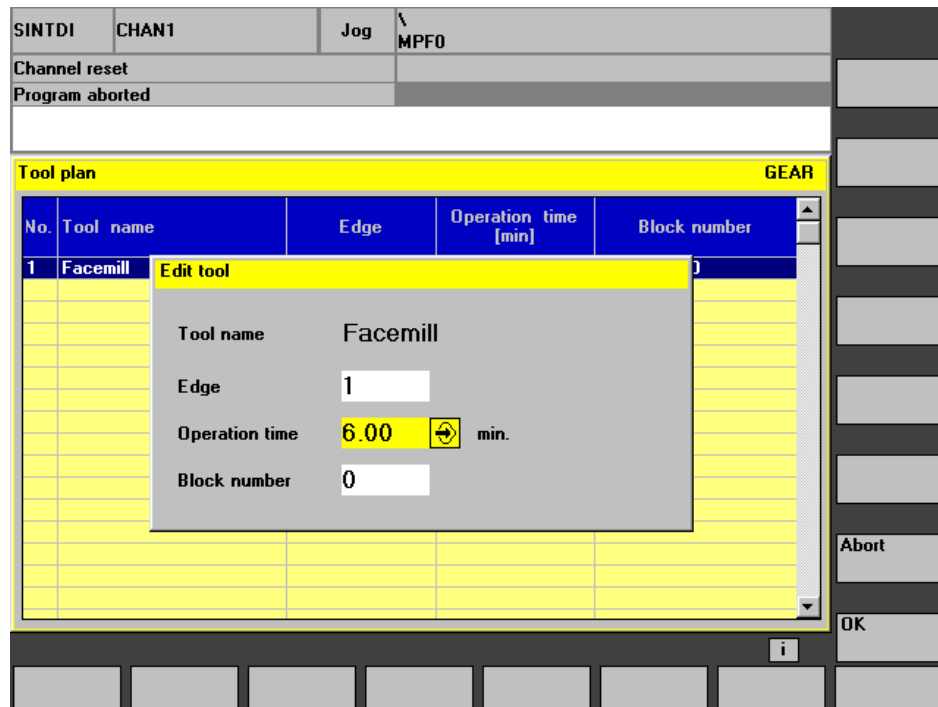


Fig. 4-7 Editing a tool

You can make changes to the tool selected in the tool plan using the **Edit tool** function.

Note

A prerequisite for correct functioning of SINTDI on the next balancing level is that the tool master data (particularly the planned service life) are set up in the tool catalog for all tools specified in tool plans. These data are displayed in the **Compensations screen of the Tool management** system.

Compensation of master tool data

You can open the screen for master tool data compensations by selecting softkey sequence **Parameters** → **Tool catalog** → **Compensations**.

More Tools		CHAN1	Jog	\	MPF0		
Channel reset						Cutting edge +	
Program aborted						Cutting edge -	
Tool catalog: Tool edge data							
Tool name:		Facemill			No. cutting edges:		1
Tool type:		140 Face mill			T edge pos:		0
					Cut. edge No.:		1
Comp parameters cutting edge 1		Geometry		Wear		Base	
Length compens.		Length 1 :		0.000		0.000 mm	
		Length 2 :		0.000		0.000 mm	
		Length 3 :		0.000		0.000 mm	
Radius comp.		Length 1 :				mm	
		Length 2 :				mm	
		Radius 1 :		0.000		mm	
		Radius 2 :				mm	
		Angle 1 :				deg.	
		Angle 2 :				deg.	
Technology		Clear angle:				deg.	
		Tool inv.:					
Monitoring data cutting edge 1		Setpoint value		Prewarn. limit			
Quantity:		1		0		Pieces	
Life:		11		8.00		Minutes	
Tool catalog		Tool cabinet					

Fig. 4-8 Compensating tool master data

4.1.3 Balance options

SINTDI	CHAN1	Jog	\	MPF0		
Channel reset						
Program aborted						
Balance options						
<input checked="" type="radio"/> standard balance (tool lifetime from catalogue)						
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Limit tool number per type to : 5						
<input type="radio"/> List of differences						
<input checked="" type="checkbox"/> calculation with service life evaluation						
<input type="checkbox"/> Limit period of use (in hours) 1						
<input checked="" type="checkbox"/> Limit total tool number to : 40						
Options for net requirement only						
<input type="checkbox"/> Consider unloaded tools						
<input checked="" type="checkbox"/> Consider provided tools						
Output requirement after:						
<input checked="" type="radio"/> Operating time						
<input type="radio"/> Accumulated						
i						
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list

Fig. 4-10 Balance options

You can reach the balancing options screen by selecting horizontal softkey **Balance options**.

