## Training Document for Integrated Automation Solutions

### **Totally Integrated Automation (TIA)**

Module S02 CNC Programming Turning ShopTurn

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#### 1 Preface

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The training document "Programming with ShopTurn' is used for getting to know the software.



Today, CNC controllers are considered the most essential part of any automation. Depending on the problem definition, the most varied tasks in the areas of turning, milling, lasering, and grinding as well as in many other areas can be performed economically with the controllers ShopMill and ShopTurn.

#### Training Objective:

Module S02 shows you step by step how to program with ShopTurn. Subsequently, the reader is to be able to solve the tasks provided.

#### **Prerequisites:**

To successfully work through Module S02, the following knowledge is assumed:

- Knowledge in handling Windows
- Fundamentals of CNC programming with Sinutrain (for example, Module S01)

#### Hardware and software required

- PC, operating system Windows XP Professional starting with SP1 with 500 MHz and 256 MB RAM, free disk storage approx. 400 MB, of that 50 MB on the system drive, 1GB for installation of all products, MS Internet Explorer starting with 6.0
- 2 Software SINUTRAIN 802D/ 810D/840D/840Di/ Programming & Training, SinuTrain/JopShop



### 2 Introduction

#### 2.1 Development Phases in CNC Technology

- At the beginning of the eighties, first CNC machines with simple controllers
- In the middle of the eighties, more powerful controllers with cycles because of faster processors as well as machine tools with greater processing speed
- At the end of the eighties, machine tools with 5 and more axes and special software tools for external programming by using CAD/CAM systems
- At the beginning of the nineties, flexible manufacturing systems with extensive supplementary functions such as palette systems and multiple clamping with multiple spindle drives
- In the middle of the nineties, continued development of tool systems and the use of special tools for processing complex workpiece contours with only one tool
- End of the nineties: central programming systems for programming several different controllers at different machine tools.

#### 2.2 Requirements for Controllers in the New Millennium

- Openness: It is to be possible for the machine manufacturer or the user to configure and expand controllers according to their own requirements
- Independence: Programming by means of a uniform controller interface for the most varied CNC processing
- Equality: All machine data is to be available also at the external programming units. Programming at the external programming units is the same as on the machine tool.
- Saving programming time: With graphic machining plans and help displays, it is to be possible to generate complex workpiece contours very easily and quickly
- Editing capability: Extensive editing functions provide for fast and simple program changes/program expansion

### 2.3 Advantages of CNC Programming with SinuTrain SHOPMILL, SHOPTURN

The controller is continuously optimized and can be adapted any time to the individual requirements of the machine manufacturers. Moreover, cycles and functions can be integrated later.

Regardless of whether turning, milling, or any other type of processing is performed, it always takes place with the same program interface and the same menus or functions.

Retrofit: This means: Siemens can retrofit also older CNC machines to ShopMill and ShopTurn .

Advantage: Operating the software and the menu structure has to be learned only once.

By transferring the machine data to the programming system of SINUTRAIN, programming at the external programming unit is the same as on the machine tool.

By using contour calculators and CAD readers, simple programming is possible without technical terms. By directly entering technological values, no external calculations have to be made beforehand. The integrated contour calculator is able to process all conceivable dimensions, yet is very simple to handle. Through machining step programming and many online help functions, extensive programming tasks can be solved very quickly.

Convenient programming is possible with functions such as Copy, Cut, and Insert.

Since the program is generated in the editor as a graphic work plan by means of individual machining steps, all editing steps are provided in a straightforward manner.

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### 3 Operator Components

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This chapter shows the basic operator components. These components are to be considered examples, and are not necessarily included on the machine in the design described.

Take note of the information by the machine manufacturer.

Here an example of an operator panel of the type OP010C.

This operator panel consists of a screen with horizontal



| SIEMENS |             |
|---------|-------------|
|         |             |
|         | Y Z = 7 8 9 |
|         |             |
|         |             |

and vertical



softkeys.

They are used for calling individual cycles, programs and functions.

Depending on the operator panel, an alpha/numeric block and a correction block is provided on the side.



Here an example of a machine control panel.

Machining the workpiece is started by means of the machine control panel, for example.



In this chapter, the keys preassigned by Siemens and their functions are not discussed any further, since they are described in detail in the operating instructions "Operation/Programming".

### 4 Program Management Turning

The following is described in detail: the structure, the management and saving programs under ShopMill <<should be ShopTurn?>>.

### **Content of Module S02:**



#### 4.1 Directory

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In the directories, programs can be stored. This keeps the program memory clearly arranged.

By pressing the softkey



the available directories under ShopTurn are opened in the operating area





|   | VERZEICHNIS     |             |          |              |         |                   |
|---|-----------------|-------------|----------|--------------|---------|-------------------|
|   | Name            | Typ Gelad   | en Größe | Datum/Ze.    | it      |                   |
|   | CAD_PROGRAM     | WPD X       | NCK-Dir. | 07.12.2005 1 | 5:27    |                   |
|   | SHOPTURN        | WPD X       | NCK-Dir. | 16.11.2005 0 | 8:45    |                   |
| The following is                            | WERKSTUECKE     | WPD X       | NCK-Dir. | 17.11.2005 1 | 3:41    | Neu               |
| displayed: the names<br>of the directories, |                 |             |          |              |         | Um-<br>benennen   |
|   |                 |             |          |              |         | Markieren         |
|   |                 |             |          |              |         | Kopieren          |
|   |                 |             |          |              |         | Einfügen          |
| Name  |                 |             |          |              |         | Aus-<br>schneiden |
| CAD_PROGRAM                                 | Freier Speicher | Festplatte: | 10 GByt  | es NC:       | 1883968 | Weiteres          |
| SHOPTURN                                    | NC 00 Disk A    | tid Stick   | <        |              |         |                   |
|   |                 |             |          |              |         |                   |
| the directory type.                         | Datum/Ze        | eit         |          |              |         |                   |
| the encodery type,                          | 07.12.2005      | 15:27       |          |              |         |                   |
| Тур   | 16.11.2005      | 08:45       |          |              |         |                   |
| WPD   | 17.11.2005      | 13:41       |          |              |         |                   |
| as well as the generation date and          |                 |             |          |              |         |                   |

time.

### **Directory Structure**

| The size of the         | VERZEICHNIS       |       |        |           |            |         |                 |
|-------------------------|-------------------|-------|--------|-----------|------------|---------|-----------------|
| directory is not        | Name              | Тур   | Gelad  | len Größe | Datum/2    | eit     |                 |
| directory is not        | BEISPIELPROGRAMME | WPD   | X      | NCK-Dir.  | 24.11.2005 | 15:29   |                 |
| displayed.              | CAD_PROGRAM       | WPD   | x      | NCK-Dir.  | 07.12.2005 | 15:01   |                 |
| The X in the area       | GRAVUR GRAVUR     | WPD   | x      | NCK-Dir.  | 25.11.2005 | 08:24   | Neu             |
|                         | SHOPMILL          | WPD   | х      | NCK-Dir.  | 23.11.2005 | 14:30   |                 |
| "Loaded" means that     | 🛅 ТЕМР            | WPD   | х      | NCK-Dir.  | 24.11.2005 | 15:29   | Um-<br>benennen |
| the directory is loaded |                   |       |        |           |            |         |                 |
|                         |                   |       |        |           |            |         | Markieren       |
| on the NC of the        |                   |       |        |           |            |         | -               |
| machine.                |                   |       |        |           |            |         | Kopieren        |
|                         |                   |       |        |           |            |         |                 |
|                         |                   |       |        |           |            |         | Einfügen        |
| Geladen Größe           |                   |       |        |           |            |         |                 |
|                         |                   |       |        |           |            |         | Aus-            |
| X NCK-Dir.              |                   |       |        |           |            |         | schneider       |
|                         |                   |       |        |           |            |         |                 |
| V NOK DI                | Freier Speicher   | Festp | latte: | 10 GBy    | tes NC:    | 12/3/52 | Weiteres        |
| X NCK-Dir.              |                   | 1¢    | USB    |           |            |         |                 |
|                         |                   | 05    | 1      |           |            |         |                 |

#### 4.2 Program Structure

By opening a directory, existing programs can be accessed, or new ones can be set up.

### By pressing the arrow key



on the CNC keyboard,

the selected directory opens



In ShopTurn, only main directories can be created - mpf - no subdirectories - spf -.





closes the directory. You are returned to the directory overview.

#### 4.3 Editing Programs

The same functions are available as in Word.

| With the softkeys | VERZEICHNIS     |             |          |            |         |                   |
|-------------------|-----------------|-------------|----------|------------|---------|-------------------|
|                   | Name            | Typ Gelade  | en Größe | Datum/2    | eit     |                   |
| Um-               | MONTAGEPLATTE   | MPF X       | 111      | 27.04.2006 | 08:36   | Neu               |
| Denemen           |                 |             |          |            |         | Um-<br>benennen   |
| Markieren         |                 |             |          |            |         | Markieren         |
| Kopieren          |                 |             |          |            |         | Kopieren          |
|                   |                 |             |          |            |         | Einfügen          |
| Einfügen          |                 |             |          |            |         | Aus-<br>schneiden |
| Aus-              | Freier Speicher | Festplatte: | 10 GBy   | tes NC:    | 1295256 | Weiteres          |
| schneiden         | NC 🖧 Disk A     | ද්ධ USB     |          |            |         |                   |

directories, programs, or individual program parts can be edited.

The individual softkeys are not described in detail since they occur in the exercises below..

#### 4.4 Saving Program Data

Here, all important program data such as tools, zero points, etc. can be stored.



the softkey below appears in the vertical softkey bar



With "Save data", the relevant machining data of the currently selected program can be saved.

| VER | ZEICHNIS  |         |       |         |        |            |         |  |
|-----|-----------|---------|-------|---------|--------|------------|---------|--|
| t.  | Name      |         | Тур   | Geladen | Größe  | Datum/Z    | eit     | Manuell                                  |
| J)  | WERKSTUEC | KE.WPD\ |       |         |        |            |         | laden                                    |
|     | ANTRIEBSW | ELLE    | MPF   |         | 2168   | 26.02.2004 | 12:18   |  |
|     | FFF       |         | MPF   |         | 1      | 17.11.2005 | 13:41   | entladen                                 |
| ľ   | HOHLWELLE | _SEITE1 | MPF   |         | 3778   | 26.02.2004 | 12:18   |  |
| ľ   | HOHLWELLE | _SEITE2 | MPF   |         | 3847   | 26.02.2004 | 12:18   |  |
| B   | STUFENWEL | LE      | MPF   | х       | 2406   | 12.01.2006 | 09:35   | _  |
| ľ   | UMLENKWEL | LE      | MPF   |         | 3305   | 30.11.2005 | 14:15   |  |
|     |           |         |       |         |        |            |         | Daten<br>sichern<br>Auslesen<br>Einlesen |
| Fre | ier Speic | her     | Festp | latte:  | 10 GBy | tes NC:    | 1881920 | Zurück                                   |
| NC  | NC 🖞      | Disk A  | ٩ţ    | Stick   |        |            |         |  |

opens a dialog field.

By pressing the softkey

O Alternat.

the desired data is selected.

| VERZ | EICHNIS          |                 |            |            |         |           |
|------|------------------|-----------------|------------|------------|---------|-----------|
|      | Name             | Typ Geladen     | Größe      | Datum/Ze   | əit     | 0         |
| 5.   | WERKSTUECKE.WPD\ |                 |            |            |         | Alternat. |
| l i  | ANTRIEBSWELLE    | MPF             | 2168       | 26.02.2004 | 12:18   |           |
| E F  | FFF              | MPF             | 1          | 17.11.2005 | 13:41   |           |
| B I  | HOHLWELLE_SEITE1 | MPF             | 3778       | 26.02.2004 | 12:18   |           |
| E I  | HOHLWELLE_SEITE2 | MPF             | 3847       | 26.02.2004 | 12:18   |           |
|      |                  | MDP V           | 2400       | 42 04 2000 | 00.95   |           |
| E ı  | Werkzeugdaten:   | Keine           |            | -          |         |           |
|      | Nullpunkte:      | Keine           |            |            |         |           |
|      | Verzeichnis:     | \WKS.DIR\WERKST | UECKE . WP | D          |         |           |
|      | Dateiname:       | STUFENWELLE_TMZ | :          |            |         |           |
|      |                  |                 |            |            |         | Abbruch   |
| Frei | er Speicher      | Festplatte:     | 10 GByt    | es NC:     | 1881920 | ок        |
| NC   | NC 🕅 Disk A      | C Stick         |            |            |         |           |



#### STUFENWELLE\_TMZ

The program with the correcponing "INI" file can now be saved externally. With the program and the INI file, all relevant data for manufacturing the workpiece is saved, and can be called any time.

INI

When an "INI file" is selected, all saved data is read in again.

When reading in the tools used in the program, a query is displayed regarding tools with the same name: whether the current tool is to be overwritten.

| VER | ZEICHNIS               |       |           |          |            |         |           |
|-----|------------------------|-------|-----------|----------|------------|---------|-----------|
|     | Name                   | Тур   | Geladen   | Größe    | Datum/2    | eit     | 0         |
| 5   | WERKSTUECKE.WPD\       |       |           |          |            |         | Alternat. |
|     | STUFENWELLE_TMZ        | INI   |           | 30231    | 12.01.2006 | 13:12   |           |
|     | ANTRIEBSWELLE          | MPF   |           | 2168     | 26.02.2004 | 12:18   |           |
|     | FFF                    | MPF   |           | 1        | 17.11.2005 | 13:41   | -         |
|     | HOHLWELLE_SEITE1       | MPF   |           | 3778     | 26.02.2004 | 12:18   |           |
|     | HOUL MELLE CETTES      | MDP   |           | 2047     | 1000 00 00 | 49.40   |           |
|     | Gesicherte Daten einle | sen   |           |          |            |         |           |
|     | Werkzeugdaten:         | kompl | ette Werk | zeuglist | e          |         |           |
|     |                        |       |           |          |            |         |           |
|     |                        |       |           |          |            |         |           |
|     |                        |       |           |          |            |         |           |
|     |                        |       |           |          |            |         |           |
|     |                        |       |           |          |            |         |           |
|     |                        |       |           |          |            |         | Abbruch   |
|     |                        |       |           |          |            |         | -         |
| Fre | ier Speicher           | Festp | latte:    | 10 GBy   | tes NC:    | 1881920 | ок        |
| _   |                        |       |           |          |            |         |           |
| NC  | NC 🛱 Disk A            | ₿₿    | Stick     |          |            |         |           |

Here, the "complete tool list", or the tools "used in the program" can be stored.

If the "complete tool list" is read in, all existing tools are deleted and replaced with the stored tools.

### 5 Program Structure Turning

#### 5.1 Program Header

In the program header, the basic settings are described.

| After entering | the |
|----------------|-----|
| program name   | Э   |

Neues ShopTurn Programm Bitte geben Sie den neuen Namen ein: Welle

and confirming the input with



the program header of the new program is opened automatically.

Here, the basic settings for the program sequence are made.

As the first input, a zero point shift can be programmed for the program directly in the program header.







The unmachined part definition is necessary only for simulation.

### With the retraction plane

| Rückzug: | einfach   |
|----------|-----------|
| XRA      | 5.000 ink |
| ZRA      | 2.000 ink |

we define the distance that the tool travels with only one axis motion from the workpiece to the tool change point.



In the case of ShopTurn, we differentiate between





return motion single for external machining;

return motion expanded

Rückzug: <mark>erweitert</mark>

for outside and inside machining and



For each machining, a return motion has to be specified.



Rückzug: <mark>all</mark>

for outside, inside and backside machining.



or in the machine coordination system.





In the next input field the safety distance is defined.

Sicherheitsabstand: SC 1.000 ink

The safety distance indicates how close the tool travels to the workpiece at its approach at rapid feed. During retraction, the safety distance specifies the distance with which the tool travels from the workpiece in the feed.





Drehzahlgrenzen: S1 3000.000 U/min

By pressing the softkey





the input is accepted in the machining plan.

### 6 Tool Management

In this module, the structure of tool management with the individual programming options is described.

Content of the module:



### 6.1 Calling the Tool List



### 6.2 Structure of the Tool List

| WERKZ            | EUGE      | :    |             |      |    |   |  |  |               |   |                                |                                     |                        |                |   |          |
|------------------|-----------|------|-------------|------|----|---|--|--|---------------|---|--------------------------------|-------------------------------------|------------------------|----------------|---|----------|
| Werkze           | augl      | iste | ;           |      |    |   |  |  |               |   |                                |                                     |                        |                | 0   |          |
| P1.              | Тур       | Wer  | kzeugnam    | e    | DP | 1. Schne  | eide   |  |               |   |                                |                                     | #                      | <b>5</b> -5    | Alternat  |          |
|                  |           |      | -           |      |    | Länge X   | Länge Z  | Radius   |               | 0   |                                | Plat.<br>länge                      | ,                      | 12             | in  |          |
| 1                |           | SCHE | RUPPER_8    | 10 A | 1  | 55.840  | 39.124   | 0.800  | ) ←           | 93.0                                      | 80                             | 12.6                                | 35                     |                | Manuell   |          |
| 2                | <u>67</u> | Bohr | RER_32      |      | 1  | 0.000   | 185.124  | 32.000   | l             | 180.0                                     |                                |                                     | 2                      | П              |   |          |
| 3                | Ø         | SCHL | LICHTER_    | 35 A | 1  | 123.976   | 57.370   | 0.400  | ) ←           | 93.0                                      | 35                             | 12.6                                | 30                     | П              | Werkzeug  | 9        |
| 4                |           | SCHE | RUPPER_8    | 0 I  | 1  | -8.950  | 122.457  | 0.800  | ) ←           | 95.0                                      | 80                             | 10.6                                | <b>3</b> 2             | П              |   |          |
| 5                | U         | STEC | CHER_3 A    | 1    | 1  | 85.124  | 44.124   | 0.200  | )             | 3.000                                     |                                | 8.6                                 | <b>3</b> 2             |                | Entlador  |          |
| 6                | Ø         | SCHL | LICHTER_    | 35 I | 1  | -12.658   | 121.807  | 0.400  | (←            | 95.0                                      | 35                             | 8.8                                 | 32                     |                | Linciade  |          |
| 7                | +         | GEW] | INDE_1.5    | ;    | 1  | 66.326  | 33.333   | 0.050  | 1             |   |                                |                                     | ଦ                      | П              |   |          |
| 8                | ⊠=        | FRAE | ESER 8      |      | 1  | 87.833  | 74.621   | 8.000  | )             |   | 3                              |                                     | 2                      |                |   |          |
| 9                | n         | STEO | -<br>CHER3T |      | 1  | -11.736   | 135, 124   | 9,100  |               | 3.000                                     |                                | 4.6                                 | าว                     |                |   |          |
| 10               |           | RUHE | DFD 5       |      | 4  | 0 000   | 185 124  | 5 000  |               | 118 0                                     |                                |                                     | 2                      |                | Schneide  | n        |
| 11               | 6         | DTLS | 7 9 0       |      |    | 00 112  | 20 122   | 2 000  | 1             | 110.0                                     |                                |                                     | 0                      |                |   |          |
| 11               | U         | P1L2 |             | Ne   |    | 00.112  | 30.123   | 2.000  |               | 400.0                                     |                                |                                     | 2                      |                |   |          |
| 12               | 622       | Gew. | -BUHKER     | _мь  |    | 0.000   | 145.132  | 6.000  |               | 180.0                                     |                                |                                     | .5                     |                | Sortiere  | n        |
| 13               | <u> </u>  | ROHF | REK10       |      | 1  | 0.000   | 0.000  | 10.000   | ,             | 118.0                                     |                                |                                     | ' <u>1</u>             |                |   |          |
| 14               |           |      |             |      |    |   |  |  |               |   |                                |                                     |                        |                |   |          |
|                  | erkz      |      | Werkz       |      | _  | sa Ma   | aga-   | Nullp.   | F             | R-Pa                                      | ara                            |                                     | [>                     | ·              |   |          |
|                  | 150       |      | verscr      | ו    |    |   |  | versch   | -             | met                                       | er                             |                                     |                        |                |   |          |
| DI               |           |      |             |      |    | The lo  | cation   | numbe  | r:            |   |                                |                                     |                        |                |   |          |
| 1<br>2<br>3<br>4 |           |      |             |      |    | The lo<br>locatio<br>numbe<br>in the<br>Tools t<br>active | caton r<br>n. If a t<br>er, the t<br>magazi<br>that do<br>in the r | number<br>tool is l<br>tool is a<br>ine.<br>n't have<br>magazi | e<br>ne       | descr<br>cated<br>tive;<br>a loc<br>e. Th | ibe<br>I a<br>tha<br>ati<br>ey | es the<br>fter t<br>at is,<br>ion n | e r<br>he<br>it<br>iun | na<br>is<br>nb | igazine<br>ocation<br>available<br>er are ne<br>e | ə<br>ot  |
|                  |           |      |             |      |    | active.   | er". Th€   | e correc   | CTI           | on di                                     | ata                            | a cor                               | Itir                   | nue            | es to de  |          |
| Тур              |           |      |             |      |    | Ine Iy  | <u>/pe:</u>  |  |               |   |                                |                                     |                        |                |   |          |
|                  |           |      |             |      |    | Here,<br>tool typ<br>positio<br>Examp                     | a symb<br>be, as v<br>n.<br>ble of to                              | ool is as<br>well as<br>ool edg                                | ss<br>tł<br>e | igneo<br>ne co<br>posit                   | d to<br>rre                    | o the<br>espo<br>n usi              | e re<br>nd             | esp<br>ling    | pective<br>g tool ed<br>finishing                 | ige<br>g |
| 1                |           |      |             |      |    | tool:   | C.   | 0  |               | W   |                                |                                     |                        |                |   | -        |

+

### 6.3 Structure of the Tool List

| The following tool types with the | P1.   | Тур                       | Werkzeugname   |
|-----------------------------------|---|---------------------------|--|
| are available:                    | 1   |                           | SCHRUPPER  |
|                                   | 2   | <u></u>                   | BOHRER   |
|                                   | 3   | Ø                         | SCHLICHTER   |
| In addition, there is             | 4   | Ū                         | GEWINDE  |
| the 3D button and the             | 5   | IJ                        | STECHER  |
| fixed stop as symbol.             | 6   | Ø                         | PILZ   |
|                                   | 7   |                           | DREHBOHRER   |
|                                   | 8   | ⊠=                        | FRAESER  |
|                                   | 9   | ~~~                       | GEWINDEBOHRER  |
| Werkzeugname                      | The T                                       | <u>ool N</u>              | ame:   |
| SCHRUPPER                         | In this<br>tool.<br>Letters<br>entere       | field<br>s, nui<br>ed.    | , a name is entered to identify the mbers, and special characters can be                       |
| DP<br>2                           | <u>The D</u><br>If an a<br>alread<br>tool). | uplo<br>Idditic<br>ly exi | <u>Number:</u><br>onal tool is set up with a name that<br>sts, it becomes a duplo tool (sister |
| 1. Schneide                       | The T                                       | <u>ool E</u>              | dge Length   |
| Länge X Länge Z                   | lf a too<br>availa                          | ol is r<br>ble in         | neasured, the tool lengths are the tool list.  |
| 55.840 39.124                     | Up to<br>assigr                             | nine<br>ned to            | edges can be measured and<br>a tool.   |
| Radius                            | <u>The R</u>                                | adius                     | 2  |
| A. 800                            | Here,                                       | the to                    | ool radius is entered in the list.   |
| 0.000                             | Exam  | ole: F                    | Plate radius 0.8 mm.   |

#### Structure of the Tool List 6.4



The Reference Direction for the Support Angle

This refers to the tool's main cutting direction.

The Supprt Angle

This defines the angle of the tool support.



æ

The Tool Tip Angle

Here, the angle of the tool tip is entered.

Number of Tool Edges

If the tool that has been set up new as a milling tool, the number of tool eges is specified in this input field, not an angle.

Plat. länge 12.0

▦

K

もも

12

Length of the Plate

Here, the length of the tool tip is defined.

**Direction of Spindel Rotation** 

In the case of driven tools, the DOR refers to the tool spindle, in the case of turning tools to the main or counter spindle.



Cooling Water Supply

Under ShopTurn, inner and outer coolant supply can be activated, for example.

Plat. 12 länge

12 Ø

8.0

0.800 ← 95.0 80 12.0

0.000

з

0.400 + 93.0 35

0.200 3.000

0.000 0.000

+ Nullp. R-Para

0.050

0.000

0.000

8.000

Pilz

Anschlag

Gewinde

Dreh-

D-Taste

Zurück

#### 6.5 Tool Wear



0.000

WERKZEUGE

| WERK2 | EUGE         | :             |    |          |         |         |          |        |           |
|-------|--------------|---------------|----|----------|---------|---------|----------|--------|-----------|
| Werkz | eugv         | erschleiß     |    |          |         |         |          |        |           |
| P1.   | Тур          | Werkzeugname  | DP | 1. Schne | eide    |         |          |        |           |
|       |              |               |    | ∆LängeX  | ∆LängeZ | ∆Radius | T<br>C   |        |           |
| 1     |              | SCHRUPPER     | 2  | 0.000    | 0.000   | 0.000   |          |        |           |
| 2     | 622          | BOHRER        | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 3     | Ø            | SCHLICHTER    | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 4     | Ū            | GEWINDE       | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 5     | Π            | STECHER       | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 6     | ø            | PILZ          | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 7     |              | DREHBOHRER    | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 8     | ₿=           | FRAESER       | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 9     | c::::        | GEWINDEBOHRER | 1  | 0.000    | 0.000   | 0.000   |          |        |           |
| 10    |              |               |    |          |         |         |          |        | Schneiden |
| 11    |              |               |    |          |         |         |          |        |           |
| 12    |              |               |    |          |         |         |          |        | Sortieren |
| 13    |              |               |    |          |         |         |          |        |           |
| 14    |              |               |    |          |         |         |          |        |           |
|       |              |               |    | 1        |         |         |          | $\sum$ |           |
| 1     | erkz<br>List | Werkz.        |    | Ma Ma    | aga- 🔶  | Nullp.  | R R-Para |        |           |

DP1. Schneide

1

1 0.000

2 55.840 39.124

1 123.976 57.370

1 66.326 33.333

1 87.833 74.621

Magazin

0.000

0.000

85.124 44.124

0.000

0.000

0.000

Länge X Länge Z Radius

0.000 185.124 32.000 180.0

Starting with ShopTurn SW Version 6.4, an allowance can be entered directly in the input screen form "Contour finishing".

It is advisable to prepare, by means of this "allowance", exact measurements such as fitted measurements, and not to implement this by using tool wear.

The value entered in the input screen form "Contour finishing" **only** refers to the generated program; the value entered in the tool wear, on the other hand, applies to **all** programs.

#### 6.6 Tool Wear

The operation duration of a tool can be defined with the tool life

T Standzeit [min];

WERKZEUGE

or the number if units.

C Stückzahl

For both options, a prewarning limit can be used.

Vorwarn Stand-

25.0

zeit

30.0

grenze

| TIGLINE | cugi          | GESCHIGIN     |    |             |         | o con role o e | ~ .    |        | o cache an        |          |    |
|---------|---------------|---------------|----|-------------|---------|----------------|--------|--------|-------------------|----------|----|
| P1.     | Тур           | Werkzeugname  | DP | 1. Schne    | eide    |                |        |        |                   | Alternat | Ł. |
|         |               |               |    | ∆LängeX     | ∆LängeZ | Δø             | Т<br>С |        |                   |          | 1  |
| 1       |               | SCHRUPPER     | 2  | 0.000       | 0.000   | 0.000          | Т      | 0.0    | 0.0               |          |    |
| 2       | <u>67</u>     | BOHRER        | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          | ł  |
| 3       | 0             | SCHLICHTER    | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          |    |
| 4       | ٦             | GEWINDE       | 1  | 0.000       | 0.000   | 0.000          |        |        |                   | -        | i  |
| 5       | Π             | STECHER       | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          |    |
| 6       | Ø             | PILZ          | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          |    |
| 7       |               | DREHBOHRER    | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          | ï  |
| 8       | ⊠=            | FRAESER       | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          |    |
| 9       | C             | GEWINDEBOHRER | 1  | 0.000       | 0.000   | 0.000          |        |        |                   |          |    |
| 10      |               |               |    |             |         |                |        |        |                   | Schneide | er |
| 11      |               |               |    |             |         |                |        |        |                   |          | ł  |
| 12      |               |               |    |             |         |                |        |        |                   | Sortiere | er |
| 13      |               |               |    |             |         |                |        |        |                   |          | ì  |
| 14      |               |               |    |             |         |                |        |        |                   |          |    |
|         |               |               |    |             |         |                |        |        | $\mathbf{\Sigma}$ |          |    |
| N N     | lerkz<br>List | Werkz.        |    | Magazina Ma | aga-    | Nullp.         | R      | R-Para |                   |          |    |
|         |               |               |    |             |         | - CLOCH        |        |        |                   | -        |    |

After the prewarning limit is reached, a message appears that the tool life or the number of loadings is soon reached.

Tools can be defined as "blocked"

| 2 | $\square$ | Bohrer | 1 | 0.000 | 0.000 | 0.000 | G |
|---|-----------|--------|---|-------|-------|-------|---|

or as "oversize"

| 8 | §= Fraeser | i | 0.000 | 0.000 | 0.000 |  |
|---|------------|---|-------|-------|-------|--|
|   |            |   |       |       |       |  |

U

### 6.7 The Magazine

In the area



-by pressing the softkey



| WERK2 | EUGE? |               |    |          |         |        |        |     |                |            |                 |
|-------|-------|---------------|----|----------|---------|--------|--------|-----|----------------|------------|-----------------|
| Werkz | eugl  | iste          |    |          |         |        |        | Hal | terwi          | nkel       |                 |
| Р1.   | Тур   | Werkzeugname  | DP | 1. Schne | aide    |        |        |     |                | \$\$ ₹     | Pilz            |
|       |       |               |    | Länge X  | Länge Z | Radius | 0      | F   | Plat.<br>Länge | 12         |                 |
| 1     |       | SCHRUPPER     | 2  | 55.840   | 39.124  | 0.800  | + 95.0 | 80  | 12.0           | 2          | Anschlag        |
| 2     | 622   | BOHRER        | 1  | 0.000    | 185.124 | 32.000 | 180.0  |     |                | 2          | _               |
| 3     | 0     | SCHLICHTER    | 1  | 123.976  | 57.370  | 0.400  | + 93.0 | 35  | 12.0           | 2          |                 |
| 4     | ũ     | GEWINDE       | 1  | 66.326   | 33.333  | 0.050  |        |     |                | ଦ          |                 |
| 5     | Π     | STECHER       | 1  | 85.124   | 44.124  | 0.200  | 3.000  |     | 8.0            | 2          |                 |
| 6     | Ø     | PILZ          | 1  | 0.000    | 0.000   | 0.000  |        |     |                | 5          |                 |
| 7     |       | DREHBOHRER    | 1  | 0.000    | 0.000   | 0.000  | 0.000  |     |                | 2          | Gewinde-        |
| 8     | ₿=    | FRAESER       | 1  | 87.833   | 74.621  | 8.000  |        | з   |                | 5          | bohrer          |
| 9     | -     | GEWINDEBOHRER | 1  | 0.000    | 0.000   | 0.000  | 0.000  |     |                | 2          |                 |
| 10    |       |               |    |          |         |        |        |     |                |            | Dreh-<br>bohrer |
| 11    |       |               |    |          |         |        |        |     |                |            |                 |
| 12    |       |               |    |          |         |        |        |     |                |            | 3D-Taster       |
| 13    |       |               |    |          |         |        |        |     |                |            |                 |
| 14    |       |               |    |          |         |        |        |     |                |            | <b>«</b>        |
|       |       |               |    |          |         |        |        |     |                | $[\Sigma]$ | Zurück          |
| The ' | lerk; | Werkz.        |    | 🐋 Ma     | aga-    | Nullp. | R R-Pa | ara |                |            |                 |
|       | Ilst  | Versch        |    |          | 110   T | versch | riet   | er  |                |            |                 |

the input fields for the

Magazin

are activated.

Here, a magazine can be blocked.



The tool status

Werkz. zustand

- that is, whether a tool is blocked or oversize- is displayed here.

| WERKZ  | EUGE    |      |   |    |      |    |                      |           |
|--------|---------|------|---|----|------|----|----------------------|-----------|
| Magaz. | in      |      |   |    |      |    | Magazinplatz sperren | 0         |
| P1.    | Тур     | Werl | <zeugname< td=""><td>DP</td><td>Plat</td><td>z-</td><td>Werkz.</td><td>Alternat.</td></zeugname<> | DP | Plat | z- | Werkz.               | Alternat. |
|        |         |      |   |    | sper | re | zustand              | -         |
| 1      |         | SCH  | RUPPER  | 2  |      |    |                      |           |
| 2      | <u></u> | BOH  | RER   | 1  |      |    | G                    |           |
| 3      | Ø       | SCHI | .ICHTER   | 1  |      |    |                      |           |
| 4      | ,       | GEW: | INDE  | 1  |      |    |                      |           |
| 5      | Ū       | STE  | CHER  | 1  |      |    |                      | Alle      |
| 6      | Ø       | PIL: | z   | 1  |      |    |                      | entladen  |
| 7      |         |      |   |    |      |    |                      |           |
| 8      | ⊠⊨      | FRA  | ESER  | 1  |      |    | U                    | Umsetzen  |
| 9      |         |      |   |    |      |    |                      |           |
| 10     |         |      |   |    |      |    |                      |           |
| 11     |         |      |   |    |      |    |                      |           |
| 12     |         |      |   |    |      |    |                      |           |
| 13     |         |      |   |    |      |    |                      |           |
| 14     |         |      |   |    |      |    |                      |           |
|        |         |      | _   |    |      |    |                      |           |
| W      | erkz    |      | Werkz.  |    |      |    | Aaga- Nullp. R-Para  |           |

### 6.8 Setting Up a New Tool

As an example, the following tool is set up.





In this case, the cursor has to be on a free input field of the tool list.

By pressing the softkey New Tool,



the different tool types are displayed in the vertical softkey bar.

After selecting the tool type Roughing Tool



the tool position is selected.

Since the machining takes place behind the turning center,



### 6.9 The Tool Edge Position

HEDVORUOR

by pressing the softkey



the corresponding edge position is selected.

| P1. | Тур | Werkzeugname | DP | 1. Schne | eide    |        |                   |    |                | # ≈ ≈  | •        |
|-----|-----|--------------|----|----------|---------|--------|-------------------|----|----------------|--------|----------|
|     |     |              |    | Länge X  | Länge Z | Radius |                   |    | Plat.<br>länge | 12     |          |
| 1   |     | SCHRUPPER    | 2  | 55.840   | 39.124  | 0.800  | <del>+</del> 95.0 | 80 | 12.0           | 5      |          |
| 2   | 22  | BOHRER       | 1  | 0.000    | 185.124 | 32.000 | 180.0             |    |                | 2      |          |
| 3   | 0   | SCHLICHTER   | 1  | 123.976  | 57.370  | 0.400  | <del>+</del> 93.0 | 35 | 12.0           | 2      | •        |
| 4   | Ū.  | GEWINDE      | 1  | 66.326   | 33.333  | 0.050  |                   |    |                | ۲<br>C |          |
| 5   | Π   | STECHER      | 1  | 85.124   | 44.124  | 0.200  | 3.000             |    | 8.0            | 2      | •        |
| 6   | Ø   | PILZ         | 1  | 0.000    | 0.000   | 0.000  |                   |    |                | 2      |          |
| 7   |     |              |    |          |         |        |                   |    |                |        |          |
| 8   | ⊠=  | FRAESER      | 1  | 87.833   | 74.621  | 8.000  |                   | 3  |                | 2      |          |
| 9   |     |              |    |          |         |        |                   |    |                |        |          |
| 10  |     |              |    |          |         |        |                   |    |                |        |          |
| 11  |     |              |    |          |         |        |                   |    |                |        | _        |
| 12  |     |              |    |          |         |        |                   |    |                |        | Weitere  |
| 13  |     |              |    |          |         |        |                   |    |                |        |          |
| 14  |     |              |    |          |         |        |                   |    |                |        | <b>«</b> |
| _   |     |              |    |          |         |        |                   |    |                | Γ      | Zurück   |

When selecting the edge position, the tool name of the selected tool type is entered automatically in the name field.

**SCHRUPPER\_80** The new tool is set up.

| WERKZ | EUGE         | :    |                  |    |          |         |                  |                |                 |       |    |                     |
|-------|--------------|------|------------------|----|----------|---------|------------------|----------------|-----------------|-------|----|---------------------|
| Werkz | eugl         | iste |                  |    |          |         |                  |                |                 |       |    |                     |
| P1.   | Тур          | Werk | zeugname         | DP | 1. Schne | eide    |                  |                |                 | 4     | 66 |                     |
|       |              |      |                  |    | Länge X  | Länge Z | ø                |                | N               |       | 12 |                     |
| 1     |              | SCHF | NUPPER           | z  | 55.840   | 39.124  | 0.800            | <del>(</del> 9 | 5.0 80          | 12.0  |    | in<br>Manuell       |
| 2     | 22           | BOHF | RER              | 1  | 0.000    | 185.124 | 32.000           | 18             | 80.0            | 1     |    |                     |
| 3     | Ø            | SCHL | ICHTER           | 1  | 123.976  | 57.370  | 0.400            | ÷ ç            | 93.035          | 12.0  |    | Werkzeug<br>löschen |
| 4     | (I           | GEWI | INDE             | 1  | 66.326   | 33.333  | 0.050            |                |                 | G     |    |                     |
| 5     | Π            | STEC | CHER             | 1  | 85.124   | 44.124  | 0.200            | з.             | 000             | 8.0   |    | Entladen            |
| 6     | Ø            | PILZ | 2                | 1  | 0.000    | 0.000   | 0.000            |                |                 | 1     |    |                     |
| 7     |              |      |                  |    |          |         |                  |                |                 |       |    |                     |
| 8     | ⊠=           | FRAE | ESER             | 1  | 87.833   | 74.621  | 8.000            |                | 3               | 3     |    |                     |
| 9     |              |      |                  |    |          |         |                  |                |                 |       |    |                     |
| 10    |              |      |                  |    |          |         |                  |                |                 |       |    | Schneiden           |
| 11    |              | SCHF | RUPPER_80        | 1  | 0.000    | 0.000   | 0.000            | <del>(</del> 9 | 93.055          | 11.07 |    |                     |
| 12    |              |      |                  |    |          |         |                  |                |                 |       |    | Sortieren           |
| 13    |              |      |                  |    |          |         |                  |                |                 |       |    |                     |
| 14    |              |      |                  |    |          |         |                  |                |                 |       |    |                     |
|       |              |      | _                |    |          |         |                  |                |                 | ĺ     | 2  |                     |
| 1     | erkz<br>List |      | Werkz.<br>versch |    | Ma 👷     | aga-    | Nullp.<br>versch | R              | R-Para<br>meter |       |    |                     |

When working with tools of the same type, unique names should be assigned since duplo tools are generared from tools with the same name without a warning.

### 6.10 Deleting Tools

To delete a tool from the tool list, select the location with the tool.