4.1.4 Gross requirement

Calculate gross requirement

No.	Tool name	Made available at [hh:mm]	Planned service life [min]	Machining operation	Part
1	Facemill	00:00	11.00	GEAR	1
2	Twistdrill	00:08	16.00	GEAR	1
3	Ballheadtool	00:17	10.00	VMOTOR	1
4	Boringbar	00:23	11.00	VMOTOR	1
5	Counterbore	00:33	9.00	VMOTOR	1
6	Threadcutter	00:41	14.00	VMOTOR	1
7	Ballheadtool	00:53	10.00	VMOTOR	2
8	Boringbar	00:59	11.00	VMOTOR	2
9	Counterbore	01:09	9.00	VMOTOR	2
10	Threadcutter	01:17	14.00	VMOTOR	2
11	Facemill	01:29	11.00	GEAR	1
12	Twistdrill	01:37	16.00	GEAR	1
13	Reamer	01:46	14.00	MCASING	1
14	Threadcutter	01:55	14.00	MCASING	1
15	Boringbar	02:03	11.00	MCASING	1
16	Reamer	02:11	14.00	MCASING	2

Created: 14:57

Machining sequence | Tool plan | Balance options | **Gross requirement** | Net requirement | Unloading list | Loading list

Fig. 4-11 Gross requirement according to operation time

You can start calculation of the gross requirement by selecting softkey **Gross requirement**.

The calculation is based on the following factors:

- Current machining sequence
- Associated tool plans
- Planned tool service life from tool catalog
- Settings in screen **Balance options**

Note

The gross requirement is calculated from the operation time of the tool and the number of workpieces to be machined.

Tools loaded in the magazine are not taken into account.

Gross requirement result list

The result list specifies the **tools** with their calculated **Available at times**.

Note

The "available at" time is specified in relation to the calculation time.

The **Planned service life** from the tool catalog is also displayed.
The **Machining operation** column indicates the operation for which a tool is required.

4.1.5 Net requirement

Calculate net requirement

No.	Tool name	Made available at [hh:mm]	Planned service life [min]	Machining operation	Part
1	Facemill	00:00	11.00	GEAR	1
2	Twistdrill	00:08	16.00	GEAR	1
3	Ballheadtool	00:17	10.00	VMOTOR	1
4	Boringbar	00:23	11.00	VMOTOR	1
5	Counterbore	00:33	9.00	VMOTOR	1
6	Threadcutter	00:41	14.00	VMOTOR	1
7	Facemill	00:53	11.00	GEAR	1
8	Twistdrill	01:01	16.00	GEAR	1
9	Reamer	01:10	14.00	MCASING	1
10	Threadcutter	01:19	14.00	MCASING	1
11	Boringbar	01:27	11.00	MCASING	1

Net requirement after operating time Created: 15:03

Machining sequence | Tool plan | Balance options | Gross requirement | **Net requirement** | Unloading list | Loading list

Fig. 4-12 Net requirement according to operation time

You can start the net requirement calculation by selecting softkey **Net requirement**.

Note

When the net requirement is calculated, the tools already loaded in the magazine are also taken into account (unlike the gross requirement calculation). The calculated requirement may therefore be lower.

The result lists for net requirement and gross requirement are structured identically.

Net requirement result list

The tools already loaded in the magazine are included in the net requirement calculation.

Note

You can display the current status of the tool magazine by selecting **Parameters** → **Magazine list**.

The **S** column indicates the load or unload status for SINTDI.

More Tools		CHAN1	Jog	\ MPF0																				
Channel reset															Mag list 1									
Program aborted															Mag list 2									
Magazine list 1															Mag list 3									
Magazine:		1 - KETTE_1										Locat.:		20										
PI	P	P	P	P	P	P	P	P	Tool ID	Dupl	TNo	L	R	T	B	Mpt	T	T	T	T	T	T	T	S
1	-	-	-	-	-	-	-	-	Ballheadtool	2	12	1	1	1	1	1	1	P	-	-	-	-	-	0
2	-	-	-	-	-	-	-	-	Counterbore	2	13	1	1	1	1	1	1	P	-	-	-	-	-	0
3	-	-	-	-	-	-	-	-	Facemill	3	14	1	1	1	1	1	1	P	-	-	-	-	-	0
4	-	-	-	-	-	-	-	-	Twistdrill	3	15	1	1	1	1	1	1	P	-	-	-	-	-	2
5	-	-	-	-	-	-	-	-	Threadcutter	3	16	1	1	1	1	1	1	P	-	-	-	-	-	0
6	-	-	-	-	-	-	-	-	Boringbar	3	17	1	1	1	1	1	1	P	-	-	-	-	-	0
7	-	-	-	-	-	-	-	-	Facemill	1	18	1	1	1	1	1	1	P	-	-	-	-	-	1
8	-	-	-	-	-	-	-	-	Boringbar	1	21	1	1	1	1	1	1	P	-	-	-	-	-	2
9	-	-	-	-	-	-	-	-	Threadcutter	1	23	1	1	1	1	1	1	P	-	-	-	-	-	1
10	-	-	-	-	-	-	-	-	Reamer	1	26	1	1	1	1	1	1	P	-	-	-	-	-	1
11	-	-	-	-	-	-	-	-	Threadcutter	2	27	1	1	1	1	1	1	P	-	-	-	-	-	2
12	-	-	-	-	-	-	-	-	Twistdrill	2	25	1	1	1	1	1	1	P	-	-	-	-	-	1
13	-	-	-	-	-	-	-	-	Facemill	2	24	1	1	1	1	1	1	P	-	-	-	-	-	1
14	F	-	-	-	-	-	-	-																