By pressing the softkey Delete Tool



the softkeys Cancel/Delete are displayed:



By pressing the softkey



The selected tool is deleted from the tool list.

| WERKZ | EUGE          |                  |    |           |         |                  |                 |         |                   |                     |
|-------|---------------|------------------|----|-----------|---------|------------------|-----------------|---------|-------------------|---------------------|
| Werkz | eugl          | iste             |    |           |         |                  |                 |         |                   | O                   |
| P1.   | Тур           | Werkzeugname     | DP | 1. Schne  | ide     |                  |                 |         | 433               | Alternat.           |
|       |               |                  |    | Länge X   | Länge Z | ø                | ۲               | I       | 12                |                     |
| 1     |               | SCHRUPPER        | z  | 55.840    | 39.124  | 0.800            | ← 95.08         | 80 12.0 | 9 Q               | in<br>Manuell       |
| 2     | <u></u>       | BOHRER           | 1  | 0.000     | 185.124 | 32.000           | 180.0           |         | 2                 |                     |
| з     | 0             | SCHLICHTER       | 1  | 123.976   | 57.370  | 0.400            | ÷ 93.03         | 85 12.0 | 9 Q               | Werkzeug<br>löschen |
| 4     | Ū,            | GEWINDE          | 1  | 66.326    | 33.333  | 0.050            |                 |         | ۲                 |                     |
| 5     | U             | STECHER          | 1  | 85.124    | 44.124  | 0.200            | 3.000           | 8.0     | 9 Q               | Entladen            |
| 6     | Ø             | PILZ             | 1  | 0.000     | 0.000   | 0.000            |                 |         | 2                 |                     |
| 7     |               |                  |    |           |         |                  |                 |         |                   |                     |
| 8     | ⊠⊨            | FRAESER          | 1  | 87.833    | 74.621  | 8.000            |                 | 3       | 2                 |                     |
| 9     |               |                  |    |           |         |                  |                 |         |                   |                     |
| 10    |               |                  |    |           |         |                  |                 |         |                   | Schneiden           |
| 11    |               | SCHRUPPER_80     | 1  | 0.000     | 0.000   | 0.000            | ÷ 93.05         | 5 11.0  | 9.5               |                     |
| 12    |               |                  |    |           |         |                  |                 |         |                   | Sortieren           |
| 13    |               |                  |    |           |         |                  |                 |         |                   | _                   |
| 14    |               |                  |    |           |         |                  |                 |         |                   |                     |
|       |               |                  |    |           |         |                  |                 |         | $\mathbf{\Sigma}$ |                     |
|       | lerkz<br>List | Werkz.<br>versch |    | Ma<br>2 Z | in 🔶    | Nullp.<br>versch | R R-Par<br>mete | r       |                   |                     |

| 1. | Тур | Werkzeugname | DP | 1. Schne | ide     |        |                   |    | d    | <b>⇒</b> ≈ |       |
|----|-----|--------------|----|----------|---------|--------|-------------------|----|------|------------|-------|
|    |     |              |    | Länge X  | Länge Z | ø      |                   | Ν  |      | 12         |       |
| 1  |     | SCHRUPPER    | 2  | 55.840   | 39.124  | 0.800  | ÷ 95.0            | 80 | 12.0 | 2          |       |
| 2  | 22  | BOHRER       | 1  | 0.000    | 185.124 | 32.000 | 180.0             | 1  | (    | 2          |       |
| 3  | Ø   | SCHLICHTER   | 1  | 123.976  | 57.370  | 0.400  | <del>+</del> 93.0 | 35 | 12.0 | 2          |       |
| 4  | Ū,  | GEWINDE      | 1  | 66.326   | 33.333  | 0.050  |                   |    | ç    | 2          | -     |
| 5  | Π   | STECHER      | 1  | 85.124   | 44.124  | 0.200  | 3.000             | 1  | 8.0  | 2          |       |
| 6  | Ø   | PILZ         | 1  | 0.000    | 0.000   | 0.000  |                   |    | (    | 2          |       |
| 7  |     |              |    |          |         |        |                   |    |      |            | -     |
| 8  | ⊠=  | FRAESER      | 1  | 87.833   | 74.621  | 8.000  |                   | 3  | (    | 2          |       |
| 9  |     |              |    |          |         |        |                   |    |      |            |       |
| 10 |     |              |    |          |         |        |                   |    |      |            |       |
| 11 |     | SCHRUPPER_80 | 1  | 0.000    | 0.000   | 0.000  | ÷ 93.0            | 55 | 11.0 | 2          | -     |
| 12 |     |              |    |          |         |        |                   |    |      |            | ×     |
| 13 |     |              |    |          |         |        |                   |    |      |            | HDDEU |
|    |     |              |    |          |         |        |                   |    |      |            | 1     |

Please note the tool manufacturer's information. In the case of some manufacturers, active tools can not be deleted.

A tool with several edges is set up as described above.

By pressing the softkey Edges

| WERK2      | EUGE          |                    |    |          |               |                  |                   |           |                |        |                     |
|------------|---------------|--------------------|----|----------|---------------|------------------|-------------------|-----------|----------------|--------|---------------------|
| Werkz      | eugl          | .iste              |    |          |               |                  |                   |           |                |        | O                   |
| P1.        | Тур           | Werkzeugname       | DP | 1. Schne | eide          |                  |                   |           |                | ∯⊰⊰    | Alternat.           |
|            |               |                    |    | Länge X  | Länge Z       | Radius           | 0                 |           | Plat.<br>länge | 12     |                     |
| 1          |               | SCHRUPPER          | 2  | 55.840   | 39.124        | 0.800            | <del>+</del> 95.0 | 80        | 12.0           | 2      | in<br>Manuell       |
| 2          | 222           | BOHRER             | 1  | 0.000    | 185.124       | 32.000           | 180.0             |           |                | 5      |                     |
| 3          | Ø             | SCHLICHTER         | 1  | 123.976  | 57.370        | 0.400            | <del>+</del> 93.0 | 35        | 12.0           | 2      | Werkzeug<br>löschen |
| 4          | Ū             | GEWINDE            | 1  | 66.326   | 33.333        | 0.050            |                   |           |                | ନ<br>ହ |                     |
| 5          | Π             | STECHER            | 1  | 85.124   | 44.124        | 0.200            | 3.000             |           | 8.0            | 5      | Entladen            |
| 6          | Ø             | PILZ               | 1  | 0.000    | 0.000         | 0.000            |                   |           |                | 2      | Encroacin           |
| 7          |               |                    |    |          |               |                  |                   |           |                |        |                     |
| 8          | ₿=            | FRAESER            | 1  | 87.833   | 74.621        | 8.000            |                   | 3         |                | 5      |                     |
| 9          |               |                    |    |          |               |                  |                   |           |                |        |                     |
| 10         |               |                    |    |          |               |                  |                   |           |                |        | Schneiden           |
| 11         |               | SCHRUPPER_80       | 1  | 0.000    | 0.000         | 0.000            | <del>+</del> 93.0 | 55        | 11.0           | 2      |                     |
| 12         |               |                    |    |          |               |                  |                   |           |                |        | Sortieren           |
| 13         |               |                    |    |          |               |                  |                   |           |                |        |                     |
| 14         |               |                    |    |          |               |                  |                   |           |                |        |                     |
|            |               |                    |    |          |               |                  |                   |           |                | Γ      |                     |
| <b>b</b> ' | lerk;<br>list | e Werkz.<br>versch |    | Ma<br>Z  | aga-<br>zin 🔶 | Nullp.<br>versch | R R-Pa            | ara<br>er |                |        |                     |



an input screen form opens where several edges can be defined.

By pressing the softkey New Edge

| Neue     |
|----------|
| Schneide |

an additional edge can be set up for the selected tool.

| WERKZ | EUGE         |      |           |    |          |         |                |       |       |        |      |                   |    |                  |
|-------|--------------|------|-----------|----|----------|---------|----------------|-------|-------|--------|------|-------------------|----|------------------|
| Werkz | eugl         | iste | 2         |    |          |         |                |       |       |        |      |                   | ľ  | D. No. 4         |
| Р1.   | Тур          | Werl | kzeugname | DP | 1. Schne | ide     |                | 4 ~ ~ | 1     | D-ME + |      |                   |    |                  |
|       |              |      |           |    | Länge X  | Länge Z | Plat.<br>länge | 12    |       |        |      |                   |    |                  |
| 1     |              | SCH  | RUPPER    | 2  | 55.840   | 39.124  | 0.800          | ÷     | 95.0  | 80     | 12.0 | 5                 | н  | D-Nr -           |
| 2     | 622          | BOH  | RER       | 1  | 0.000    | 185.124 | 32.000         |       | 180.0 |        |      | 5                 | Ji |                  |
| 3     | 0            | SCHI | LICHTER   | 1  | 123.976  | 57.370  | 0.400          | ÷     | 93.0  | 35     | 12.0 | 5                 | I  | Neue<br>Schneide |
| 4     | σ            | GEW  | INDE      | 1  | 66.326   | 33.333  | 0.050          |       |       |        |      | ç                 | k  | Connorad         |
| 5     | Π            | STE  | CHER      | 1  | 85.124   | 44.124  | 0.200          |       | 3.000 |        | 8.0  | 5                 | Г  |                  |
| 6     | Ø            | PIL  | Z         | 1  | 0.000    | 0.000   | 0.000          |       |       |        |      | 5                 | L  |                  |
| 7     |              |      |           |    |          |         |                |       |       |        |      |                   | Г  |                  |
| 8     | ⊠=           | FRA  | ESER      | 1  | 87.833   | 74.621  | 8.000          |       |       | 3      |      | 5                 | L  |                  |
| 9     |              |      |           |    |          |         |                |       |       |        |      |                   | B  |                  |
| 10    |              |      |           |    |          |         |                |       |       |        |      |                   | L  |                  |
| 11    |              | SCH  | RUPPER_80 | 1  | 0.000    | 0.000   | 0.000          | ÷     | 93.0  | 55     | 11.0 | 5                 | J. |                  |
| 12    |              |      |           |    |          |         |                |       |       |        |      |                   |    |                  |
| 13    |              |      |           |    |          |         |                |       |       |        |      |                   | k  |                  |
| 14    |              |      |           |    |          |         |                |       |       |        |      |                   | ſ  | <b>«</b>         |
|       |              |      |           |    |          |         |                | i     |       |        |      | $\mathbf{\Sigma}$ | ł. | Zurúck           |
| 1     | erkz<br>list |      | Werkz.    |    | Ma       | in 🔶    | Nullp.         | R     | R-Pa  | er     |      |                   | ſ  |                  |

D-Nr + P1. Typ Werkzeugname DP2. Schneide Länge X Länge Z Radius Plat. länge D-Nr 1 SCHRUPPER 2 2 BOHRER 1 🥭 SCHLICHTER Neue Schneide 3 1 GEWINDE 4 1 5 T STECHER 1 6 D PILZ 1 7 8 S= FRAESER 1 9 10 11 📑 SCHRUPPER\_80 0.000 0.000 + 0.0 0 0.000 0.0 1 12 13 14 **«** Zurück  $\mathbf{\Sigma}$ Maga-zin Vullp. R R-Para rkz. Werkz. iste versch b

DP2. Schneide

WERKZEUGE

### 6.11 Sorting the Tools

When calling the tool list and pressing the softkey



four options are displayed for sorting tools: according to the magazine, the name, the type, the Tnumber

| 1. | Тур | Werkzeugname | DP 2 | 2. Schne<br>änge X | ide<br>Länge 7 | Padius |              | Plat  | 1   |         |
|----|-----|--------------|------|--------------------|----------------|--------|--------------|-------|-----|---------|
|    |     |              |      | Junge A            | Longe L        | naaras |              | länge | - 1 | in      |
| 1  |     | SCHRUPPER    | 2    |                    |                |        |              |       | - L | Manuel  |
| 2  | 622 | BOHRER       | 1    |                    |                |        |              |       | - 6 |         |
| 3  | 0   | SCHLICHTER   | 1    |                    |                |        |              |       | - 1 | Verkze  |
| 4  | Ū.  | GEWINDE      | 1    |                    |                |        |              |       | - 6 |         |
| 5  | Π   | STECHER      | 1    |                    |                |        |              |       | - [ | Entlad  |
| 6  | Ø   | PILZ         | 1    |                    |                |        |              |       | - L |         |
| 7  |     |              |      |                    |                |        |              |       | - 6 |         |
| 8  | ⊠=  | FRAESER      | 1    |                    |                |        |              |       |     |         |
| 9  |     |              |      |                    |                |        |              |       |     |         |
| 10 |     |              |      |                    |                |        |              |       |     | Schneic |
| 11 |     | SCHRUPPER_80 | 1    | 0.000              | 0.000          | 0.000  | <b>⊢ 0.0</b> | 0 0.0 |     |         |
| 12 |     |              |      |                    |                |        |              |       | - 1 | Sortier |
| 13 |     |              |      |                    |                |        |              |       |     |         |
| 14 |     |              |      |                    |                |        |              |       | - 5 |         |
| _  |     |              |      |                    |                |        |              |       |     |         |



| erk2 | eugi | .iste        |    |        |            |      |     |        |   |     |   |       |    | nach                                    |
|------|------|--------------|----|--------|------------|------|-----|--------|---|-----|---|-------|----|---|
| Р1.  | Тур  | Werkzeugname | DP | 2. Sch | nnei<br>vi | de   | 7 1 | Padiuc |   |     |   | Plat  |    | Magazir                                 |
|      |      |              |    | Lange  | ^ -        | ange | -   | naurus |   |     |   | länge |    | nach                                    |
| 1    |      | SCHRUPPER    | 2  |        |            |      |     |        |   |     |   |       |    | Name                                    |
| 2    | 622  | BOHRER       | 1  |        |            |      |     |        |   |     |   |       |    |   |
| з    | 0    | SCHLICHTER   | 1  |        |            |      |     |        |   |     |   |       |    | nach<br>Typ                             |
| 4    | Ū    | GEWINDE      | 1  |        |            |      |     |        |   |     |   |       |    | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| 5    | Π    | STECHER      | 1  |        |            |      |     |        |   |     |   |       |    | nach                                    |
| 6    | Ø    | PILZ         | 1  |        |            |      |     |        |   |     |   |       |    | T-Numme                                 |
| 7    |      |              |    |        |            |      |     |        |   |     |   |       |    |   |
| 8    | ⊠=   | FRAESER      | 1  |        |            |      |     |        |   |     |   |       |    |   |
| 9    |      |              |    |        |            |      |     |        |   |     |   |       |    |   |
| 10   |      |              |    |        |            |      |     |        |   |     |   |       |    |   |
| 11   |      | SCHRUPPER_80 | 1  | 0.0    | 00         | 0.00 | 30  | 0.000  | ÷ | 0.0 | 0 | 0.0   |    | -                                       |
| 12   |      |              |    |        |            |      |     |        |   |     |   |       |    |   |
| 13   |      |              |    |        |            |      |     |        |   |     |   |       |    |   |
| 14   |      |              |    |        |            |      |     |        |   |     |   |       |    | "                                       |
| _    |      |              |    |        |            | _    |     | _      |   |     | _ | ſ     | 51 | Zurück                                  |

The active softkey is darkened.



7 Programming with Machining Cycles

Using an example, working with the machining cycles under ShopTurn is described below.


ShopTurn provides three machining cycles.

Machining without radius and chamfer





Machining with radius and chamfer,





Machining with a slope, radius, and chamfer.



For facing the frontal face, the machining cycle is used without radius and chamfer.





The following values are to be entered in the input screen form.

| Т     | SCHRUPPER_80 |  |  |  |  |  |  |
|-------|--------------|--|--|--|--|--|--|
| F     | 0.500 mm/U   |  |  |  |  |  |  |
| ۷     | 350 m/min    |  |  |  |  |  |  |
| Bear  | beitung: ⊽   |  |  |  |  |  |  |
| Lage: |              |  |  |  |  |  |  |
|       | Plan         |  |  |  |  |  |  |
| X0    | 102.000 abs  |  |  |  |  |  |  |
| ZØ    | 2.000 abs    |  |  |  |  |  |  |
| X1    | -1.600 abs   |  |  |  |  |  |  |
| Z1    | 0.000 abs    |  |  |  |  |  |  |
| D     | 2.000 ink    |  |  |  |  |  |  |
| UX    | 0.000 ink    |  |  |  |  |  |  |
| UZ    | 0.000 ink    |  |  |  |  |  |  |



For facing, the value for the depth X-1.6 should correspond to 2x plate radius size (0.8mm) of the tool; because otherwise, material remains in the center.

After accepting the input in the machining plan,





Machining is done again with the same machining cycle, only with machining the

0.000 ink

| Längs        |          | PROG | IAMM              |            | Abspanrichtun   |                |
|--------------|----------|------|-------------------|------------|---|----------------|
|              | -        | Р    |                   |            | Abspanen 1  | Alternat.      |
| SCHRUPPER_80 | C        | )    |                   |            | T SCHRUPPER_80 D<br>F 0.500 mm/U<br>V 350 m/min             | 1<br>Werkzeuge |
| 0.500        | mm/U     | END  | - 7               | +          | Bearbeitung: ⊽  |                |
| 350          | m/min    |      |                   | <b></b>    | Lage:   |                |
| rbeitung:    | $\nabla$ |      |                   |            | X0 102.000 abs<br>Z0 2.000 abs                              |                |
| e:           | <u></u>  |      | <b></b>           | ×1         | X1 60.000 abs   Z1 -60.000 abs   D 2.000 ink   UX 0.000 ink |                |
| Längs        |          |      | Uz                | ļ          | UZ 0.000 ink  |                |
| 102.000      | abs      |      | U <sub>x</sub>    | † T        |   |                |
| 2.000        | abs      |      |                   |            |   | ×              |
| 60.000       | abs      |      |                   |            |   | Abbruch        |
| -60.000      | abs      |      |                   |            |   | Übernahme      |
| 2.000        | ink      | 2    | ierade Bohren Dre | hen Kontur | rāsen Diver- 🔒 Simul  | a NC Abar-     |
| 0.000        | ink      | _    | TIEI2             | arenen 2.  | ses tion  | Deiten         |

The input values can be retained modally. The values entered last appear again in the input screen form after the cycle is called again. Thus, in the example, the correct starting point appears as value in the screen after again calling the cycle for longitudinal machining.

By pressing the softkey Accept



the values in the input screen form are accepted into the machining plan.

Since the workpiece is only to be roughened, the turning operation is done.

Next, center hole is made.

### By pressing the softkey





the input screen form is opened.

| PRO | igram | 1            |          |            |                |            |      |                      |
|-----|-------|--------------|----------|------------|----------------|------------|------|----------------------|
| BOL | ZEN   | · .          |          |            |                |            |      |                      |
| Ρ   | N5    | BOLZEN       |          | Nullpktv.  | 1 G54          |            |      | Bohren<br>Mittig     |
| 3   | N20   | Abspanen     | $\nabla$ | T=SCHRUPPE | R_80 F0.5/U    | V350m Pla  | n    |                      |
| 3   | N25   | Abspanen     | $\nabla$ | T=SCHRUPPE | R_80 F0.5/U    | V350m Läng | gs → | Gewinde<br>Mittig    |
| END |       | Programmende |          | N=1        |                |            |      |                      |
|     |       |              |          |            |                |            |      | Bohren<br>Reiben     |
|     |       |              |          |            |                |            |      | Tief-<br>bohren      |
|     |       |              |          |            |                |            |      | Gewinde              |
|     |       |              |          |            |                |            |      |                      |
|     |       |              |          |            |                |            |      | Positio-<br>nen      |
|     |       | _            | _        | _          | _              | _          | iΣ   | Position<br>wiederh. |
| 2   | Gera  | ade Bohren   | 🚽 Drehen | 📕 Kontur   | <b>F</b> räsen | Diver-     | tion | Abar-                |



### After entering the corresponding values

| т  | BOHRER_10    | D1 |
|----|--------------|----|
| F  | 0.120 mm/U   |    |
| S  | 1200 U/min   |    |
|    |              |    |
|    | Spänebrechen |    |
|    | Schaft       |    |
| ZØ | 0.000 abs    |    |
| Z1 | -20.000 abs  |    |
| D  | 10.000       |    |
| DF | 50.000 %     |    |
| ۷1 | 8.000        |    |
| V2 | 1.000        |    |
| DT | 0.000 s      |    |



and acceptaing them in the machining plan of ShopTurn, the program is done.





### 8 Contour Programming Turning

SIEMENS

After finishing this module, you will be able to follow the operating philosophy of the contour calculator under ShopTurn.

Using an example, the contour calculator and the subsequent machining is described.



### 8.1 Structure of the Contour Calculator

SIEMENS



and



| PRO  | PROGRAMM |                       |                   |                      |  |  |  |  |
|------|----------|-----------------------|-------------------|----------------------|--|--|--|--|
| BOL. | ZEN      |                       |                   | Neue                 |  |  |  |  |
| Р    | N5       | BOLZEN                | Nullpktv. 1 G54 🕞 | Kontur               |  |  |  |  |
| END  |          | Programmende          | N=1               |                      |  |  |  |  |
|      |          |                       |                   | Abspanen             |  |  |  |  |
|      |          |                       |                   | Abspanen<br>Rest     |  |  |  |  |
|      |          |                       |                   | Stechen              |  |  |  |  |
|      |          |                       |                   | Stechen<br>Rest      |  |  |  |  |
|      |          |                       |                   | Stechdreh<br>en      |  |  |  |  |
|      |          |                       |                   | Stechdreh<br>en Rest |  |  |  |  |
|      |          |                       |                   |                      |  |  |  |  |
|      | -        |                       |                   |                      |  |  |  |  |
| 2    | Ger      | ade 🔜 Bohren 🚽 Dreher | Kontur            | Abar-                |  |  |  |  |

an input window is opened where we enter the name of the contour we want to describe.



After entering the name, the contour calculator opens.

First, the starting point of the contour is entered.

In this case, the direct diameter can be entered, without applying a starting chamfer or radius.

The transition at the contour start is defined directly with the starting point.

Ubergang am Konturanf.: FS 0.000 Å Also, the approach strategy to the contour can be selected here.

After accepting the starting point by pressing the softkey Accept,



the contour is described with the softkeys







When the contour is created, it can be generated completely, even if the workpiece is generated later in different machining steps and in different working areas. By pressing the softkey



a straight line in X direction can be defined.

In addition to the input field for the length of the contour element,



Übergang zum Folgeele. FS 0.000

The transition can be defined as chamfer or as radius.



# By pressing the softkey



the input options are expanded.



In addition to the expanded input options -for example, the angle input-

there is also the option to enter an element-related feed function for finishing

| mm/U |  |
|------|--|
| <br> |  |

and the input of a feed for the transition elements .

FB

| FS                      | 0.000                                    | )         |
|-------------------------|--|-----------|
| FRC                     |  | mm/U      |
| Likev<br>allov<br>defir | wise, a grin<br>vance can b<br>ned here. | ding<br>Ə |

| Sch1 | .eifaufmaß: |            |
|------|-------------|------------|
| CA   | 0.000       | $\uparrow$ |



In a free input field, any instructions in the form of G-code can be called.

As a rule, a contour element is defined by determining the end position.

By pressing the softkey



not the endposition of the elements is calculated, but the tangential contact point of two elements. In this way, tangential transitions can be generated.

If the contour calculator calculates several position options, we can select among the different options by using the softkey





#### 8.2 Example of Contour Programming

SIEMENS

The example below provides more detail for working with the contour calculator.



After setting up a program with the name Shaft, the following values are entered in the program header, and accepted.

| Prog | gramml | <pre>copf</pre> |       |      |        |       |          |       |            |          |       |                        |                    |     |
|------|--------|-----------------|-------|------|--------|-------|----------|-------|------------|----------|-------|------------------------|--------------------|-----|
| NPV  | 1      | G54             | mm    |      |        |       |          |       |            |          |       |                        |                    |     |
| Roht | eil:   | Zylind          | er    |      |        |       |          |       |            |          |       |                        |                    |     |
| XA   |        | 90.000          | abs   |      |        |       |          |       |            |          |       |                        |                    |     |
|      |        |                 |       | DDOC | DUN    |       |          |       |            |          |       |                        |                    |     |
| ZA   |        | 2.000           | abs   | PRUC | KHMM   |       |          |       |            |          |       |                        |                    | _   |
| ZI   | -      | 150.000         | abs   | WELL | .E.    |       |          | Werk  | zeugwechs  | elpunkt  | Prog  | Maschinen<br>Trammkonf | koord.syste        | 01+ |
| ZB   | -      | 130.000         | abs   |      |        |       |          |       |            |          | NPV   | 1 G54                  | mm                 | HIC |
| Rück | zug:   | einfac          | h     |      |        |       |          |       |            |          | Roht  | eil: Zyl               | inder              | Nul |
| YPO  |        | 5 000           | ink   |      |        |       |          |       |            |          | XA    | 90.                    | 000 abs            | ve  |
|      |        | 5.000           | THE   |      |        |       |          |       |            |          | ZA    | 2.                     | 000 abs            |     |
| 700  |        | 0.000           |       |      |        | ZI    | ZB       | 2     | A          |          | ZB    | -150.                  | 000 abs<br>000 abs |     |
| ZRH  |        | 2.000           | INK   |      |        |       |          |       | — <b>v</b> |          | Rück  | zug: ein               | fach               |     |
|      |        |                 |       |      |        |       |          |       | A A        |          | XRA   | 5.                     | 000 ink            |     |
|      |        |                 |       |      |        |       |          |       |            |          | ZRA   | 2.                     | 000 ink            |     |
|      |        |                 |       |      |        |       |          |       |            |          |       |                        |                    |     |
|      |        | 1               | MKO   |      |        |       |          |       |            |          |       |                        |                    |     |
| WKZV | ecnse  | erbkt:          | MKS   |      |        |       |          |       |            |          | Wkzw  | echselpkt              | .: MKS             | Wkz |
| XT   |        | 250.000         |       |      |        |       |          |       |            |          | ZT    | 250.                   | 888<br>888         | te  |
| ZT   |        | 100.000         |       |      |        |       |          |       |            |          | Sich  | nerheitsab             | stand:             |     |
| Sich | erhe   | itsəbsta        | nd:   |      |        |       |          |       |            |          | SC    | 1.<br>zablaren:        | 000 ink<br>ven:    | Ab  |
| CC   |        | 4 000           | م     |      |        |       |          |       |            |          | S1    | 3000.                  | 000 U/min          |     |
| ระ   |        | 1.000           | INK   |      |        |       |          |       |            |          |       |                        | (7)                | Übe |
| Dreh | nzahlg | grenzen:        |       |      | Gerade |       |          |       | Kontu      | r –      |       | Dive                   | r- Simul           |     |
| S1   | 3      | 000.000         | U/min | 2    | Kreis  | Bohre | en   📫 D | rehen | 🥏 drehe    | n 🔽 🖷 Fi | rasen | ses                    | tior               |     |



After entering the values, the machining cycle is accepted in the machining plan.

| Abspanen 1 |              |          |  |  |  |  |
|------------|--------------|----------|--|--|--|--|
| т          | SCHRUPPER_80 | D1       |  |  |  |  |
| F          | 0.500 r      | nm/U     |  |  |  |  |
| ۷          | 350 r        | n∕min    |  |  |  |  |
| Bear       | beitung:     | $\nabla$ |  |  |  |  |
| Lage       | •:           |          |  |  |  |  |
|            | Plan         |          |  |  |  |  |
| XØ         | 92.000 a     | abs      |  |  |  |  |
| ZØ         | 2.000 a      | abs      |  |  |  |  |
| X1         | -1.600 a     | abs      |  |  |  |  |
| Z1         | 0.000 a      | abs      |  |  |  |  |
| D          | 2.000 :      | ink      |  |  |  |  |
| UX         | 0.000        | ink      |  |  |  |  |
| UZ         | 0.000        | ink      |  |  |  |  |





Through facing, the plane surface becomes the reference point for the Z-axis.

### Topic: Example of Contour Programming

SIEMENS



and



| PRO    | GRAM        | M                          |           |                  |                |            |                |                      |
|--------|-------------|----------------------------|-----------|------------------|----------------|------------|----------------|----------------------|
| WEL    | LE          |                            |           |                  |                |            |                | Neue                 |
| Р      | N5          | WELLE                      |           | Nullpktv.        | 1 G54          |            |                | Kontur               |
| 1.00 M | N10         | Abspanen                   | V         | T=SCHRUPPER      | R_80 F0.5/U    | V350m Plar | • 🗗 י          |                      |
| END    |             | Programmende               |           | N=1              |                |            |                | Abspanen             |
|        |             |                            |           |                  |                |            |                |                      |
|        |             |                            |           |                  |                |            |                | Abspanen<br>Rest     |
|        |             |                            |           |                  |                |            |                | Stechen              |
|        |             |                            |           |                  |                |            |                | Stechen<br>Rest      |
|        |             |                            |           |                  |                |            |                | Stechdreh<br>en      |
|        |             |                            |           |                  |                |            |                | Stechdreh<br>en Rest |
|        |             |                            |           |                  |                |            |                |                      |
| 2      | Ger:<br>Kre | ade<br>eis <b>e</b> Bohren | La Drehen | Kontur<br>drehen | <b>F</b> räsen | Diver-     | Simula<br>tion | NC Abar-             |



After the name is accepted, the contour calculator opens under ShopTurn.

The first input defines the starting point.



Here, the first diameter of the .finished part contour is described.



The transition at the contour start, programmed at the starting point, is taken into account automatically when the actual machining starting point is calculated.





whose end position is unkown. Only the transition to the subsequent element is known.



The next element is a



After entering the following values

| Kreis |           |     |  |  |  |  |
|-------|-----------|-----|--|--|--|--|
| Dreh  | richtung: | 2   |  |  |  |  |
| R     | 23.000    |     |  |  |  |  |
| Х     | 60.000    | abs |  |  |  |  |
| Z     |           | abs |  |  |  |  |
| Ι     | 80.000    | abs |  |  |  |  |
| ĸ     |           | abs |  |  |  |  |
| α2    |           | •   |  |  |  |  |

a dialog field opens. The contour calculator offers a selection of possible contour geometries that can be selected by pressing the softkey



and accepted by pressing









The following geometry is shown in the "Dialog selection".





After accepting and entering the remaining values,

| Krei | s                  |
|------|--------------------|
| Dreh | richtung: 🤉 🤉      |
| R    | 23.000             |
| Х    | 60.000 abs         |
| Z    | -55.712 abs        |
| Ι    | 80.000 abs         |
| ĸ    | -35.000 abs        |
| α2   | 45.921°            |
|      |                    |
| Über | gang zum Folgeele. |
| R    | 4.000              |
|      |                    |





### The last contour element is a



#### with the value

| Gera | ade Z              |
|------|--------------------|
| Ζ    | -100.000 abs       |
| α2   | 71.565 °           |
| Über | gang zum Folgeele. |
| FS   | 0.000              |



T I A Training Document Status: 01/2010

PROGRAMM The finished part contour has now been Element löschen Ρ  $\oplus$ described, and is 100.000 abs 71.565 ° <u>.</u>  $\sim$ 1 included in the ang zum Folgeele.: 0.000 --/ END machining plan by --pressing the softkey ← END Weiteres ×ø Abbruch Übernahme ÜЬ **I** A I Fräsen Diver-Simula NC Abar Gerade 🚽 Drehe 1 Bohren



The programmed contours under ShopTurn can be changed or supplemented any time.

### 8.3 Contour Machining



Under ShopTurn, the softkey "Machining" exists twice. On the one hand, there is the autonomous cycle "Machining" for facing and longitudinal turning (bracket in the machining plan is not cosed). Then there is the softkey "Machining" in the area "Contouring" (bracket in the machining plan is closed).



without relief cuts

Abspanen

### After entering the corresponding values

| т    | SCHRUPPER_80 | D1       |          |                      |              |          |                                  |               |           |
|------|--------------|----------|----------|----------------------|--------------|----------|----------------------------------|---------------|-----------|
| F    | 0.200        | mm/U     |          |                      |              |          |                                  |               |           |
| 4    | 400          | m/min    |          |                      |              |          |                                  |               |           |
| Beau | beitung:     | $\nabla$ |          |                      |              |          |                                  |               |           |
|      | Längs        |          |          |                      |              |          |                                  |               |           |
|      | Außen        | ←        |          |                      |              |          |                                  |               |           |
|      | 3.000        | ╠╠╪      |          |                      |              |          |                                  |               |           |
| х    | 0.200        |          |          |                      |              |          |                                  |               |           |
|      | 0.200        |          |          |                      |              |          |                                  |               |           |
| 1    | 0.000        |          |          |                      |              |          |                                  |               |           |
| L    | Zylinder     |          |          |                      |              |          |                                  |               |           |
| D    | 90.000       | ink      |          |                      |              |          |                                  |               |           |
| Eine | arenzen :    | nein     |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               |           |
| 1101 | erschnitte:  | nein     |          | PROGRAM              | 1M           |          |                                  |               |           |
|      |              |          |          | WELLE                |              |          |                                  |               |           |
| ı٢   | id accep     | tance    | into the | P N5                 | WELLE        |          | Nullpktv. 1 G54                  |               | Werkzeug  |
| n    | achinina     | nlan     |          | 1. N16               | ) Abspanen   | $\nabla$ | T=SCHRUPPER_80 F0.5/U V350m Plan |               |           |
|      | acriming     | pian,    |          | . ប <sub>ា</sub> N19 | 5 WELLE      |          |                                  |               | Gerade    |
| m    | achining     | was a    | ippende  | 0 🖌 🛛 N26            | 3 Abspanen   | $\nabla$ | T=SCHRUPPER_80 F0.2/U V400m      | $\rightarrow$ |           |
| łn   | the cont     | our T    | ho       | END                  | Programmende |          | N=1                              |               | Kreis     |
| J    |              |          |          |                      | -            |          |                                  |               | Mittelp.  |
| ٥r   | acket is (   | closed   | l.       |                      |              |          |                                  |               | Kunda     |
|      |              |          |          |                      |              |          |                                  |               | Radius    |
|      |              |          |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               | Polar     |
|      |              |          |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               | Anfahren/ |
|      |              |          |          |                      |              |          |                                  |               | Abfahren  |
|      |              |          |          |                      |              |          |                                  |               |           |
| ſ    | - N15 WE     | I.I.E    |          |                      |              |          |                                  |               |           |
| 2    |              |          |          |                      |              |          |                                  |               |           |
|      |              |          |          |                      |              |          |                                  |               |           |
| Se   | N20 OF       | spane    | n        |                      |              |          |                                  |               |           |

The workpiece is machined as follows.

Programmende

END



Cerade Bohren L Drehen Kreis ses Lion Liver-

### 8.4 Contour Machining Residual Material

To machine the remaining material from the circular arc to the finishing allowance, the function



is provided. The residual material is machined with a tool having a different edge geometry; for example, roughing tool 55°









If necessary, this cycle can be performed several times consecutively with different tools.

The last step consists of machining the finish. This is done with the mushroom tool.



By pressing the softkey

|          | Abspanen                                |                        | PROGRAMM<br>MELLE   |
|----------|---|------------------------|---|
| an<br>ma | input is made for<br>chining the finish |                        |   |
|          | Abspanen                                |                        |   |
|          | T PILZ<br>F 0.200 mm<br>V 400 m/        | D1<br>n/U<br>'min      |   |
|          | Bearbeitung:                            | $\nabla \nabla \nabla$ |   |
|          | Längs                                   |                        | / Gerade Bobren   |
|          | Aufmaß:                                 | nein                   |   |
|          | Eingrenzen:                             | nein                   | In the finishing<br>defined directly<br>Advantage: Th<br>manufactured,<br>actual value fo |
|          | Hinterschnitte: <mark>-</mark>          | ja                     |   |
|          |   |                        |   |



In the finishing cycle for finishing the contour, an allowance can be defined directly; for example for fit manufacturing.

Advantage: The value for tool wear remains untouched when a fit is manufactured, for example, and does not have to be reset to the old actual value for subsequent machining.

After accepting the input into the machining plan, the program is complete. It can be simulated and executed.

|              | N5<br>N10 | WELLE        |                        |                                  |                |
|--------------|-----------|--------------|------------------------|----------------------------------|----------------|
| ا ہے!<br>ر س | N10       |              |                        | Nullpktv. 1 G54                  | Neue<br>Kontur |
| ا ر ک        |           | Abspanen     | $\nabla$               | T=SCHRUPPER_80 F0.5/U V350m Plan |                |
|              | N15       | WELLE        |                        |                                  | Abspanen       |
| <u>-</u> -   | N20       | Abspanen     | $\nabla$               | T=SCHRUPPER_80 F0.2/U V400m      | -              |
| <i></i>      | N25       | Restabspanen | $\nabla$               | T=Schrupper_55 F0.2/U V360m      | Abspanen       |
| € L          | N30       | Abspanen     | $\nabla \nabla \nabla$ | T=PILZ F0.2/U V400m              | Rest           |
| ND           |           | Programmende |                        | N=1                              | Stachen        |
|              |           |              |                        |                                  |                |
|              |           |              |                        |                                  | Stechen        |
|              |           |              |                        |                                  | Rest           |
|              |           |              |                        |                                  | Stechdrei      |
|              |           |              |                        |                                  | en             |
|              |           |              |                        |                                  | Stechdrei      |
|              |           |              |                        |                                  | en Rest        |
|              |           |              |                        |                                  |                |
|              |           |              | _                      |                                  |                |
| <b>,</b>     | Gera      | ade Rohmon   | Drohon                 | Kontur Frägen Simu               | la 📧 Abar-     |



### 9 Working with a Raw Part Contour

SIEMENS

In this module, working with a raw part contour under ShopTurn is explained, based on an example.

In practice, the shape of a raw part is often not a cylinder.

If this is the case, the raw part contour can be described under ShopTurn.

By defining a raw and a finished part contour, machining can take place contour-parallel; that is, without idle passes.

The following raw part contour is to be programmed under ShopTurn.



A program with the name Shaft Premachined



| VER | ZEICHNIS              |           |            |         |            |         |                       |
|-----|-----------------------|-----------|------------|---------|------------|---------|-----------------------|
|     | Name                  | Тур       | Geladen    | Größe   | Datum/Ze   | eit     |                       |
| 5   | SHOPTURN.WPD\         |           |            |         |            |         |                       |
|     | BOLZEN                | MPF       | х          | 509     | 16.02.2006 | 11:30   |                       |
|     | WELLENSTUMPF          | MPF       | х          | 158     | 11.01.2006 | 14:43   | Shop lurn<br>Programm |
|     |                       |           |            |         |            |         |                       |
|     |                       |           |            |         |            |         | G-Code<br>Programm    |
|     | Neues ShopTurn Progra | mm        |            |         |            |         |                       |
|     | Bitte geben Sie       | den neuer | n Namen e. | in:     |            |         |                       |
|     | Welle_vo              | rgearbei  | tet        |         |            |         |                       |
|     |                       |           |            |         |            |         |                       |
|     |                       |           |            |         |            |         |                       |
|     |                       |           |            |         |            |         | ×                     |
|     |                       |           |            |         |            |         | Abbruch               |
| Fre | ier Speicher          | Festp     | latte:     | 10 GByt | tes NC:    | 1851200 | ок                    |
| NC  | NC 🕂 Disk A           | ģļ        | Stick      |         |            |         |                       |

After face turning, the raw part contour is programmed.

In this case, there is a special consideraton.

This contour description would be correct for a finished part contour.





The raw part contour has to be closed, and surround the finished part contour.



After accepting the contour in the machining plan, the finished part contour is programmed.



| By accepting the                        | PROGRAMM                          |                                  |                      |
|---|-----------------------------------|----------------------------------|----------------------|
| finished part contour                   | P N5 WELLE_VORGEARBEITET          | Nullpktv. 1 G54                  | Markiere             |
| in the machining plan                   | N10 Abspanen ⊽                    | T=SCHRUPPER_80 F0.5/U V350m Plan |                      |
|   | V م N15 Rohteil:                  | AUSSEN                           | Kopierer             |
| ShopTurn                                | \/ <mark> </mark> N20 Fertigteil: | WELLE                            |                      |
| automatically defines                   | END Programmende                  | N=1                              | Einfügen             |
| automatically defines                   |                                   |                                  |                      |
| the first contour as                    |                                   |                                  | Aus-<br>schneide     |
| the raw part contour                    |                                   |                                  |                      |
| and the second as the                   |                                   |                                  | Suchen               |
| and the second as the                   |                                   |                                  |                      |
| finished part contour.                  |                                   |                                  | Um-<br>benenner      |
|   |                                   |                                  |                      |
| N10 Abspanen                            |                                   |                                  | Neu num-<br>merierer |
| ) (-N15 Robteil:                        |                                   |                                  |                      |
|   |                                   |                                  | Zurück               |
| <b>∖</b> - <mark>N20 Fertigteil:</mark> | Gerade<br>Kreis - Bohren - Drehe  | an 📕 Kontur 🚛 Fräsen 📑 Diver-    | Simula C Abar        |

We have to check that the finished part contour is located within the raw part contour







#### In addition, a



When working with raw part and finished part contours and subsequent longitudinal machining, relief cuts of contours where the tool is not operating move at rapid feed.

### **10 Drilling and Milling Positions**

Drilling and milling positions under ShopTurn are explained, based on an example.