Magazine list
Tool list
Load
Unload
Relocate

Fig. 4-13 Magazine list

4.2 Accept tool offsets from TSS

Data transfer to the MMC

To accept tool offsets from the tool setting station (TSS), you require an offline link as a connection between the TSS and SINTDI. The data from the setting station are imported in ASCII file form via floppy disk in the **Services** area of the MMC machining catalog.

Tool offset data

The file SEG0001.COM below has been generated by the TSS and contains the offset data for two tools. The data for the first tool in the file are listed completely. The data for the second tool have been restricted to all parameters that are not set to their defaults.

The first two lines are the program header. They contain the file name and directory of the tool offset data file.

Note

The file is contained on the last Setup floppy disk for test purposes.

Import data

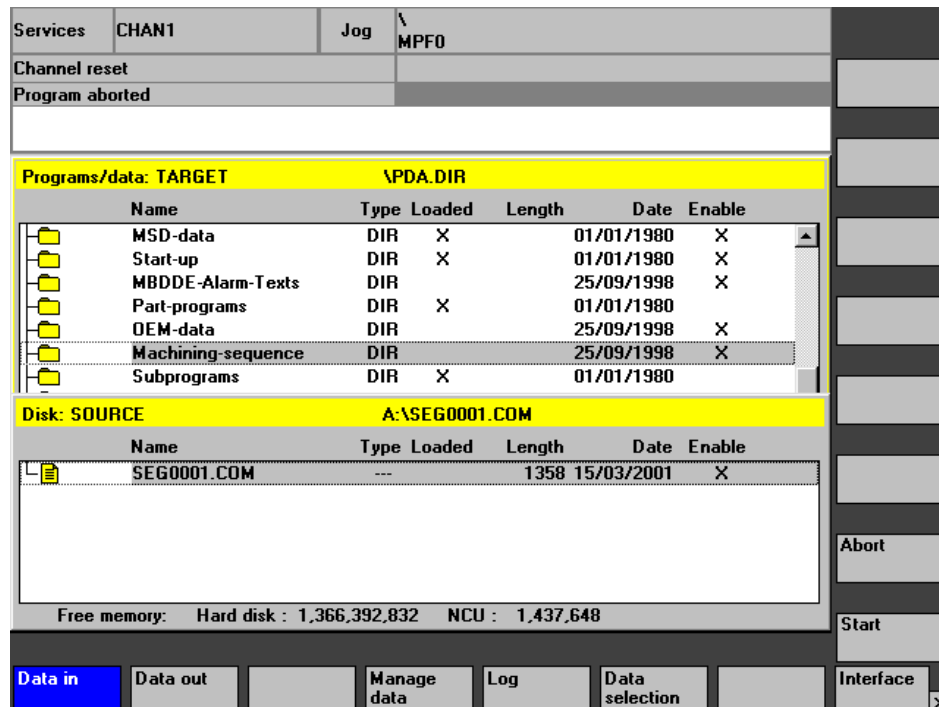


Fig. 4-16 Importing tool offset data

Copying tool offset data into machining sequence directory

You can copy the Ascii file to the machining sequence directory by selecting **Services** → **Data in**.

Fig. 4-16 shows the screen for importing file SEG0001.COM from floppy disk into the machining sequence directory.

Press softkey **Start** to begin the data transfer and **Abort** to cancel.

Transfer tool offset data to loading list

You can transfer the data supplied by the TSS to the loading list in the **SINTDI** MMC area. To do so, open the **Loading list** screen. Select softkey **Accept TSS data** data to open a box with the tool offset files and select **OK** to transfer them to the loading list.