### By pressing the softkey Drill



| rogram     | M                |          |   |                     |
|------------|------------------|----------|---|---------------------|
| IELLE      |                  |          |   | Werkzeug            |
| P N5       | WELLE            |          | Nullpktv. 1 G54                               |                     |
| N10        | Abspanen         | $\nabla$ | T=SCHRUPPER_80 F0.5/U V350m Plan              |                     |
| N15 ך 1    | WELLE            |          |   | Gerade              |
| 🖌 - N20    | Abspanen         | $\nabla$ | T=SCHRUPPER_80 F0.2/U V400m                   |                     |
| ND         | Programmende     |          | N=1   | Kreis<br>Mittelp.   |
|            |                  |          |   | Kreis<br>Radius     |
|            |                  |          |   | Polar               |
|            |                  |          |   | Anfahren<br>Abfahre |
|            |                  |          |   |                     |
|            |                  |          |   |                     |
| Ger<br>Kre | ade<br>is Bohren | Drehen   | Kontur Fräsen Diver-<br>drehen räsen ses tion | a NC Abar           |

#### and Bohren Reiben

for off center machining,

| PRO      | GRAM | 1            |          |            |               |       |      |     |     |          |                  |
|----------|------|--------------|----------|------------|---------------|-------|------|-----|-----|----------|------------------|
| WEL      | LE   |              |          |            |               |       |      |     | T   | Вс       | ohren            |
| Р        | N5   | WELLE        |          | Nullpktv.  | l G54         |       |      |     | _   | M        | ittig            |
| 1        | N10  | Abspanen     | $\nabla$ | T=SCHRUPPE | R_80 F0.5/U   | V350m | Plan |     |     | 0        |                  |
| <u>ل</u> | N15  | WELLE        |          |            |               |       |      |     |     | Ge<br>Mj | winde            |
| -        | N20  | Abspanen     | $\nabla$ | T=SCHRUPPE | R_80 F0.2/U   | V400m |      | E   | •   |          |                  |
| END      |      | Programmende |          | N=1        |               |       |      |     | Т   | Bo       | hren             |
|          |      |              |          |            |               |       |      |     | 1   | Re       | TDEL             |
|          |      |              |          |            |               |       |      |     | 1   | т        | ief-             |
|          |      |              |          |            |               |       |      |     |     | bo       | ohren            |
|          |      |              |          |            |               |       |      |     | 1   | -        |                  |
|          |      |              |          |            |               |       |      |     |     | Ge       | winde            |
|          |      |              |          |            |               |       |      |     |     |          |                  |
|          |      |              |          |            |               |       |      |     |     |          |                  |
|          |      |              |          |            |               |       |      |     | 1   | -        | _                |
|          |      |              |          |            |               |       |      |     | - 6 | Pos      | sitio-           |
|          |      |              |          |            |               |       |      |     |     |          | nen              |
|          |      |              |          |            |               |       |      |     | 18  |          |                  |
|          |      |              |          |            |               |       |      |     |     | Pos      | sition<br>ederh. |
|          | 0    |              |          | I Konton   |               | D.    |      | ιi  |     |          |                  |
| 2        | Kre  | is Bohren    | 💾 Drehen | drehen     | <b>Frasen</b> | 5 D1  | ver- | tio | n   | NU       | HDar-<br>beiter  |
|          |      |              |          |            |               |       |      |     |     |          |                  |

the input screen form is displayed for off center hole machining.

After entering the tool and the technology,

| т | Zentrierer | D1 |
|---|------------|----|
| F | 0.200 mm/U |    |
| S | 1500 U/min |    |



the machining plane

#### Front

Stirn

or

Shell

Mantel

is selected.

In this example, machining on the frontal face is selected.





Since this is a centering task, it can be entered by taking the diameter



into account.



After pressing the softkey



to save the values entered,



shown in the machining plan, as in the case of contour programming.

an open bracket is

By again pressing the softkey





After selecting the tool, the technology and the machining plane, we can select between



After selecting the reference point

|    | Schaft     |
|----|------------|
| Z1 | 10.000 ink |
| DT | 1.000 s    |

and entering the depth and dwell time basically 1 secondthe input values are accepted into the







but not yet closed.

Next, the position for machining is defined.

By pressing the softkey



, the position patterns are opened.
















After entering the values for the holes in the program example





#### and accepting them in the machining plan,



the bracket is closed through the indication of the machining position.

The programmed machining step can be simulated and executed.

| program   | M                    |                                       |                      |
|-----------|----------------------|---------------------------------------|----------------------|
| WELLE     |                      |                                       | Bohren               |
| P N5      | WELLE                | Nullpktv. 1 G54                       | Mittig               |
| N10       | Abspanen 🗸           | T=SCHRUPPER_80 F0.5/U V350m Plan      | Constants            |
| N15 ך ک   | WELLE                |                                       | Mittig               |
| 🐔 🗆 NZE   | Abspanen 🗸           | T=SCHRUPPER_80 F0.2/U V400m           |                      |
| 2 N25 ך   | Zentrieren 🛛         | * T=Zentrierer F0.2/U S1500U ø3       | Bohren               |
| 2 - N36   | Bohren               | ★ T=BOHRER_5 F0.12/U \$1900U Z1=10ink | Reiben               |
| 1 N35     | 001: Lochvollkreis 🛛 | × 20=0 R16 N4 →                       | Tief-                |
| 40        | Programmende         | N=1                                   | bohren               |
|           |                      |                                       | Gewinde              |
|           |                      |                                       | Positio-<br>nen      |
| _         |                      | <u>رين</u>                            | Position<br>wiederh. |
| Ger<br>Kr | ade Bohren 🛃 Drehe   | n 🛃 Kontur 📭 Fräsen 📑 Diver- 📩 Simula | NC Abar-<br>beiter   |



The positions described here are used for hole machining as well as milling with standard cycles.

#### 11 Milling with Standard Milling Cycles

SIEMENS

Standard milling cycles of ShopTurn are explained based on an example.



#### After setting up a program

N5 LOCHPLATTE

Р

END





and pressing the

softkey

the following standard milling cycles are available.





Kreistasche















After selecting the cycle "Rectangular spigot" and entering the values,



| т    | FRAESER_25 D   |
|------|----------------|
| F    | 0.120 mm/Zahn  |
| S    | 1350 U/min     |
|      | Stirn          |
| Bear | rbeitung: ⊽    |
|      | Einzelposition |
|      |                |
| XØ   | 0.000 abs      |
| YØ   | 0.000 abs      |
| ZØ   | 0.000 abs      |
| W    | 90.000         |
| L    | 90.000         |
| R    | 5.000          |
| αØ   | 0.000 °        |
| Z1   | 10.000 ink     |
| DZ   | 2.000          |
| UXY  | 0.000 mm       |
| UZ   | 0.000          |
| W1   | 100.000        |
| L1   | 100.000        |



they are included in the machining plan by pressing the softkey



.

| PRO  | GRAMM           |            |         |                  |           |           |          |                |                       |
|------|-----------------|------------|---------|------------------|-----------|-----------|----------|----------------|-----------------------|
| LOC  | HPLATTE         |            |         |                  |           |           |          |                |                       |
| Р    | N5 LOCH         | PLATTE     | Nu      | illpktv. Ba      | asis G500 |           |          |                | Werkzeug              |
| 1222 | N10 Rech        | teckzapfen | ∇ @+ T= | FRAESER_2        | 5 FØ.12/Z | \$1350U > | (0=0 Y0= | 0 🖂            | _                     |
| END  | Prog.           | rammende   | N=      | -1               |           |           |          |                | Gerade                |
|      |                 |            |         |                  |           |           |          |                |                       |
|      |                 |            |         |                  |           |           |          |                | Kreis<br>Mittelp.     |
|      |                 |            |         |                  |           |           |          |                | Kreis<br>Radius       |
|      |                 |            |         |                  |           |           |          |                | nuulus                |
|      |                 |            |         |                  |           |           |          |                | Polar                 |
|      |                 |            |         |                  |           |           |          |                | Anfahren/<br>Abfahren |
|      |                 |            |         |                  |           |           |          |                |                       |
|      |                 |            |         |                  |           |           |          |                |                       |
|      |                 |            |         |                  |           |           |          |                | _                     |
|      |                 |            |         |                  |           |           |          |                |                       |
|      |                 |            |         |                  |           |           |          | iΣ             |                       |
| 2    | Gerade<br>Kreis | - Bohren   | Drehen  | Kontur<br>drehen | rasen 🖕   | Div<br>Se | er-      | Simula<br>tion | Abar-                 |

The rectangle is created and can be simulated.







the input screen form for pocket milling is displayed. After selecting the cycle for making a rectangular pocket, select the tool and enter the technology data.



F

DZ

UXY

Eintauchen:

υz

FΖ



a bracket opens after the values have been accepted into the machining plan.

2.000

0.100

0.100 mm

mittig

0.100 mm/Zahn







The positons described here are used for hole machining as well as milling with standard cycles.

, selecting the corresponding position pattern and entering the values, the position pattern is accepted in the machining plan by



pressing Accept.

| PROGRAMM                          |       |                 |           |              |
|-----------------------------------|-------|-----------------|-----------|--------------|
| LOCHPLATTE                        | Dee   | Man             | tel/Stirn | U U          |
| P                                 | Pos   | itionen         |           | Alternat.    |
|                                   |       | Stirn           |           |              |
| <u>/////</u>                      |       | rechtwinklig    | 3         | Alle         |
| <u></u> ]                         | ZØ    | 0.000           | abs       | löschen      |
| <mark>.∧'</mark> -'  <b>.</b> ↓   |       |                 |           |              |
| END                               | XØ    | 30.000          | abs       | • /          |
|                                   | YØ    | -25.000         | abs       |              |
|                                   | X1    | 30.000          | abs       |              |
|                                   | Y1    | 25.000          | abs       |              |
|                                   | xz    | -30.000         | abs       |              |
|                                   | Y2    | 25.000          | abs       |              |
|                                   | XЗ    | -30.000         | abs       |              |
| Y <sub>2</sub>                    | Y3    | -25.000         | abs       |              |
| Y <sub>i</sub>                    | X4    |                 | abs       |              |
|                                   | Y4    |                 | abs       |              |
|                                   | X5    |                 | abs       |              |
|                                   | Y5    |                 | abs       |              |
|                                   | хө    |                 | abs       | ×            |
|                                   | YG    |                 | abs       | Abbruch      |
|                                   | X7    |                 | abs       |              |
|                                   | Y7    |                 | abs       | $\checkmark$ |
|                                   |       |                 | (T)       | Übernahme    |
|                                   |       |                 |           |              |
| Kreis Bohren Drehen Kontur drehen | rāser | n Diver-<br>ses | tion      | beiten       |



The bracket is closed.

| PRO         | Gram  | 1         |           |       |     |  |                       |
|-------------|-------|-----------|-----------|-------|-----|--|-----------------------|
| LOC         | IPLAT | ITE       |           |       |     |  | Werkzeug              |
| Р           | N5    | LOCHE     | PLATTE    |       |     | Nullpktv. Basis G500                   | merneoug              |
| 222         | N10   | Recht     | Leckzapfe | n ⊽   | ⊡+  | T=FRAESER_25 F0.12/Z \$1350U X0=0 Y0=0 |                       |
| ////<br>/// | N15   | Recht     | tecktasch | e ⊽   | ⊡+  | T=FRAESER_8 F0.1/Z S2000U Z1=30ink     | Gerade                |
| <u>-</u>    | N20   | 001:      | Position  | en    | œ۲  | Z0=0 X0=30 Y0=-25 X1=30 Y1=25 X2=-30   |                       |
| IND         |       | Prog      | ammende   |       |     | N=1                                    | Kreis                 |
|             |       |           |           |       |     |  | nirecorp              |
|             |       |           |           |       |     |  | Kreis<br>Radius       |
|             |       |           |           |       |     |  |                       |
|             |       |           |           |       |     |  | Polar                 |
|             |       |           |           |       |     |  | Anfahren/<br>Abfahren |
|             |       |           |           |       |     |  |                       |
|             |       |           |           |       |     |  | -                     |
|             |       |           |           |       |     |  |                       |
|             |       |           |           | _     |     | []>                                    |                       |
| Ø           | Gera  | ade<br>is | 🕳 Bohren  | 🚽 Dre | hen | 📕 Kontur 📲 Fräsen 📑 Diver- 📩 Simula    | NC Abar-              |
|             |       |           |           |       |     |  |                       |

As the last machining step, the two circular pockets are programmed.

After calling the corresponding cycle, here also machining takes place with the "Position pattern".

| Т    | FRAESER_8 |            |          | D1 |
|------|-----------|------------|----------|----|
| F    | 0.:       | 100        | mm/Zah   | n  |
| S    | 15        | 500        | U/min    |    |
|      | Stirn     |            |          |    |
| Bear | beitung:  |            | $\nabla$ |    |
|      | Position  | ารคเ       | ıster    |    |
|      |           |            |          |    |
|      |           |            |          |    |
|      |           |            |          |    |
|      |           |            |          |    |
| ø    | 25.0      | 300        |          |    |
| Z1   | 10.0      | 900        | ink      |    |
| DXY  | 40.0      | <b>900</b> | %        |    |
| DZ   | 3.0       | 900        |          |    |
| UXY  | 0.0       | 300        | mm       |    |
| UZ   | 0.0       | <b>900</b> |          |    |
| Eint | auchen:   | mj         | ittig    |    |
| FZ   | 0.:       | 100        | mm/Zah   | n  |
|      |           |            |          |    |





After entering the values, the cycle is accepted into the machining plan.

After entering the corresponding position, the program done.

|    | Stirn        |
|----|--------------|
|    | rechtwinklig |
| ZØ | 0.000 abs    |
|    |              |
| XØ | 0.000 abs    |
| YØ | 25.000 abs   |
| X1 | 0.000 abs    |
| Y1 | -25.000 abs  |



#### 12 Face Milling with Free Contour Input

Face milling with free contour input under ShopTurn is explained, based on an example.







In this example, the contour of a kidney is to leap out as an "island". For that reason, two contours have to be defined:

Boundary contour

First, a boundary contour that surrounds the raw part in the example, and then the contour in the form of a kidney. The hatched area between the two contours is to be machined.



First, the boundary contour is described.

The starting point is entered "radius related".



The boundary contour should have a larger diameter than the raw part so that no burr remains.

However, the diameter should not be too large since the outer path represents the longest machining path.



The machine manufactorer/commissioning engineer can freely define the coordinate cross in the contour calculator. This has to be taken into account during programming.

and accepting the values into the machining plan, next another contour is set up.

Bitte geben Sie den neuen Namen ein

Niere

| NIER | E   |           |         |           |         |         |          |    |      |          |
|------|-----|-----------|---------|-----------|---------|---------|----------|----|------|----------|
| Ρ    | N5  | NIERE     |         |           | Nullp   | ktv. Ba | asis G50 | 30 |      |          |
| Σı   | N10 | NIERE_GR  | ENZE    | 0+        |         |         |          |    | 6    | <u> </u> |
| END  |     | Programme | ende    |           | N=1     |         |          |    |      |          |
|      |     |           |         |           |         |         |          |    |      |          |
|      |     |           |         |           |         |         |          |    |      |          |
|      | _   |           |         |           |         |         |          |    | <br> |          |
|      | Ne  | ue Kontur |         |           |         |         |          |    |      |          |
|      |     | Bitte     | geben : | Sie den m | neuen M | lamen e | in:      |    |      |          |
|      |     |           | -       | _         |         |         |          |    |      |          |
|      |     |           | Nier    | 9         |         |         |          |    |      |          |
|      |     |           |         |           |         |         |          |    | <br> |          |
|      |     |           |         |           |         |         |          |    |      |          |
|      |     |           |         |           |         |         |          |    |      |          |
|      |     |           |         |           |         |         |          |    |      | АЫ       |
|      |     |           |         |           |         |         |          |    |      |          |
|      |     |           |         |           |         |         |          |    | <br> |          |
|      |     |           |         |           |         |         |          |    |      |          |

#### After entering the contour starting point

| Star | tpunkt  |    |
|------|---------|----|
|      | Stirn   |    |
|      |         |    |
|      |         |    |
| Х    | 29.000  | ab |
| Y    | -20.000 | ab |
|      |         |    |



#### the milling contour is generated by means of these four softkeys





as in the case of the contour description for turning.

Element 1





Element2





#### Element3





#### Element 4





#### The contour is done and by pressing the softkey









The following options are provided for machining milling contours.









Zapfen fräsen





т

F

s

ZØ

Z1 DXY

DZ

UXY

UZ

Abhebemodus: auf Rückzugsebene

40.000 %

2.500

0.000

, these actions are included in the machining plan and can be simulated.

0.000 mm



|         |               |      |                                  |        | Werkzeu  |
|---------|---------------|------|----------------------------------|--------|--|
| P N5    | NIERE         |      | Nullpktv. Basis G500             |        | HOLKEUG  |
| 10 ך 🗅  | NIERE_GRENZE  | 0+   |                                  |        |  |
| ) - N15 | NIERE         | ⊡+   |                                  |        | Gerade   |
| ] 1 N20 | Zapfen Fräsen | ⊽ 0+ | T=FRAESER_12 F0.2/Z \$1350U Z0=0 | $\Box$ | -  |
| ND      | Programmende  |      | N=1                              |        | Kreis  |
|         |               |      |                                  |        | HICCOIP  |
|         |               |      |                                  |        |  |
|         |               |      |                                  |        | Kreis  |
|         |               |      |                                  |        | Kreis<br>Radius                                |
|         |               |      |                                  |        | Kreis<br>Radius                                |
|         |               |      |                                  |        | Kreis<br>Radius<br>Polar                       |
|         |               |      |                                  |        | Kreis<br>Radius<br>Polar                       |
|         |               |      |                                  |        | Kreis<br>Radius<br>Polar<br>Anfahre<br>Abfahre |

The milling strategy of ShopTurn looks like this: Milling starts outside the programmed boundary contour. The machining pattern corresponds to the final pattern of the "island contour", only on a larger scale. Machining continues up to the final dimension. By using this strategy, even hard and tough materials can be "peeled" to the desired finishing dimension.

#### **13 Delimitation and Counter Spindle**

Delimitation and machining with a counter spindle under ShopTurn is explained based on an example.



The following is to be noted regarding the workpiece called "Fitted Shaft" <<?>>:

During finishing, the marked area is to be machined with a special tool.

This special tool is a mushroom. The radii generated at the contour transitions are within the tolerance.







| Eingr | enzen:  | ja  |
|-------|---------|-----|
| XA    |         | abs |
| XB    |         | abs |
| ZA    | -30.000 | abs |
| ZB    |         | abs |

| After entering the program name  | VERZEICHNIS<br>Name Typ Geladen Größe Datum/Zeit<br>L\ GEGENSPINDEL.WPD\     |  |
|--|--|--|
| Fitted Shaft   |  | ShopTurn<br>Programm<br>G-Code<br>Programm |
| Neues ShopTurn Programm<br>Bitte geben Sie den neuen Namen ein:<br>Passvelle | Neues ShopTurn Programm<br>Bitte geben Sie den neuen Namen ein:<br>Passwelle |  |
|  | Freier Speicher Festplatte: 12 GBytes NC: 1572264                            | Abbruch                                    |
| are entered in the   | NC Disk A Dig Stick  |  |

|      | Si     | cherhei  | tsabstan |
|------|--------|----------|----------|
| Prog | ıramml | opf      |          |
| NPV  | 1      | G54      | mm       |
| Roht | eil:   | Zylind   | ler      |
| XA   |        | 80.000   | abs      |
|      |        |          |          |
| ZA   |        | 2.000    | abs      |
| ZI   | -      | 130.000  | abs      |
| ZB   | -      | 110.000  | abs      |
| Rück | zug:   | einfac   | :h       |
| XRA  |        | 2.000    | ink      |
|      |        |          |          |
| ZRA  |        | 2.000    | ink      |
|      |        |          |          |
|      |        |          |          |
| Wkzw | echse  | elpkt:   | WKS      |
| ХТ   |        | 250.000  | abs      |
| ZT   |        | 200.000  | abs      |
| Sich | erhe:  | itsabsta | and:     |
| SC   |        | 1.000    | ink      |
| Dreh | zahlg  | renzen   | :        |
| S4   | 3      | 500.000  | U/min    |
| \$3  | 3      | 500.000  | U/min    |

program header.



The frontal face is faced using the machining cycle.

No finishing allowance is defined.

|      | Be           | zugspu   | nkt |
|------|--------------|----------|-----|
| Absp | oanen 1      |          |     |
| т    | SCHRUPPER_80 |          | D1  |
| F    | 0.230        | mm/U     |     |
| ٧    | 450          | m/min    |     |
| Bear | beitung:     | $\nabla$ |     |
| Lage | <b>:</b>     | <u>,</u> |     |
|      | Plan         |          |     |
| XØ   | 81.000       | abs      |     |
| ZØ   | 2.000        | abs      |     |
| X1   | -1.600       | abs      |     |
| Z1   | 0.000        | abs      |     |
| D    | 2.000        | ink      |     |
| UX   | 0.000        | ink      |     |
| UZ   | 0.000        | ink      |     |



| Werkz | eugl | iste         |    |          |         |        |        |    |                |    |
|-------|------|--------------|----|----------|---------|--------|--------|----|----------------|----|
| P1.   | Тур  | Werkzeugname | DP | 1. Schne | ide     |        |        |    |                | щ: |
|       |      |              |    | Länge X  | Länge Z | Radius | 0      |    | Plat.<br>länge |    |
| 1     |      | SCHRUPPER_80 | 1  | 100.000  | 100.000 | 0.800  | ÷ 95.0 | 80 | 11.0           | 5  |

Machining is to be done with a roughing tool.