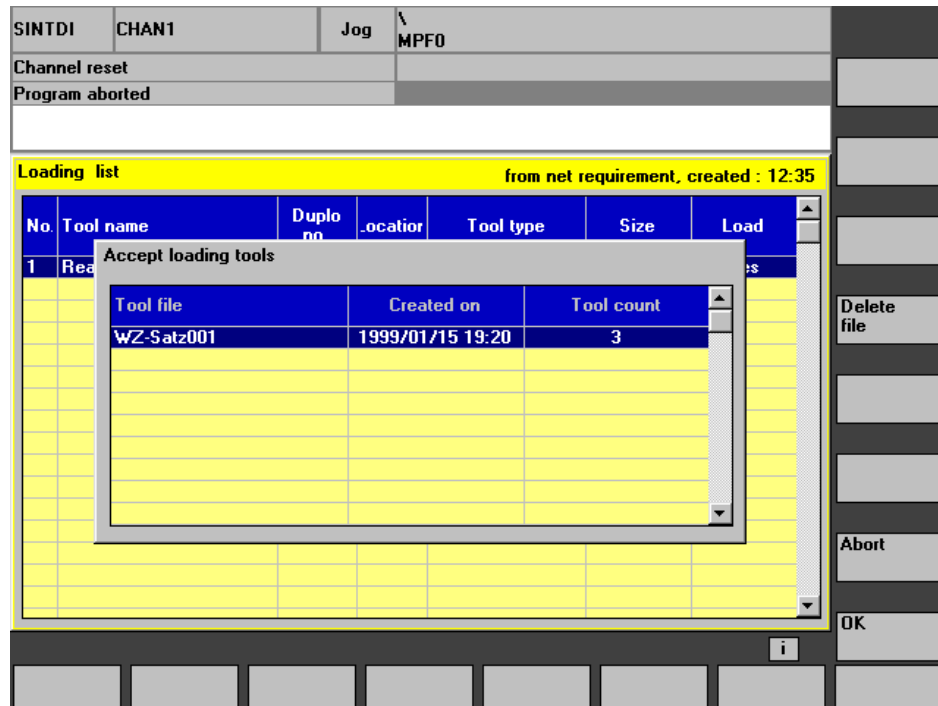


Fig. 4-17 Transferring tool offset data to loading list

The **Delete file** deletes the selected tool (offset data) file and the **Abort** key cancels the transfer of tool offset data between a tool file and the loading list.

SINTDI		CHAN1		Jog	\ MPF0		
Channel reset							Accept tool setting
Program aborted							
Loading list							Tool data
Tool setting station file : WZ-Satz001							
No.	Tool name	Duplo no.	Location	Tool type	Size	Load	
1	Counterbore	1	5	231 Counterbore	1/1/1/1	Yes	Load yes/no
2	Boringbar	1	31	210 Boring bar	1/1/1/1	Yes	
3	Threadcutter	1	32	145 Thread	1/1/1/1	Yes	
							Load all
							Load none
							To tool list
i							
Machining sequence	Tool plan	Balance options	Gross requirement	Net requirement	Unloading list	Loading list	

Fig. 4-18 Loading list

Load

After you have transferred a file, the individual tools are displayed in the loading list. You can alter the loading status of the tools with functions **Load yes/no**, **Load all** and **Load none**. Tools labeled for loading have loading status **Yes**.

Tool data

You can display the data for the selected tool by pressing softkey **Tool data**.

No.	Tool name	Duplo no.	Location	Tool type	Size	Load
1	Facemill	0	0	140 Face mill	1/1/1/1	No
2	Facemill	0	0	140 Face mill	1/1/1/1	Yes
3	Reamer	0	0	250 Reamer	1/1/1/1	No
4	Threadcutter				/1	No
5	Boringbar				/1	No
6	Reamer				/1	No
7	Threadcutter				/1	No
8	Boringbar				/1	No

SINTDI
Transfer tools marked with 'yes' to tool list ?

from gross requirement, created : 12:35

Channel reset
Program aborted

Abort
OK

Fig. 4-19 Transferring tools to tool list

To tool list

When you select **To tool list** the tools labeled **Yes** are transferred to the tool list.

Note

The loaded tools are no longer displayed in the tool list.

View loaded tools

Row	Magr	PI	Tool ID	Dupl	TNo	L	R	T	B	T	T	T	T	T	T	Mpt	S
1	1	1	Ballheadtool	2	12	1	1	1	1	1	-	P	-	-	-	-	1 0
2	1	2	Counterbore	2	13	1	1	1	1	1	-	P	-	-	-	-	1 0
3	1	3	Facemill	3	14	1	1	1	1	1	-	P	-	-	-	-	1 0
4	1	4	Twistdrill	3	15	1	1	1	1	1	-	P	-	-	-	-	1 2
5	1	5	Threadcutter	3	16	1	1	1	1	1	-	P	-	-	-	-	1 0
6	1	6	Boringbar	3	17	1	1	1	1	1	-	P	-	-	-	-	1 0
7	1	7	Facemill	1	18	1	1	1	1	1	-	P	-	-	-	-	1 1
8			Twistdrill	1	19	1	1	1	1	1	-	-	-	-	-	-	1 1
9			Ballheadtool	1	20	1	1	1	1	1	-	-	-	-	-	-	1 1
10	1	8	Boringbar	1	21	1	1	1	1	1	-	P	-	-	-	-	1 2
11			Counterbore	1	22	1	1	1	1	1	-	-	-	-	-	-	1 1
12	1	9	Threadcutter	1	23	1	1	1	1	1	-	P	-	-	-	-	1 1
13	1	13	Facemill	2	24	1	1	1	1	1	-	P	-	-	-	-	1 1
14	1	12	Twistdrill	2	25	1	1	1	1	1	-	P	-	-	-	-	1 1
15	1	10	Reamer	1	26	1	1	1	1	1	-	P	-	-	-	-	1 1
16	1	11	Threadcutter	2	27	1	1	1	1	1	-	P	-	-	-	-	1 2

Fig. 4-20 Tool list

You can select the **Tool list** function in the **Parameters** area to view a list of loaded tools. Tools transferred to the tool list are displayed without location assignment and with load identifier 1 in column S.

Physical loading

The tool is physically loaded with the **Load** function.

Physical unloading

The tool is physically unloaded with the **Unload** function.



List of Errors

The possible causes of system errors are listed below:

-300	Error reading the TDI_IN directory
-301	Error reading the tool file
-302	Error opening the tool file
-303	Format error in the tool file
-304	Format error in the tool file
-305	Format error in the tool data
-306	Error reading the tool data
-307	Faulty or unknown variable code
-309	Error deleting the data in the tool file
-310	Error deleting the tool file
-311	Error deleting the file
-312	Error creating a new tool
-313	Error setting up the DDE connection
-314	Error reading data out of the NC
-318	Error initializing the SINTDI software
-320	Error determining the path to the tool catalog
-323	Error reading the tool master data
-324	Error reading the tool data from the tool master data
-325	Error updating the location types
-327	Cutting edge data not found in tool catalog



Servicing

6

Please contact the

Sinumerik Hotline

Tel.: ++49 180 / 525 - 8008

Fax: ++49 180 / 525 - 8009



Appendix

A

References

General Documentation

/BU/	SINUMERIK 840D/840Di/810D/802S, C, D Ordering Information Catalog NC 60 Order No.: E86060-K4460-A101-A8-7600
/ST7/	SIMATIC SIMATIC S7 Programmable Logic Controllers Catalog ST 70 Order No.: E86060-K4670-A111-A3
/Z/	SINUMERIK, SIROTEC, SIMODRIVE Accessories and Equipment for Special-Purpose Machines Catalog NC Z Order No.: E86060-K4490-A001-A7-7600

Electronic Documentation

/CD6/	The SINUMERIK system DOC ON CD (with all SINUMERIK 840D/840Di/810D/FM-NC and SIMODRIVE publications) Order No.: 6FC5 298-6CA00-0BG1	(09.01 Edition)
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User Documentation

/AUE/	SINUMERIK 840D/810D/FM-NC AutoTurn Graphic Programming System Part 2: Setup Order No.: 6FC5 298-4AA50-0BP2	(07.99 Edition)
/AUK/	SINUMERIK 840D/810D/FM-NC Short Guide AutoTurn Operation Order No.: 6FC5 298-4AA30-0BP2	(07.99 Edition)
/AUP/	SINUMERIK 840D/810D/FM-NC AutoTurn Graphic Programming System Operator's Guide Part 1: Programming Order No.: 6FC5 298-4AA40-0BP2	(07.99 Edition)
/BA/	SINUMERIK 840D/810D/FM-NC Operator's Guide MMC Order No.: 6FC5 298-6AA00-0BP0	(10.00 Edition)
/BAD/	SINUMERIK 840D/840Di/810D Operator's Guide: HMI Advanced Order number: 6FC5 298-6AF00-0BP0	(02.01 Edition)
/BAE/	SINUMERIK 840D/810D/FM-NC Operator's Guide Unit Operator Panel Order No.: 6FC5 298-3AA60-0BP1	(04.96 Edition)
/BAH/	SINUMERIK 840D/840Di/810D Operator's Guide HT 6 (PHG new) Order No.: 6FC5 298-0AD60-0BP1	(11.00 Edition)
/BAK/	SINUMERIK 840D/840Di/810D Short Guide Operation Order No.: 6FC5 298-6AA10-0BP0	(02.01 Edition)
/BAM/	SINUMERIK 810D/840D Operator's Guide ManualTurn Order No.: 6FC5 298-5AD00-0BP1	(08.00 Edition)
/BAP/	SINUMERIK 840D/840Di/810D Operator's Guide Handheld Programming Unit Order number: 6FC5 298-5AD20-0BP1	(04.00 Edition)
/BAS/	SINUMERIK 840D/810D Operator's Guide ShopMill Order No.: 6FC5 298-5AD10-0BP1	(08.00 Edition)
/BAT/	SINUMERIK 840D/810D Operator's Guide ShopTurn Order number: 6FC5 298-6AD50-0BP0	(03.01 Edition)
/BEM/	SINUMERIK 840D/810D Operator's Guide HMI Embedded Order number: 6FC5 298-6AC00-0BP0	(02.01 Edition)
/BNM/	SINUMERIK 840D/840Di/810D/FM-NC User Guide Measuring Cycles Order No.: 6FC5 298-6AA70-0BP0	(10.00 Edition)