The input can be checked with a simulation.



After entering the contour and accepting it into the machining plan, the bracket has opened.





For the bracket to be closed, the machining for the generated contour has to be specified next.

The machining cycle for contouring is selected.

In this case, the changing cutting depth is selected.





For changing cutting depths, the value for the adjustment is conical.

D 2.000

By selecting the changing cutting depth, the point on the tool tip where the greatest wear takes place is shifted.

The friction is distributed over a larger area of the tip. The result is a longer life for the tip.



form,

т

F

s

D

υx

υz

DI

XD

ZD

Eingrenzen:

After entering the PROGRAMM values in the screen Ρ SCHRUPPER 80 Di <u>,</u> 0.200 mm/U 400 U/min ע ען eitung: SCHRUPPER 80 D1 END Längs 0.200 mm/U Auß 400 U/min D 2.000 😫 🚝 🚍 Bearbeitung:  $\nabla$ . 200 . 200 . 000 UX UZ DI BL XD ZD Eii 0. 0. 0. Längs Zylin Außen 72.000 abs 2.000 ink 2.000 🎼 🙀 🗧 nein 0.200 Abbruch 0.200 Hinterschnitte: nein 0.000 Übernahm BL Zylinder 72.000 abs \_\_\_ Dref 📕 Kontur 📷 Fräsen 📑 Diver-Simula NC Abar-

Hinterschnitte: nein

2.000 ink

nein



it can be checked with a simulation.

Since for roughing the workpiece an  $80\,^\circ$ insert is used, machining takes place without relief cutting.







It has to be noted that during residual machining, the correct cycle is selected for the tool that is used respectively.

Example: Roughing tool 55°





| т    | STECHER 3 | D1       |
|------|-----------|----------|
| FX   | . 120     | mm/U     |
| FZ   | 0.110     | mm/U     |
| V    | 90        | m/min    |
| Bear | beitung:  | $\nabla$ |
|      | Längs     |          |
|      | Außen     |          |
| D    | 2.000     |          |
|      |           |          |
|      | 0.000     |          |
| UX   | 0.200     |          |
| U2   | 0.200     |          |
| DI   | 0.000     |          |
| Eing | renzen:   | nein     |
|      |           |          |
| Ν    | 1         |          |
|      |           |          |





residual material machining is shown in the simulation.



Next, finishing follows.



This machining is done with the active tool.



After calling the grooving lathe cycle

and pressing the softkey





STECHER\_3

T FX

the function delimitation in this input screen form is used.

0.150 mm/U

D1





By starting the simulation, the travel movement is shown with the delimitation.



The same cycle is called again (this can also be done with the function "Copy").



Only the values for delimiting are changed.

| Eing | renzen: | ja  |
|------|---------|-----|
| XA   |         | abs |
| XB   |         | abs |
| ZA   |         | abs |
| ZB   | -55.000 | abs |
| Ν    | 1       |     |
|      |         |     |









this tool is called in the screen form for machining.

Here also, the machining area is delimited.



| Eing | renzen: | ja  |
|------|---------|-----|
| XA   |         | abs |
| XB   |         | abs |
| ZA   | -55.000 | abs |
| ZB   | -30.000 | abs |
| N    | 1       |     |



As the last machining step on the main spindle, a groove is made with the grooving tool.



After entering the values

| т    | STECHER_3                | D   |  |  |  |  |  |
|------|--------------------------|-----|--|--|--|--|--|
| F    | 0.120 mm/U               |     |  |  |  |  |  |
| V    | 80 m/min                 |     |  |  |  |  |  |
| Bear | Bearbeitung: \vec{V+VVV} |     |  |  |  |  |  |
| Lage | :                        | L L |  |  |  |  |  |
| XØ   | 37.000                   | abs |  |  |  |  |  |
| ZØ   | -62.000                  | abs |  |  |  |  |  |
| B1   | 5.000                    | ink |  |  |  |  |  |
| T1   | 27.000                   | abs |  |  |  |  |  |
| α1   | 0.000                    | •   |  |  |  |  |  |
| α2   | 0.000                    | •   |  |  |  |  |  |
| FS1  | 1.000                    |     |  |  |  |  |  |
| R2   | 0.500                    |     |  |  |  |  |  |
| R3   | 0.500                    |     |  |  |  |  |  |
| R4   | 0.000                    |     |  |  |  |  |  |
| D    | 2.000                    | ink |  |  |  |  |  |
| U    | 0.200                    | ink |  |  |  |  |  |
| N    | 1                        |     |  |  |  |  |  |

and accepting them into the machining plan, machining on the main spindle is completed.





To machine with the counter spindle, first the chuck of the spndle and the jaw type have to be defined.

We access the corresponding screen form by pressing the softkey

| WERKZ | EUGE |       |               |      |    |        |        |      |        |     |       |      |     |            | _          |   |   |
|-------|------|-------|---------------|------|----|--------|--------|------|--------|-----|-------|------|-----|------------|------------|---|---|
| Werkz | eugl | iste  |               |      |    |        |        |      |        |     |       |      |     |            |            |   |   |
| P1.   | Тур  | Werka | zeugname      |      | DP | 1. Sch | neide  |      |        |     |       |      |     | 4          | もも         |   |   |
|       |      |       |               |      |    | Länge  | X Läng | ge Z | Radius |     |       |      |     |            | 12         |   |   |
| 1     |      | SCHR  | UPPER_80      |      | 1  | 100.00 | 90 100 | .000 | 0.80   | 9 ← | 95.6  | 9 80 | 11. | <b>0</b> 5 |            |   |   |
| 2     | 0    | SCHL  | ICHTER_3      | 5    | 1  | 100.00 | 90 100 | .000 | 0.400  | 9 ← | 93.6  | 35   | 11. | <b>0</b> 2 |            |   |   |
| 3     |      | SCHR  | UPPER_04      |      | 1  | 0.00   | 90 0   | .000 | 0.400  | 9 t | 93.6  | 9 55 | 5.  | <b>0</b> 5 |            |   |   |
| 4     | 0    | SCHL  | ICHTER_s      | tirn | 1  | 100.00 | 90 100 | .000 | 0.400  | 9 t | 93.6  | 35   | 11. | <b>0</b> 2 |            | - |   |
| 5     | =8   | FRAE  | SER_3         |      | 1  | 100.00 | 90 100 | .000 | 3.000  | 3   |       | 3    |     | ହ          |            |   |   |
| 6     | 22   | BOHR  | ER_5          |      | 1  | 100.00 | 90 100 | .000 | 5.000  | 3   | 118.6 | 9    |     | 2          |            |   |   |
| 7     | Π    | STEC  | HER_3         |      | 1  | 100.00 | 90 100 | .000 | 0.10   | 3   | 3.000 | 3    | 8.  | <b>0</b> 2 |            |   | _ |
| 8     | Ð    | PILZ  | _5            |      | 1  | 0.00   | 90 O   | .000 | 2.50   | 3   |       |      |     | 2          |            |   |   |
| 9     | =8   | GRAV  | URFRAESE      | R    | 1  | 100.00 | 90 100 | .000 | 0.200  | 3   |       | 2    |     | ç          |            |   |   |
| 10    |      | STEC  | HER_Stir      | n    | 1  | 100.00 | 90 100 | .000 | 0.200  | 9   | 2.500 | 3    | 8.  | <b>0</b> 2 |            |   |   |
| 11    | 22   | BOHR  | ER24          |      | 1  | 100.00 | 90 100 | .000 | 22.000 | 3   | 180.0 | 3    |     | ହ          |            |   |   |
| 12    | Ø    | SCHL  | ICHTER_i      |      | 1  | 100.00 | 90 100 | .000 | 0.400  | 9 ← | 93.6  | 35   | З.  | <b>0</b> 2 |            |   |   |
| 13    |      |       |               |      |    |        |        |      |        |     |       |      |     |            |            | - |   |
| 14    |      |       |               |      |    |        |        |      |        |     |       |      |     |            |            |   |   |
|       |      |       |               |      |    |        |        |      |        |     |       |      |     | D          | •          |   |   |
|       |      | 0     | Spin-<br>deln |      |    |        |        |      |        |     |       |      | DEF | Anw<br>der | en-<br>dat |   |   |





and the chuck of the counter spindle, Drehzahlgrenze: S3 1000.000 U/min



|     | Backenart |     |
|-----|-----------|-----|
| ZL1 | 0.000     | ink |
| ZL2 | 0.000     | ink |
|     |           |     |

After entering the values, the corresponding input screen form is opened



Drehzahlgrenze: S3 0.000 U/min

Backenart

0.000 ink

0.000 ink

ZL1

ZL2

by pressing the softkey

|     | Backenart  |
|-----|------------|
| ZL1 | 10.000 ink |
| ZL2 | 30.000 ink |







| Komp | lett    |     |
|------|---------|-----|
| Grei | fen:    | MKS |
| XP   | 300.000 |     |
| ZP   | 200.000 |     |
|      |         |     |

When positioning the workpiece, it is advisable to use the coordinates of the tool change point in the program header for the park position, in order to obtain a defined travel movement.



After entering the remaining values

| Komp       | let  | t         |        |  |
|------------|------|-----------|--------|--|
| Grei       | fen  | :         | MKS    |  |
| XP         |      | 300.000   |        |  |
| ZP         |      | 200.000   |        |  |
| Futt       | er : | spülen:   | nein   |  |
| ×          |      |           |        |  |
|            |      |           |        |  |
| α1         |      | 30.000    | •      |  |
| Z1         |      | -100.000  | abs    |  |
| ZR         |      | 1.000     | ink    |  |
| FR         |      | 50.000    | mm/min |  |
| Fest       | anso | chlag:    | ja     |  |
| Zieh       | en:  |           |        |  |
| Roht       | eil  | ziehen:   | nein   |  |
|            |      |           |        |  |
| Abst       | icha | zyklus:   | ja     |  |
| Rückseite: |      |           |        |  |
| Null       | punl | ktverschi | ebung: |  |
|            |      | 3         | G56    |  |
| Z3W        |      | 0.000     | abs    |  |
| ZV         |      | -120.000  | ink    |  |



the input is accepted into the machining plan.

The zero point shift can be selected freely.

| Nullpunktverschiebung: |          |     |
|------------------------|----------|-----|
|                        | 3        | G56 |
| Z3W                    | 0.000    | abs |
| ZV                     | -120.000 | ink |

The value Z3W defines the machining position of the counter spindle in reference to the machine zero point. If no value is entered, machining takes place with the maximum possible distance to the machine zero point.

| Since in the input    |
|-----------------------|
| screen form, the      |
| question about a cut- |
| off cycle was         |
| answered with         |
| yes                   |

Abstichzyklus: ja
### a bracket opens in the machining plan.

| <b></b> | N590 | Gegenspindel |
|---------|------|--------------|
|         |      |              |

After opening the input screen form for the cut-off cycle and entering the values,

| PRO  | igramm       |                          |                        |  |                       |
|--|--------------|--------------------------|------------------------|--|-----------------------|
| PAS  | SELLE        |                          |                        |  | Marke                 |
| Ρ  | N5           | PASSELLE                 |                        | Nullpktv. 1 G54                              | setzen                |
| <u>_</u>   | N10          | Abspanen                 | $\nabla$               | T=SCHRUPPER_80 F0.2/U V750m Plan             |                       |
| J.   | N75          | WELLE_MIT_PASS           | _aussen                |  | Wieder-<br>holung     |
| M  | N80          | Abspanen                 | $\nabla$               | T=SCHRUPPER_80 F0.2/U S400U                  | _                     |
| de la compañía de la comp | N395         | Reststechdreh            | $\nabla$               | T=STECHER_3 F0.12/U V90m                     | Unter-                |
| ×  | N460         | Stechdrehen              | $\nabla \nabla \nabla$ | T=STECHER_3 F0.15/U V88m                     | programm              |
| 1  | N575         | Stechdrehen              | $\nabla \nabla \nabla$ | T=STECHER_3 F0.15/U V88m                     | Vorrich-              |
| ×  | N580         | Stechdrehen              | $\nabla \nabla \nabla$ | T=PILZ_5 F0.15/U V88m                        | tungen                |
| 3.E  | N585         | Einstich                 | ∇+∇∇∇                  | T=STECHER_3 F0.12/U V80m X0=37               | Gogon                 |
| <b>-1</b> -  | N590         | Gegenspindel             |                        | Komplett Nullpktv. 3 G56 📃                   | spindel               |
| END  |              | Programmende             |                        | N=1  |                       |
|  |              |                          |                        |  |                       |
|  |              |                          |                        |  | -                     |
|  |              |                          |                        |  | Einstel-<br>lungen    |
|  |              |                          |                        |  |                       |
|  | _            |                          | _                      | 00   | Transfor-<br>mationen |
| 2  | Gera<br>Krei | de<br>s <b>e-</b> Bohren | La Drehen              | J Kontur<br>drehen Fräsen Biver-<br>ses tion | Abar-                 |

| Т  | STECHER_3      | D |
|----|----------------|---|
| F  | 0.150 mm/U     |   |
| V  | 60 m/min       |   |
| SV | 2500.000 U/min |   |
| XØ | 70.000 abs     |   |
| ZØ | -120.000 abs   |   |
| FS | 1.000          |   |
| X1 | 15.000 abs     |   |
| FR | 0.050 mm/U     |   |
| SR | 200.000 U/min  |   |
|    |                |   |
| X2 | -2.000 abs     |   |
|    |                |   |

the bracket is closed through acceptance in the machining plan.





The machining can be tested in the simulation.



First, a hole is made on the back side, so that in the next machining step, the inside contour can be machined.

A drill with a diameter of 18mm is set up.





After the drill is set up, the screen form for drilling in the center is opened and the following values are entered.

| Boh | ren Mittig   |   |
|-----|--------------|---|
| т   | BOHRER_18    | C |
| F   | 0.110 mm/U   |   |
| S   | 2250 U/min   |   |
|     |              |   |
|     | Spänebrechen |   |
|     | Schaft       |   |
| ZØ  | 0.000 abs    |   |
| Z1  | 10.000 ink   |   |
| D   | 5.000        |   |
| DF  | 100.000 %    |   |
|     |              |   |
| ٧2  | 4.000        |   |
| DT  | 0.000 s      |   |
|     |              |   |



The input can be checked with the simulation.



Next, the contour for rear machining is set up.

Bitte geben Sie den neuen M Passwelle\_hinten PROGRAMM

| t    | Р                  | N5    | PASSELLE                 |                        | Nullpktv. 1      | G54       |              |        |          |
|------|--------------------|-------|--------------------------|------------------------|------------------|-----------|--------------|--------|----------|
|      |                    | N10   | Abspanen                 | $\nabla$               | T=SCHRUPPER      | _80 F0.2/ | /U V750m Pla | an     |          |
|      | νı                 | N75   | WELLE_MIT_PASS_          | AUSSEN                 |                  |           |              |        |          |
|      | <b>M</b> -         | N80   | Abspanen                 | $\nabla$               | T=SCHRUPPER      | _80 F0.2/ | 'U S400U     |        |          |
|      | <i></i>            | N395  | Reststechdreh            | $\nabla$               | T=STECHER_3      | FØ.12/U   | V90m         |        |          |
|      | ₩-                 | N460  | Stechdrehen              | $\nabla \Delta \Delta$ | T=STECHER 3      | FØ.15/U   | V88m         |        |          |
|      | ¥]                 | nea   | Bitte geben Si           | ie den ne              | uen Namen e:     | in:       |              |        |          |
|      | .∭<br>□ <b>1</b> 1 |       | Passwe                   | elle_hint              | en               |           |              |        |          |
| ein: | ZE ┛               | 1373  | HDSTICN                  |                        | I=STECHER_S      | F0.13/0   | 100H L91 Y   | 9=70   |          |
|      | 22                 | N600  | Bohren Mittig            | 0+                     | T=BOHRER_18      | F0.11/U   | S2250U Z0=0  | a 🗗    |          |
|      | END                |       | Programmende             |                        | N=1              |           |              |        |          |
|      |                    |       |                          |                        |                  |           |              |        | Abbruch  |
|      |                    | _     |                          | _                      |                  | _         |              |        | ок       |
|      | 2                  | Gerad | de<br>s <b></b> Bohren 🛃 | Drehen                 | Kontur<br>drehen | 🕳 Fräsen  | Diver-       | Simula | NC Abar- |

The contour is described in the usual direction.

Working on the counter spindle is not taken into account for contour programming.

After the contour is described,



| the following tool is set |       | EUGE  |                  |    |          |         |         |       |          |               |      |                     |
|---------------------------|-------|-------|------------------|----|----------|---------|---------|-------|----------|---------------|------|---------------------|
|                           | Werkz | eugli | iste             |    |          |         |         |       |          |               |      | 0                   |
| up for internal machining | P1.   | Тур   | Werkzeugname     | DF | 1. Schne | aide    |         |       |          | #             | 33   | Alternat.           |
|                           |       |       |                  |    | Länge X  | Länge Z | Radius  | 27    | P1<br>18 | .at.<br>inge  | 12   | inc                 |
|                           | 2     | 0     | SCHLICHTER_35    | 1  | 100.000  | 100.000 | 0.400 ( | 93.0  | 35 :     | 11.02         |      | Programm            |
|                           | 3     |       | SCHRUPPER_04     | :  | 0.000    | 0.000   | 0.400 1 | 93.0  | 55       | 5.0Q          |      | _                   |
|                           | 4     | Ø     | SCHLICHTER_stirn | 1  | 100.000  | 100.000 | 0.400   | 93.0  | 35 :     | <b>11.0</b> ຈ |      | Werkzeug<br>löschen |
|                           | 5     | =     | FRAESER_3        |    | 100.000  | 100.000 | 3.000   |       | 3        | ହ             |      |                     |
|                           | 6     | 220   | BOHRER_5         | :  | 100.000  | 100.000 | 5.000   | 118.0 |          | 5             |      | Entladen            |
|                           | 7     | Ū     | STECHER_3        | 1  | 100.000  | 100.000 | 0.100   | 3.000 |          | 8.02          |      |                     |
|                           | 8     | Ø     | PILZ_5           | :  | 0.000    | 0.000   | 2.500   |       |          | 2             |      |                     |
| ¥                         | 9     | =     | GRAVURFRAESER    | 1  | 100.000  | 100.000 | 0.200   |       | 2        | ହ             |      |                     |
|                           | 10    |       | STECHER_Stirn    | :  | 100.000  | 100.000 | 0.200   | 2.500 |          | 8.0Q          |      |                     |
|                           | 11    | 22    | BOHRER_18        | :  | 100.000  | 100.000 | 18.000  | 180.0 |          | ନ             |      | Schneiden           |
|                           | 12    | 0     | SCHLICHTER_i     | 1  | 100.000  | 100.000 | 0.400 ( | 93.0  | 35       | 3.0 Q         |      | _                   |
| €3. /~                    | 13    |       |                  |    |          |         |         |       |          |               |      | Sortieren           |
| $\sim$                    | 14    |       |                  |    |          |         |         |       |          |               |      |                     |
|                           | 15    | 0     | SCHLICHTER_1     | 2  | 0.000    | 0.000   | 0.2001  | 93.0  | 35       | 5.0Q          |      |                     |
|                           |       |       |                  |    |          |         |         |       |          | 2             | Σ    |                     |
|                           |       |       | Spin-<br>deln    |    |          |         |         |       | D        | EF Anw        | /en- |                     |

After entering the values in the screen form





the program is done.

| PRO         | GRAMM  |                |                                       |                                    |                       |
|-------------|--------|----------------|---------------------------------------|------------------------------------|-----------------------|
| PAS         | SELLE  |                |                                       |                                    |                       |
| Ρ           | N5     | PASSELLE       |                                       | Nullpktv. 1 G54                    | Werkzeug              |
|             | N10    | Abspanen       | $\nabla$                              | T=SCHRUPPER_80 F0.2/U V750m Plan   |                       |
| <u></u>     | N75    | WELLE_MIT_PASS | _aussen                               |                                    | Gerade                |
| <b>)</b>    | N80    | Abspanen       | $\nabla$                              | T=SCHRUPPER_80 F0.2/U S400U        |                       |
| )           | N395   | Reststechdreh  | $\nabla$                              | T=STECHER_3 F0.12/U V90m           | Kreis<br>Mitteln      |
| <b>*</b>    | N460   | Stechdrehen    | $\nabla \nabla \nabla$                | T=STECHER_3 F0.15/U V88m           | Hitterp.              |
| <b>)</b>    | N575   | Stechdrehen    | $\nabla \nabla \nabla$                | T=STECHER_3 F0.15/U V88m           | Kreis                 |
| <u>کہ</u> - | N580   | Stechdrehen    | $\nabla \Delta \Delta$                | T=PILZ_5 F0.15/U V88m              | Radius                |
| J.L         | N585   | Einstich       | $\nabla \bullet \nabla \nabla \nabla$ | T=STECHER_3 F0.12/U V80m X0=37     |                       |
| -1          | N590   | Gegenspindel   |                                       | Komplett Nullpktv. 3 G56           | Polar                 |
| 2°2 -       | N595   | Abstich        |                                       | T=STECHER_3 F0.15/U V60m FS1 X0=70 |                       |
| 22          | N600   | Bohren Mittig  | 0+                                    | T=BOHRER_18 F0.11/U S2250U Z0=0    | Anfahren/<br>Abfahren |
| U-          | N605   | PASSWELLE_HINT | EN                                    |                                    |                       |
| <b>)</b>    | N610   | Abspanen       | $\nabla$                              | T=SCHLICHTER_i F0.2/U V150m        |                       |
| END         |        | Programmende   |                                       | N=1                                |                       |
|             |        |                |                                       |                                    |                       |
|             |        | _              |                                       | IΣ                                 |                       |
| <b>"</b>    | Gera   | de Bohren      | La Drehen                             | J Kontur Fräsen Diver-             | NC Abar-              |
|             | THE GI |                | _                                     |                                    | berten                |



#### 14 Program Loops, Shifts

Based on an example, the following is described in this module: programming loops and shifts as well as the setup of a workpiece counter with message texts, and the setup of a sub-program in ShopTurn.