/DA/	SINUMERIK 840D/840Di/810D/FM-NC Diagnostic Guide Order No.: 6FC5 298-6AA20-0BP0	(10.00 Edition)
/KAM/	SINUMERIK 840D/810D Short Guide ManualTurn Order number: 6FC5 298-2AD40-0BP0	(11.98 Edition)
/KAS/	SINUMERIK 840D/810D Short Guide ShopMill Order No.: 6FC5 298-2AD30-0BP0	(01.98 Edition)
/PG/	SINUMERIK 840D/840Di/810D/FM-NC Programing Guide, Fundamentals Order No.: 6FC5 298-6AB00-0BP0	(10.00 Edition)
/PGA/	SINUMERIK 840D/840Di/810D/FM-NC Programming Guide Advanced Order No.: 6FC5 298-6AB10-0BP0	(10.00 Edition)
/PGK/	SINUMERIK 840D/840Di/810D/FM-NC Short Description, Programming Order No.: 6FC5 298-6AB30-0BP0	(10.00 Edition)
/PGM/	SINUMERIK 840D/840Di/810D Programming Guide ISO Milling Order number: 6FC5 298-6AC20-0BP0	(02.01 Edition)
/PGT/	SINUMERIK 840D/840Di/810D Programming Guide ISO Turning Order number: 6FC5 298-6AC10-0BP0	(02.01 Edition)
/PGZ/	SINUMERIK 840D/840Di/810D/FM-NC Programming Guide Cycles Order No.: 6FC5 298-6AB40-0BP0	(10.00 Edition)
/PI/	PCIN 4.4 Software for Data Transfer to/from MMC Module Order No.: 6FX2 060-4AA00-4XB0 (German, English, French) Order from: WK Fürth	
/SYI/	SINUMERIK 840Di System Overview Order No.: 6FC5 298-5AE40-0BP0	(10.00 Edition)

Manufacturer/Service Documentation**a) Lists**

/LIS/ SINUMERIK 840D/840Di/810D/FM-NC
SIMODRIVE 611D
Lists (10.00 Edition)
Order No.: 6FC5 297-6AB70-0BP0

b) Hardware

/BH/ SINUMERIK 840D/840Di/810D/FM-NC
Operator Components Manual (HW) (10.00 Edition)
Order No.: 6FC5 297-6AA50-0BP0

/BHA/ SIMODRIVE **Sensor**
Absolute Encoder with Profibus-DP
User Guide (HW) (02.99 Edition)
Order No.: 6SN1 197-0AB10-0YP1

/EMV/ SINUMERIK, SIROTEC, SIMODRIVE
EMC Directive (06.99 Edition)
Planning Guide (HW)
Order No.: 6FC5 297-0AD30-0BP1

/PHC/ SINUMERIK 810D
Manual Configuring (HW) (10.00 Edition)
Order No.: 6FC5 297-4AD10-0BP0

/PHD/ SINUMERIK 840D
NCU 571.2-573.2 Configuring Manual (HW) (10.00 Edition)
Order No.: 6FC5 297-6AC10-0BP0

/PHF/ SINUMERIK FM-NC
NCU 570 Configuring Manual (HW) (04.96 Edition)
Order No.: 6FC5 297-3AC00-0BP0

/PMH/ SIMODRIVE **Sensor**
Measuring System for Main Spindle Drives
Configuring Installation Guide, SIMAG-H (HW) (05.99 Edition)
Order No.: 6SN1197-0AB30-0BP0

c) Software**/FB1/**

SINUMERIK 840D/840Di/810D/FM-NC
Description of Functions, Basic Machine (Part 1) (10.00 Edition)
 (the various sections are listed below)
 Order No.: 6FC5 297-6AC20-0BP0

A2 Various Interface Signals
 A3 Axis Monitoring, Protection Zones
 B1 Continuous Path Mode, Exact Stop and Look Ahead
 B2 Acceleration
 D1 Diagnostic Tools
 D2 Interactive Programming
 F1 Travel to Fixed Stop
 G2 Velocities, Setpoint/Actual Value Systems, Closed-Loop Control
 H2 Output of Auxiliary Functions to PLC
 K1 Mode Group, Channels, Program Operation
 K2 Axes, Coordinate Systems, Frames,
 Actual-Value System for Workpiece, External Zero Offset
 K4 Communication
 N2 EMERGENCY STOP
 P1 Transverse Axes
 P3 Basic PLC Program
 R1 Reference Point Approach
 S1 Spindles
 V1 Feeds
 W1 Tool Compensation

/FB2/

SINUMERIK 840D/840Di/810D(CCU2)/FM-NC
Description of Functions, Extended Functions (Part 2) (10.00 Edition)
 including FM-NC: Turning, Stepping Motor
 (the various sections are listed below)
 Order No.: 6FC5 297-6AC30-0BP0

A4 Digital and Analog NCK I/Os
 B3 Several Operator Panels and NCUs
 B4 Operation via PC/PG
 F3 Remote Diagnostics
 H1 Jog with/without Handwheel
 K3 Compensations
 K5 Mode Groups, Channels, Axis Exchange
 L1 FM-NC Local Bus
 M1 Kinematic Transformation
 M5 Measurements
 N3 Software Cams, Position Switching Signals
 N4 Punching and Nibbling
 P2 Positioning Axes
 P5 Oscillation
 R2 Rotary Axes
 S3 Synchronous Spindles
 S5 Synchronized Actions (SW 3 and earlier)
 S6 Stepping Motors
 S7 Memory Configuration
 T1 Indexing Axes
 W3 Tool Change
 W4 Grinding

/FB3/	<p>SINUMERIK 840D/840Di/810D(CCU2)/FM-NC Description of Functions, Special Functions (Part 3) (10.00 Edition) (the various sections are listed below) Order No.: 6FC5 297-6AC80-0BP0</p> <ul style="list-style-type: none"> F2 3 to 5 Axis Transformation G1 Gantry Axes G3 Cycle Times K6 Contour Tunnel Monitoring M3 Coupled Axes and ESR S8 Constant Workpiece Speed for Centerless Grinding T3 Tangential Control V2 Preprocessing W5 3D Tool Radius Compensation TE1 Clearance Control TE2 Analog Axis TE3 Master/Slave for Drives TE4 Handling Transformation Package TE5 Setpoint Exchange TE6 MCS Coupling TE7 Retrace Support TE8 Clock-Independent, Path-Synchronous Switching Signal Output
/FBA/	<p>SIMODRIVE 611D/SINUMERIK 840D/810D Description of Functions, Drive Functions (10.00 Edition) (the various sections are listed below) Order No.: 6SN1 197-0AA80-0BP6</p> <ul style="list-style-type: none"> DB1 Operational Messages/Alarm Reactions DD1 Diagnostic Functions DD2 Speed Control Loop DE1 Extended Drive Functions DF1 Enables DG1 Encoder Parameterization DM1 Calculation of Motor/Power Section Parameters and Controller Data DS1 Current Control Loop DÜ1 Monitors/Limitations
/FBAN/	<p>SINUMERIK 840D/SIMODRIVE 611 DIGITAL Description of Functions ANA MODULE (02.00 Edition) Order No.: 6SN1 197-0AB80-0BP0</p>
/FBD/	<p>SINUMERIK 840D Description of Functions Digitizing (07.99 Edition) Order No.: 6FC5 297-4AC50-0BP0</p> <ul style="list-style-type: none"> D11 Installation D12 Scanning with Tactile Sensors (scancad scan) D13 Scanning with Lasers (scancad laser) D14 Milling Program Generation (scancad mill)

/FBDN/	CAM Integration DNC NT-2000 Description of Functions System for NC Data Management and Data Distribution Order No.: 6FC5 297-5AE50-0BP0	(05.00 Edition)
/FBFA/	SINUMERIK 840D/840Di/810D Description of Functions ISO Dialects for SINUMERIK Order No.: 6FC5 297-6AE10-0BP0	(10.00 Edition)
/FBFE/	SINUMERIK 840D/810D Description of Functions Remote Diagnosis Order number: 6FC5 297-0AF00-0BP0 FE1 Remote Diagnosis FE2 Interrupt-Controlled Email Messaging: @Event	(02.01 Edition)
/FBHLA/	SINUMERIK 840D/SIMODRIVE 611 digital Description of Functions HLA Module Order No.: 6SN1 197-0AB60-0BP2	(04.00 Edition)
/FBMA/	SINUMERIK 840D/810D Description of Functions ManualTurn Order No.: 6FC5 297-5AD50-0BP1	(08.00 Edition)
/FBO/	SINUMERIK 840D/810D/FM-NC Description of Functions Configuring the User Interface OP 030 (the various sections are listed below) Order No.: 6FC5 297-6AC40-0BP0 BA Operator's Guide EU Development Environment (Configuring Package) PS Online only: Configuring Syntax (Configuring Package) PSE Introduction to Configuring of Operator Interface IK Screen Kit: Software Update and Configuration	(03.01 Edition)
/FBP/	SINUMERIK 840D Description of Functions C-PLC Programming Order No.: 6FC5 297-3AB60-0BP0	(03.96 Edition)
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/S7HR/	SIMATIC S7-300 Manual STEP 7, Reference Manuals, V3.1 Order No.: 6ES7 810-4CA02-8AR0	(03.97 Edition)
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/IAA/	Installation and Start-Up Guide Order No.: 6SN 1197-0AA60-0BP6	(10.00 Edition)
/IAC/	SINUMERIK 810D Installation and Start-Up Guide (including description of SIMODRIVE 611D start-up software) Order No.: 6FC5 297-4AD20-0BP0	(10.00 Edition)
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SINUMERIK 840D/840Di/810D