In the first machining step, a through hole of 32mm is programmed.

| BOHRER_32    | D1 |
|--------------|----|
| 0.120 mm/U   |    |
| 800 U/min    |    |
|              |    |
| Entspanen    |    |
| Spitze       |    |
| 0.000 abs    |    |
| -100.000 ink |    |
| 20.000       |    |
| 60.000 %     |    |
| 2.000        |    |
| automatisch  |    |
| 0.000 s      |    |
| 0.000        |    |

After the subsequent facing,

longitudinal machining to a diameter of 70mm is the next step.





SCHRUPPER\_80 D1 Т 0.200 mm/U F ۷ 350 m/min Bearbeitung:  $\nabla$ Lage: <u>\_\_\_\_</u> Längs XØ 92.000 abs ZØ 2.000 abs X1 70.000 abs **Z1** -80.000 abs 5.000 ink D UΧ 0.000 ink 0.000 ink UZ





Finally, to manufacture a workpiece, the cut-off is made.

| т  | Abstecher_3   |
|----|---------------|
| F  | 0.100 mm/U    |
| s  | 1000 U/mir    |
|    |               |
| XØ | 70.000 abs    |
| ZØ | -13.000 abs   |
| FS | 3.000         |
| X1 | 40.000 abs    |
| FR | 0.080 mm/U    |
| SR | 700.000 U/mir |
|    |               |
|    |               |
| X2 | 31.000 abs    |
|    |               |



The ring is done.

Five more will follow.



First, the area of the program that is to be repeated is delimited.

SIEMENS

| PR  | JGRAMM   |   |                       |
|-----|--|---|-----------------------|
| RI  | NG RTNG  |   | Marke                 |
| G   | N10:Kunde Schmitz in Muste                     | erhausen                                |                       |
| G   | N15 :Teil gefertigt am 17.                     | 82.2885                                 | Wieder-               |
| 22  | N25 Bohren Mittig                              | <br>™ T=B0HRER 32 F0.12/U S800U Z0=0    | notung                |
|     | N30 Abspanen 🗸                                 | T=SCHRUPPER 80 F0.2/U V350m P1an        | Unter-                |
| 3   | N35 Abspanen 🗸                                 | T=SCHRUPPER_80 F0.2/U V350m Längs       | programm              |
| ale | N40 Abstich                                    | T=Abstecher_3 F0.1/U S1000U FS3 X0=70 → | Vorrich-              |
| END | Programmende                                   | N=1                                     | tungen                |
|     |  |   | Gegen-<br>spindel     |
|     |  |   |                       |
|     |  |   | Einstel-<br>lungen    |
|     |  |   | Transfor-<br>mationen |
| Z   | Gerade<br>Kreis <mark>- B</mark> ohren - Drehe | en 📕 Kontur 🚛 Fräsen 📑 Diver- 📥 Simula  | NC Abar-              |

To this end, the cursor has to be above the program block to be delimited; in this example, above the machining.



By pressing the softkey





| PRO | JGRAMM   |                       |
|-----|--|-----------------------|
| RIN |  | Marke                 |
| -   |  | SCLECH                |
| G   | N10;Kunde Schmitz in Musternausen                    | Wieder-               |
| G   | N15 ;Teil gefertigt am 17.02.2005                    | holung                |
| 27  | N25 Bohren Mittig @+ T=BOHRER_32 F0.12/U \$800U Z0=0 |                       |
| 1   | N30 Abspanen V T=SCHRUPPER_80 F0.2/U V350m Plan      | Unter-                |
|     | N35 Abspanen 🛛 🔍 T=SCHRUPPER_80 F0.2/U V350m Längs 🕞 | programm              |
| 2 E | N40 Abstich T=Abstecher_3 F0.1/U S1000U FS3 X0=70    | Vorrich-              |
| END | Programmende N=1                                     | tungen                |
|     |  | Gegen-<br>spindel     |
|     |  |                       |
|     |  | Einstel-<br>lungen    |
|     |  | Transfor-<br>mationen |
| 2   | Gerade de Bohren de Drehen Kontur drehen Fråsen tion | Abar-                 |

the name of the mark

| Marke setzen |  |
|--------------|--|
|              |  |
| Marke        |  |
|              |  |
|              |  |

(any name) can be entered

Through acceptance,

| PROG     | ramm   |        |        |          |      |          |         |            |           |
|----------|--------|--------|--------|----------|------|----------|---------|------------|-----------|
| RING     |        |        |        |          | Eind | deutige  | Markenb | ezeichnung |           |
| Р        |        |        |        |          |      | Marke se | etzen   |            |           |
| G        |        |        |        |          |      | Marke    |         |            |           |
| G        |        |        |        |          |      | MARK 1   |         |            |           |
| 22       |        |        |        |          |      |          |         |            |           |
| 3        |        |        |        |          |      |          |         |            |           |
| 3        |        |        |        |          |      |          |         |            |           |
| 9428     |        |        |        |          |      |          |         |            | _         |
|          |        |        |        |          |      |          |         |            |           |
| 212      |        |        |        |          |      |          |         |            | -         |
| ENU      |        |        |        |          |      |          |         |            |           |
|          |        |        |        |          |      |          |         |            |           |
|          |        |        |        |          |      |          |         |            |           |
|          |        |        |        |          |      |          |         |            |           |
|          |        |        |        |          |      |          |         |            |           |
|          |        |        |        |          |      |          |         |            | Abbruch   |
|          |        |        |        |          |      |          |         |            |           |
|          |        |        |        |          |      |          |         |            | . <       |
|          | 1      | _      | _      | _        |      | _        | _       | [i]        | Obernahme |
| <b>"</b> | Gerade | Bohren | Preben | 📕 Kontur | Er:  | äsen     | Diver-  | 🛓 Simula   | NC Abar-  |
| 5        | Kreis  |        |        | drehen   |      |          | Ses     | tion       | beiter    |

the mark is inserted above the cut-off.

| PRO   | gramm                         |  |                   |
|---|-------------------------------|--|-------------------|
| RIN   | G                             |  | Marke             |
| Ρ   | N5 RING                       |  | setzen            |
| G   | N10;Kunde Schmitz in Musterha | usen   |                   |
| G   | N15 ;Teil gefertigt am 17.02. | 2005   | Wieder-<br>holung |
| 22<br>22  | N25 Bohren Mittig □+ T        | =BOHRER_32 F0.12/U \$800U Z0=0   |                   |
| 1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1.<br>1 | N30 Abspanen 🗸 T              | =SCHRUPPER_80 F0.2/U V350m P1an  | Unter-            |
| 3   | N35 Abspanen 🛛 🖓 T            | =SCHRUPPER_80 F0.2/U V350m Längs   | programm          |
| ×   | N45 MARK1:                    | E Contraction and the second sec | Vorrich-          |
| а<br>И Е  | N40 Abstich T                 | =Abstecher_3 F0.1/U \$1000U F\$3 X0=70   | tungen            |
| END   | Programmende N                | =1   | Course            |
|   |                               |  | spindel           |
|   |                               |  |                   |
|   |                               |  |                   |
|   |                               |  |                   |
|   |                               |  | Einstel-          |
|   |                               |  | lungen            |
|   |                               |  | Transfor-         |
|   |                               | ID   | mationen          |
| <b>.</b>  | Gerade Bahaan Daahaa          | Kontur Frierr Diver- Simula  | NC Abar-          |
|   | Kreis - bonren - Drenen       | 🥏 drehen 🔤 rrasen 📑 ses 🔚 tion   | 📑 beiter          |

In this way, another mark (with a different name) is inserted below the cut-off.

| PRO   | GRAMM                             |   |
|-------|-----------------------------------|---|
| RIN   | 3                                 | Marke                                   |
| Р     | N5 RING                           | setzen                                  |
| G     | N10;Kunde Schmitz in Musterhauser |   |
| G     | N15 ;Teil gefertigt am 17.02.2005 | holung                                  |
| 23    | N25 Bohren Mittig @+ T=BOH        | RER_32 F0.12/U \$800U 20=0              |
|       | N30 Abspanen 🛛 T=SCH              | RUPPER_80 F0.2/U V350m Plan Unter-      |
| S     | N35 Abspanen 🛛 🗸 T=SCH            | RUPPER_80 F0.2/U V350m Längs            |
| ×:00  | N45 MARK1:                        | Vorrich-                                |
| 2 E   | N40 Abstich T=Abs                 | stecher_3 F0.1/U S1000U FS3 X0=70       |
| ×:000 | N50 MARK2:                        | Gomm                                    |
| END   | Programmende N=1                  | spindel                                 |
|       |                                   |   |
|       |                                   |   |
|       |                                   |   |
|       |                                   | Einstel-<br>lungen                      |
|       |                                   | Transfor-                               |
|       |                                   | i)                                      |
| 2     | Gerade Bohren 🚽 Drehen 🚽          | iontur – Fräsen Diver- – Simula 🖺 Abar- |

Next, after pressing the softkey Repeat



the number of repeats is entered in the input field

| RING                                    |                            |        |
|---|----------------------------|--------|
| p                                       | Wiederholung               |        |
| 3                                       | Startmarke:                |        |
|   | MARK 1                     |        |
|   | Endmarke:                  |        |
| 2   · · · · · · · · · · · · · · · · · · | MARK2                      | _      |
|   | Anzahl Wiederholungen:     |        |
| 3                                       | 5                          |        |
|   |                            |        |
|   |                            | -      |
|   |                            |        |
| -                                       |                            |        |
| 10                                      |                            | -      |
|   |                            |        |
|   |                            | -      |
|   |                            | Abbru  |
|   |                            | -      |
|   |                            | Überna |
|   | Ĺ                          | _      |
| Gerade Bohren 🚽 Drehen 🚽                | ontur Fräsen Diver- Simula | NC Aba |

and accepted into the machining plan.

| ×:00 | N45 MARK1:        |
|------|-------------------|
| 2 E  | N40 Abstich       |
| ×:00 | N50 MARK2:        |
| Ē₽   | N55 Wiederholung  |
| 80   | noo miodoimoi ang |

Finally, a shift has to be defined within the program loop.

To this end, a shift is inserted below the cut-off.



By pressing the softkey



and





shifts can be made in this screen form



in reference to the workpiece zero point

neu

Z X Y

or

|   | additiv |
|---|---------|
| z |         |
| Х |         |
| Y |         |

in reference to the last shift.



#### After entering the value





and accepting it into the machining plan,

| PRO                | SRAMM   |                       |
|--------------------|---|-----------------------|
| RIN                | Ĵ   | Harkzour              |
| Ρ                  | N5 RING   | HEIKZEUG              |
| G                  | N10;Kunde Schmitz in Musterhausen                         |                       |
| G                  | N15 ;Teil gefertigt am 17.02.2005                         | Gerade                |
| 22 <mark>62</mark> | N25 Bohren Mittig @+ T=BOHRER_32 F0.12/U \$800U 20=0      |                       |
|                    | N30 Abspanen 🛛 T=SCHRUPPER_80 F0.2/U V350m Plan           | Kreis                 |
|                    | N35 Abspanen V T=SCHRUPPER_80 F0.2/U V350m Längs          | Miccelp.              |
| ×OOO               | N45 MARK1:  | Kreis                 |
| 2E                 | N40 Abstich T=Abstecher_3 F0.1/U S1000U FS3 X0=70         | Radius                |
| ∆÷⊿                | N60 Verschiebung add Z-13                                 |                       |
| ×                  | N50 MARK2:  | Polar                 |
| ≣€                 | N55 Wiederholung MARK1 MARK2 P=5                          |                       |
| END                | Programmende N=1  | Anfahren/<br>Abfahren |
|                    |   |                       |
|                    |   |                       |
|                    |   |                       |
|                    |   |                       |
|                    | ٦D  |                       |
| 2                  | Gerade<br>Kreis Bohren Drehen Kontur Fräsen Diver-<br>tio | n Abar-<br>beiten     |

the program is done.

Six rings are manufactured.



In reference to the program example "Ring", a workpiece counter is programmed using Rparameters.

From the software perspective, it may be advisable to program message texts that are displayed automatically when processing a program in the automation area.

| Μ          | AVTO Achtung Werkstueck entgraten |            |          |               |        |             |                 |         |                    |
|------------|-----------------------------------|------------|----------|---------------|--------|-------------|-----------------|---------|--------------------|
| () F       | Aktiv                             |            |          | 7_N_WK        | S_DIR/ | '_n_sho     | PTURN_WPD       |         | G.,                |
|            |                                   |            |          | RING          |        |             |                 |         | Funktion           |
| WKS        | ៃ ø                               | Positi     | on [m    | m] Res        | stweg  | T,F,S       |                 |         |                    |
| Х          |                                   | -32.1      | 10       | 82.1          | 10     | T 5TE0<br>7 | CHER_3<br>0.100 | D1<br>1 | Hilfs-<br>Funktion |
| Z          |                                   | 67.8       | 89       | 82.1          | 111    | F           | EILG.           | 100%    | Alle<br>G-Funk.    |
| Ŷ          |                                   | 0.0        | 00       | 0.0           | 900    | S4          | 0.000           | X 100%  | Paciecatz          |
| <b>Z3</b>  |                                   | 800        | . 000    |               | 3.000  |             | 0.000           |         | Da5135a(2          |
|            | Nullpkt1                          |            |          |               |        | 8%          | 100%            | 200%    |                    |
|            |                                   | _          |          |               |        |             |                 |         |                    |
| G          | N65;Teil                          | gefertigt  | am 17.8  | 2.2005        |        |             |                 |         |                    |
| G          | N75 MSG(                          | 'Achtung W | erkstuec | k entgraten") |        |             |                 |         |                    |
| 229<br>229 | N25 Bohre                         | en Mittig  | c        | ™ T=BOHRER_32 | FØ.12  | 2/U \$80    | 10U 20=0        |         |                    |
| 3          | N30 Abspa                         | anen       | $\nabla$ | T=SCHRUPPER   | _80 F6 | 9.2/U V     | 350m Plan       |         |                    |
| n          | N35 Abspa                         | anen       | $\nabla$ | T=SCHRUPPER   | _80 F6 | 9.2/U V     | 350m Längs      |         |                    |
| ×:8        | N45 MARK:                         | 1:         |          |               |        |             |                 |         |                    |
| zi E       | N40 Abst.                         | ich        |          | T=Abstecher   | _3 FØ. | 1/U S1      | 000U FS3 X      | 9=70    |                    |
|            |                                   |            |          |               |        |             |                 |         |                    |
|            |                                   |            |          |               |        |             |                 | Mit-    | Prog.              |

M AVTO Achtung Werkstueck entgrate

Message texts are programmed as follows.

The text is displayed during machining until the end of the program.



If the text is not to be displayed permanently during machining, it is deleted as follows.

R-parameters are variables that are available to the programmer.



#### By pressing the softkey





| WERKZEUGE          |            |         |                |        |
|--------------------|------------|---------|----------------|--------|
| <b>R-Parameter</b> |            |         |                |        |
| R 0                | 0.0000000  | R 19    | 0.0000000      |        |
| R 1                | 0.0000000  | R 20    | 0.0000000      |        |
| R 2                | 0.0000000  | R 21    | 0.0000000      |        |
| R 3                | 0.00000000 | R 22    | 0.0000000      |        |
| R 4                | 0.00000000 | R 23    | 0.0000000      |        |
| R 5                | 0.0000000  | R 24    | 0.0000000      |        |
| R 6                | 0.0000000  | R 25    | 0.0000000      |        |
| R 7                | 0.00000000 | R 26    | 0.0000000      |        |
| R 8                | 0.0000000  | R 27    | 0.0000000      | Suchen |
| R 9                | 0.0000000  | R 28    | 0.0000000      |        |
| R 10               | 0.0000000  | R 29    | 0.0000000      |        |
| R 11               | 0.0000000  | R 30    | 0.0000000      |        |
| R 12               | 0.00000000 | R 31    | 0.0000000      |        |
| R 13               | 0.0000000  | R 32    | 0.0000000      |        |
| R 14               | 0.0000000  | R 33    | 0.0000000      |        |
| R 15               | 0.0000000  | R 34    | 0.0000000      |        |
| R 16               | 0.0000000  | R 35    | 0.0000000      |        |
| R 17               | 0.0000000  | R 36    | 0.0000000      |        |
| R 18               | 0.0000000  | R 37    | 0.0000000      |        |
|                    |            |         |                |        |
|                    |            |         |                |        |
| liste              | versch     | 🎽 zin 🔶 | versch R meter |        |

, the list of the available parameters is displayed.

Under ShopTurn, it is not possible to replace the parameter values with Rparameters. This is possible only for standard cycles under standard programming.



#### Within the loop, the number "1" is added to the variable R1 for each repetition.

SIEMENS



| PRU         |   |                         |
|-------------|---|-------------------------|
| RIN         | G   |                         |
| Ρ           | N5 RING   | Werkzeug                |
| G           | N80 R1=0  |                         |
| G           | N10;Kunde Schmitz in Musterhausen                                       | Gerade                  |
| G           | N65;Teil gefertigt am 17.02.2005  |                         |
| G           | N75 MSG("")   | Kreis                   |
| 27<br>22    | N25 Bohren Mittig O+ T=BOHRER_32 F0.12/U \$800U 20=0                    | mrccerp.                |
| <u>.</u>    | N30 Abspanen 🛛 T=SCHRUPPER_80 F0.2/U V350m Plan                         | Kreis                   |
| <u>.</u>    | N35 Abspanen V T=SCHRUPPER_80 F0.2/U V350m Längs                        | Radius                  |
| *:00        | N45 MARK1:  |                         |
|             | N85 R1=R1+1   | Polar                   |
| a e         | N40 Abstich T=Abstecher_3 F0.1/U S1000U FS3 X0=70                       |                         |
| ∆⇒ <b>⊿</b> | N60 Verschiebung add Z-13   | Anfahren/<br>Abfahren   |
| *:00        | N50 MARK2:  |                         |
| ₿Ð          | N55 Wiederholung MARK1 MARK2 P=5  |                         |
| END         | Programmende N=1  |                         |
|             |   |                         |
|             | (I)   |                         |
| 2           | Gerade<br>Kreis Bohren Drehen J Kontur<br>drehen Fräsen E Diver-<br>tio | la NC Abar-<br>n beiten |

With the following program instruction, the value of variable R1 is visible during machining.