Start-Up Guide HMI/MMC

(02.01 Edition)

Order No.: 6FC5 297-6AE20-0BP0

AE1 Updates/Extensions

BE1 Supplement operator interface

HE1 Online Help

IM1 Start-up functions for MMC 100.2

IM2 Installation and Start-Up HMI Embedded

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Siemens AG

A&D MC BMS
P. O. Box 3180

D-91050 Erlangen

Federal Republic of Germany

(Tel. 0180 / 525 - 8008 / 5009 [Hotline]

Fax: +49 9131/98-2176

email: motioncontrol.docu@.siemens.de)

Suggestions

Corrections

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SINUMERIK 840D/810D

Description of functions

From

Name:

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Tool Management SINTDI

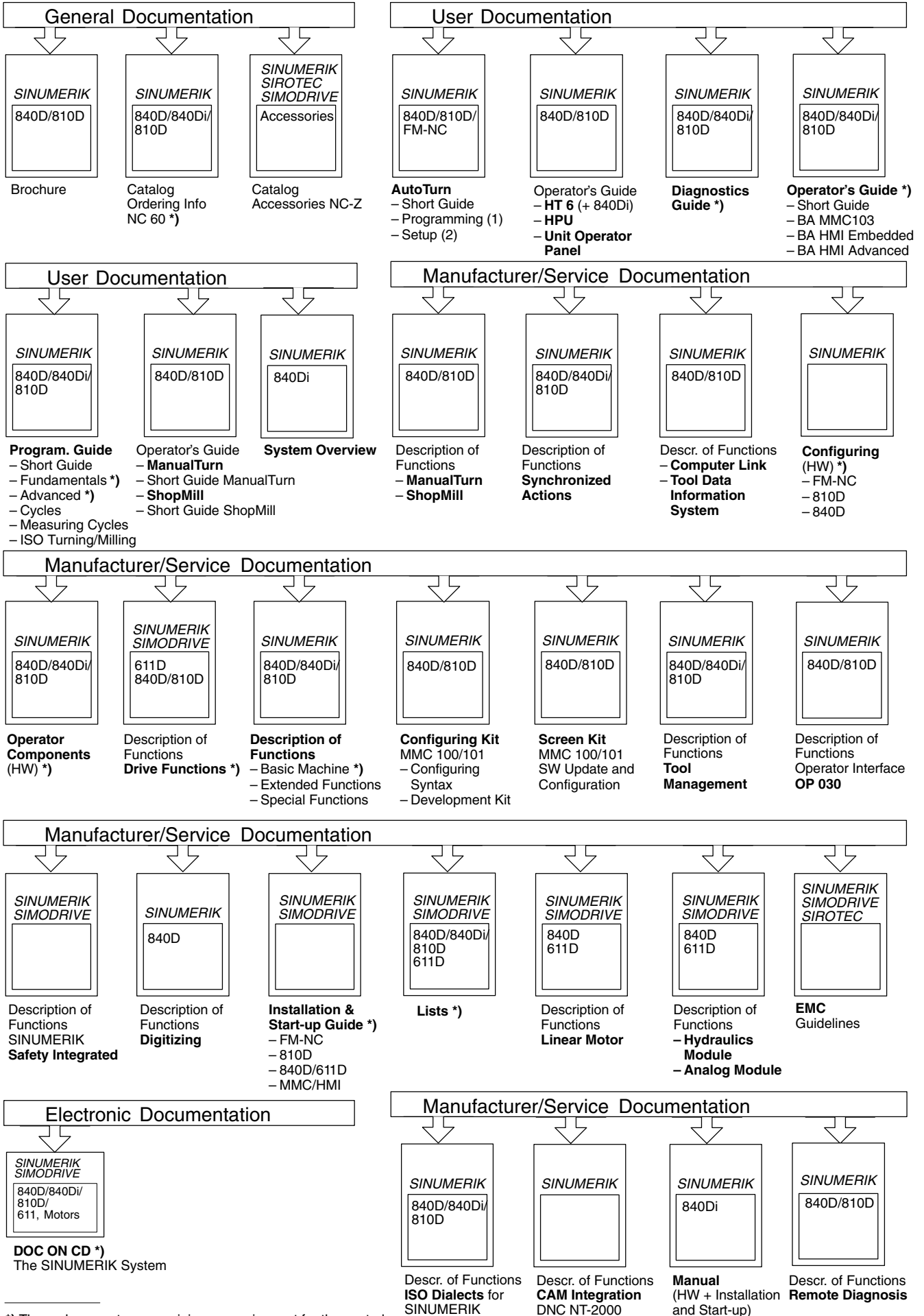
Order No.: 6FC5 297-6AE00-0BP0

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Suggestions and/or corrections

Overview of SINUMERIK 840D/840Di/810D Documentation



*) These documents are a minimum requirement for the control