#### N90 MSG("Stueck"<<R1<<"von sechs")

In this case, the correct notation has to be adhered to for displaying the variable.

| PRC            | GRAM | 4         |           |                    |           |        |          |        |         |                |               |                  |            |
|----------------|------|-----------|-----------|--------------------|-----------|--------|----------|--------|---------|----------------|---------------|------------------|------------|
| RIN            | IG   |           |           |                    |           |        |          |        |         |                |               |                  | N          |
| Р              | N5   | RING      |           |                    |           |        |          |        |         |                |               | Werkze           | ug         |
| G              | N80  | R1=0      |           |                    |           |        |          |        |         |                |               |                  |            |
| G              | N10  | ; Kunde   | Schmitz . | in Must            | erhausen  |        |          |        |         |                |               | Gerad            | le         |
| G              | N65  | ;Teil     | gefertigt | am 17.             | 02.2005   |        |          |        |         |                |               |                  |            |
| G              | N75  | MSG("     | ")        |                    |           |        |          |        |         |                |               | Kreis            | s          |
| 29<br>29<br>29 | N25  | Bohre     | n Mittig  |                    | ⊡+ T=BOHR | ER_32  | FØ.12/U  | 5800U  | Z0=0    |                |               | MICCEL           | р.         |
| Į.,            | N30  | Abspa     | nen       | $\nabla$           | T=SCHR    | UPPER_ | 80 F0.2/ | U V356 | 9m Plar |                |               | Kreis            | s          |
|                | N35  | Abspa     | nen       | $\nabla$           | T=SCHR    | UPPER_ | 80 F0.2/ | U V356 | 3m Läng | s              |               | Radiu            | IS         |
|                | N45  | MARK 1    | :         |                    |           |        |          |        |         |                |               |                  | 5          |
| G              | N85  | R1=R1     | +1        |                    |           |        |          |        |         |                |               | Pola             |            |
| G              | N90  | MSG("     | Stueck"<< | <b>₹1&lt;</b> <"vo | n sechs") |        |          |        |         |                |               |                  |            |
| a le           | N40  | Absti     | ch        |                    | T=Abst    | echer_ | 3 F0.1/U | S1006  | 9U FS3  | X0=70          |               | Anfahr<br>Abfahr | en/        |
| 1→4            | N60  | Versc     | niebung   | add                | Z-13      |        |          |        |         |                |               |                  |            |
|                | N50  | MARK2     | :         |                    |           |        |          |        |         |                |               |                  |            |
| Ð              | N55  | Wiede     | rholung   |                    | MARK 1    | MARK2  | P=5      |        |         |                |               |                  |            |
| END            |      | Progr     | ammende   |                    | N=1       |        |          |        |         |                |               |                  |            |
|                |      | -         | _         |                    | _         | -      | _        | -      | _       | [1             |               |                  |            |
| <b>,</b>       | Gera | ade<br>is | Bohren    | 📕 Drei             | nen 🚽 Ko  | ntur   | 🕳 Fräser |        | Diver-  | + <sup>s</sup> | imula<br>tion | NC Aba           | ar-<br>ten |



When processing the program, only the current run of the loop is displayed as message text.

| МI          | auto     |             | Stueck1vo | on sechs | \$      |      |        |                    |                  |           |                |
|-------------|----------|-------------|-----------|----------|---------|------|--------|--------------------|------------------|-----------|----------------|
| () A        | ktiv     |             |           | /        | '_N_WKS | _DIR | /_n_sh | OPTURN_WPD         | 1                |           | G-             |
|             |          |             |           | F        | RING    |      |        |                    |                  | Fun       | ktion          |
| WKS         | ø        | Positi      | on [mm    | 1        | Res     | tweg | T,F,S  | :                  |                  |           |                |
| Х           |          | 114.6       | 00        | 12       | 25.4    | .00  |        | stecher_3<br>0.300 | D1<br>1          | Hi<br>Fun | lfs-<br>ktion  |
| Z           |          | 132.1       | 97<br>90  | -11      | 2.1     | .97  | F      | EILG               | • 100%<br>mm/min | A<br>G-F  | lle<br>Funk.   |
| Ŷ           |          | 0.0         | 00        |          | 0.0     | 00   | S4     |                    |                  |           |                |
| Z3          |          | 800.        | 000       |          | 0       | .000 |        | 0.00               | 0 💌 100%<br>0    | Basi      | issatz         |
| ÐÐ          | Nullpkt1 |             |           |          |         |      | 8%     | 100%               | 200%             |           |                |
|             |          |             |           |          |         |      |        |                    |                  |           |                |
| G           | N85 R1=F | 1+1         |           |          |         |      |        |                    |                  |           |                |
| G           | N90 MSG  | "Stueck" << | R1<<"von  | sechs")  |         |      |        |                    |                  |           |                |
| a e         | N40 Abst | ich         |           | T=Abst   | echer_  | 3 FØ | .1/U S | 1000U FS3          | X0=70            |           |                |
| ∆⇒ <b>4</b> | NGØ Vers | chiebung    | add       | Z-13     |         |      |        |                    |                  |           |                |
| ×:00        | N50 MARK | (2:         |           |          |         |      |        |                    |                  | 1         |                |
| ≣Ð          | N55 Wiec | lerholung   |           | MARK 1   | MARK2   | P=   | 5      |                    |                  |           |                |
| END         | Prog     | grammende   |           | N=1      |         |      |        |                    |                  |           |                |
|             |          |             |           |          |         |      |        |                    | Mit-<br>zeich    |           | Prog.<br>korr. |

Stueck1von sechs

In ShopTurn, every subprogram is a main program and every main program is a subprogram.

No differentiation is made regarding programming.

In our example, hole machining is to be performed in a subpogram.

By pressing the softkey

| Μ              | auto   |                | Stueck1vor | sech:  | s          |            |            |                    |                |                    |
|----------------|--------|----------------|------------|--------|------------|------------|------------|--------------------|----------------|--------------------|
| () F           | Aktiv  |                |            |        | /_N_WKS_   | DIR        | /_n_shi    | opturn_wpd         |                | 6-                 |
|                |        |                |            | F      | RING       |            |            |                    |                | Funktion           |
| WKS            | ø      | Positi         | ion [mm]   |        | Rest       | weg        | T,F,S      |                    |                |                    |
| Х              |        | 114.6          | 600        | 12     | 25.40      | <b>9</b> 0 | T Abs      | stecher_3<br>0.300 | D1<br>1        | Hilfs-<br>Funktion |
| Z              |        | 132.1          | .97        | -11    | 12.19      | 97<br>20   | F          | EILG.              | 100%<br>mm/min | Alle<br>G-Funk.    |
| <b>Ү</b><br>23 |        | 808            | . 000      |        | 0.01<br>0. | 999<br>999 | <b>S</b> 4 | 0.000<br>0.000     | ⊠ 100%         | Basissatz          |
| B₩ I           | Nullpk | t1             |            |        |            |            | <b>9</b> % | 100%               | 200%           |                    |
|                |        |                |            |        |            |            |            |                    |                |                    |
| G              | N85 R  | 1=R1+1         |            |        |            |            |            |                    |                |                    |
| G              | N90 M  | ISG("Stueck"<< | R1<<"von s | echs"  | )          |            |            |                    |                |                    |
| 2 E            | N40 A  | bstich         |            | T=Abs  | techer_3   | FØ         | .1/U S     | 1000U FS3 X        | 0=70           |                    |
| ⊿⊶⊿            | N60 V  | erschiebung    | add        | Z-13   |            |            |            |                    |                |                    |
| ×:00           | N50 M  | IARK2:         |            |        |            |            |            |                    |                |                    |
| Ē₽             | N55 W  | liederholung   |            | MARK 1 | MARK2      | P=         | 5          |                    |                |                    |
| END            | P      | rogrammende    |            | N=1    |            |            |            |                    |                |                    |
|                |        |                |            |        |            |            |            |                    |                |                    |
|                |        |                |            |        |            |            |            |                    | Mit-<br>zeich. | Prog.<br>korr.     |



and





the program name that is to be called as subprogram is entered.

If the program is located in the same path as the main program, the name of the path does not have to be entered. The program extension, such as. ".mpf" does not have to be entered either.

| PROG           | Gramm  |        |        |          |      |          |        |          |              |    |
|----------------|--------|--------|--------|----------|------|----------|--------|----------|--------------|----|
| RING           | 3      |        |        |          |      |          |        |          |              |    |
| Р              |        |        |        |          |      | Unterpro | gramm  |          |              |    |
|                |        |        |        |          |      | Pfad/Wer | kstück |          |              |    |
| G              |        |        |        |          |      | D        | Mana   |          |              |    |
| G              |        |        |        |          |      | Bobren   | -name: | -        |              | -  |
| G              |        |        |        |          |      | Donizan  |        |          |              |    |
| 0              |        |        |        |          |      |          |        |          |              |    |
| G              |        |        |        |          |      |          |        |          |              |    |
| 57<br>50<br>60 |        |        |        |          |      |          |        |          |              |    |
| 1.             |        |        |        |          |      |          |        |          |              |    |
|                |        |        |        |          |      |          |        |          |              |    |
| ×:00           |        |        |        |          |      |          |        |          |              |    |
| G              |        |        |        |          |      |          |        |          | -            |    |
| G              |        |        |        |          |      |          |        |          |              |    |
| -H             |        |        |        |          |      |          |        |          |              | _  |
| 212            |        |        |        |          |      |          |        |          | ×            |    |
| 4-14           |        |        |        |          |      |          |        |          | Abbruch      | n  |
|                |        |        |        |          |      |          |        |          |              |    |
| 물빈             |        |        |        |          |      |          |        |          | ~ <b>~</b> . |    |
|                |        |        |        |          |      |          |        | i        | ubernahr     | чe |
| 2              | Gerade | Bohren | Drehen | 📕 Kontur | - Fr | asen     | Diver- | + Simula | NC Aba       | c- |
| -              | Kreis  |        |        | arenen   |      |          | ses    | tion     | beit         | en |

#### The program

Ausführen "Bohren"

is now executed as subprogram in the main program "Ring".

| PRO      | Gramm  |                                       |                      |
|----------|--|---------------------------------------|----------------------|
| RIN      | G  |                                       |                      |
| Ρ        | N5 RING  |                                       | Markieren            |
| 瞷        | N95 Ausführen  | "Bohren" 🖃                            | _                    |
| G        | N80 R1=0   |                                       | Kopieren             |
| G        | N10;Kunde Schmitz in Muste   | rhausen                               |                      |
| G        | N65;Teil gefertigt am 17.0   | 2.2005                                | Einfügen             |
| G        | N75 MSG("")  |                                       |                      |
| <u>.</u> | N30 Abspanen 🗸   | T=SCHRUPPER_80 F0.2/U V350m Plan      | Aus-                 |
|          | N35 Abspanen 🛛   | T=SCHRUPPER_80 F0.2/U V350m Längs     | schneiden            |
| ×:00     | N45 MARK1:   |                                       | Curtar               |
| G        | N85 R1=R1+1  |                                       | Suchen               |
| G        | N90 MSG("Stueck"< <r1<<"von< td=""><td>sechs")</td><td></td></r1<<"von<> | sechs")                               |                      |
| зE       | N40 Abstich  | T=Abstecher_3 F0.1/U S1000U FS3 X0=70 |                      |
| ∆÷⊿      | N60 Verschiebung add   | Z-13                                  |                      |
| ×000     | N50 MARK2:   |                                       | Neu num-<br>merieren |
| Ē₽       | N55 Wiederholung   | MARK1 MARK2 P=5                       |                      |
| END      | Programmende   | N=1                                   | <b>«</b>             |
|          |  | <b>_</b>                              | Zuruck               |
| 2        | Gerade Bohren 🚽 Drehe  | n 🚽 Kontur 📑 Fräsen 📑 Diver- 📩 Simula | Abar-                |

#### 15 CNC Basics Turning

Regarding CNC machines, the required sequences for manufacturing a workpiece are stored in a CNC program. The calculations (compensations) between tool, workpiece and machine required for this are taken into account when processing an NC program.

The difference between a manual and a CNC machine consists of the logic operation of numerical values.



#### 16 Manual Operating Area

In this module, the individual function areas in the manual operating area are shown, and explained based on examples.



#### 16.1 Mode TSM

After starting Shop Turn, the operating area



is active.

| M MANUELL     |                       |       |                   |       |                   |                    |                    |
|---------------|-----------------------|-------|-------------------|-------|-------------------|--------------------|--------------------|
| // Reset      |                       |       |                   |       |                   |                    | G-<br>Funktion     |
| WKS ø         | Position              | [mm]  |                   | T,F,S |                   |                    |                    |
| Х             | 188.320               |       |                   |       | PER_80 A<br>0.800 | ) D1               | Hilfs-<br>Funktion |
| Z             | 260.876               |       |                   | F     | 0.000<br>0.000    | 100%<br>mm/min     | Alle<br>G-Funk.    |
| ZGS           | 0.000                 |       |                   | S1    | 0.000<br>0.000    | ⊠ 100%             |                    |
|               |                       |       |                   | 8%    | 108%              | 288%               |                    |
|               |                       |       |                   |       |                   |                    |                    |
| <b>т,</b> s,м | NPV<br>28 setzen 8 We | illp. | lessen<br>lerkz . | <     | Posi-<br>tion     | )<br>Ab-<br>spanen | Reitstock          |

By pressing the softkey



| M MAN   | IELL                   |       |                       |                |               |
|---------|------------------------|-------|-----------------------|----------------|---------------|
| // Rese | t                      |       |                       |                |               |
| WKS ø   | Position [mm]          | T,F,  | S                     |                |               |
| Х       | 278.000                | T BO  | HRER_8<br>ø 8.000     | D1             | Werkzeuge     |
| Z       | 254.200                | F     |                       | ~~~            | No.1 Jacomies |
|         |                        |       | 0.000<br>0.000        | 100%<br>mm/min | versch.       |
| ZGS     | 0.000                  | S1    | <b>0.000</b><br>2000. | 100%           |               |
|         |                        | 8%    | 100%                  | 200%           |               |
| Т,Ѕ,М   | •                      |       | Werk                  | czeugname      |               |
|         | T D1                   |       |                       |                |               |
|         | Spindel Si U/min       | ı     |                       |                |               |
|         | Sonst. M-Fkt.          |       |                       |                |               |
|         | Nullpktv.              |       |                       |                | _             |
| _       | Mapernuert             | _     | _                     |                | K<br>Zurück   |
| ] 🗘 т.  | S,M 📴 NPV Powerkst 🖉 W | erkz. | Posi-<br>tion         | Ab-            | Tailstock     |

the input window for manually operating the machine is displayed.

| Т  | D1    |
|--|-------|
| Spindel S1                               | U/min |
| Sonst. M-Fkt.<br>Nullpktv.<br>Maßeinheit |       |

<<During spell check, "Freier Abspanzyklus Abschnitt 7 = free machining cycle, Section 7" appeared for this page, although this phrase is not visible on the page>> The tool for manual machining is called in the first input field.

| т    | D1             |
|------|----------------|
|      |                |
| Thon | the enindle is |

Then, the spindle is selected.

| M MAN   | UELL                       |                                |                      |
|---------|----------------------------|--------------------------------|----------------------|
| // Rese | ət                         |                                |                      |
| WKS ø   |                            | T,F,S                          |                      |
| X       | 278.000                    | T BOHRER_8 D1<br>6 Ø 8.000 CCC | Werkzeuge            |
| Z       | 254.200                    | F 0.000 100%<br>0.000 mm/min   | Nullpunkt<br>versch. |
| ZGS     | 0.000                      | S1 0.000 100% 2000.            |                      |
|         |                            | 8% 198% 298%                   |                      |
| T,S,M.  |                            | Werkzeugname                   |                      |
|         | T D1                       |                                | _                    |
|         | Spindel S1 U/min           |                                |                      |
|         | Sonst. M-Fkt.<br>Nullpktv. |                                |                      |
| _       | Maßeinheit                 | $[\mathbf{X}]$                 | <b>«</b><br>Zurück   |
| С, т.   | S,M NPV Nullp. Messe       | n Posi- J Ab-                  | Tailstock            |

Several spindles can be configured.

#### Example:





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The spindle speed can be entered as

#### U/min

or as a constant cutting speed

#### m/min

In the additional input fields, we can enter M-functions or zero shifts,

Sonst. M-Fkt. Nullpktv. Or we can select between the measurement units



#### Example:



After calling the tool with the corresponding technology

T SCHRUPPER\_55 D1 Spindel S1 2000 U/min 2

| M MANU   | ELL                        |                  |                         |                 |                      |
|----------|----------------------------|------------------|-------------------------|-----------------|----------------------|
| // Reset | t                          |                  |                         |                 | O<br>Alternat.       |
| WKS ø    | Position [mm]              | T,               | F,S                     |                 | _                    |
| Х        | 278.000                    | т                | BOHRER_8<br>6 ø 8.000   | D1<br>555       | Werkzeuge            |
| Z        | 254.200                    | F                | 0.000<br>0.000          | 100%<br>mm/min  | Nullpunkt<br>versch. |
| ZGS      | 0.000                      | s                | 1 <b>0.000</b><br>2000. | 100%            |                      |
|          |                            | 88               | 198%                    | 200%            |                      |
| T,S,M    |                            |                  | [m/min]                 | /[U/min]        |                      |
|          | T D1                       |                  |                         |                 |                      |
|          | Spindel S1                 | in               |                         |                 |                      |
|          | Sonst. M-Fkt.<br>Nullpktv. |                  |                         |                 |                      |
|          | Maßeinheit                 | _                |                         | Б               |                      |
| ] 🔒 т.:  | S,M P20 Setzen NULlp.      | Messen<br>Herkz. | Posi-<br>tion           | J Ab-<br>spanen | Tailstock            |

| M MAN   | JELL                       |                 |       |              |                       |                |                      |
|---------|----------------------------|-----------------|-------|--------------|-----------------------|----------------|----------------------|
| // Rese | t                          |                 |       |              |                       |                | O<br>Alternat.       |
| WKS ø   | Position                   | [mm]            |       | T,F,S        |                       |                |                      |
| х       | 278.000                    |                 |       | <b>T</b> 80H | RER_8<br>ø 8.000      | D1             | Werkzeuge            |
| Z       | 254.200                    |                 |       | F            | 0.000<br>0.000        | 100%<br>mm/min | Nullpunkt<br>versch. |
| ZGS     | 0.000                      |                 |       | S1           | <b>0.000</b><br>2000. | 100%           |                      |
|         |                            |                 |       | 8%           | 100%                  | 200%           |                      |
| Т,Ѕ,М.  |                            |                 | recht | s/link       | s/aus/posit           | ionieren       |                      |
|         | T SCHRUPPER_55             | D1              |       |              |                       |                |                      |
|         | Spindel Si                 | 2000 U/min<br>2 |       |              |                       |                |                      |
|         | Sonst. M-Fkt.<br>Nullpktv. |                 |       |              |                       |                |                      |
| _       | Maßeinheit                 |                 | _     |              | _                     | Σ              | <b>«</b><br>Zurück   |
| 1-2 т,  | S,M NPV                    | llp. Mes        | sen   |              | Posi-                 | Ab-            | Tailstock            |

the tool with the entered technology data is activated by pressing the NC start button.

| <              | $\mathbf{D}$        |                     |
|----------------|---------------------|---------------------|
| T,F,S<br>T SCH | HRUPPER_55<br>0.600 | D1                  |
| F              | 0.000<br>0.000      | ⊡<br>100%<br>mm/min |
| S1             | 0.000               | <b>Q</b> 100%       |

| M MAN   | IELL                       |                            |              |                          |                |                      |
|---------|----------------------------|----------------------------|--------------|--------------------------|----------------|----------------------|
| // Rese | t                          |                            |              |                          |                |                      |
| WKS ø   | Position                   | [nn]                       | T,F          | 7,S                      |                | _                    |
| Х       | 32.000                     |                            | T            | SCHRUPPER_55<br>11 0.600 | D1             | Werkzeuge            |
| Z       | 278.000                    |                            | F            | 0.000<br>0.000           | 100%<br>mm/min | Nullpunkt<br>versch. |
| ZGS     | 0.000                      |                            | Si           | L <b>0.000</b><br>2000.  | Q 100%         |                      |
|         |                            |                            | 8%           | 100%                     | 200%           |                      |
| T,S,M   |                            |                            |              | Werk                     | zeugname       |                      |
|         | т                          | D1                         |              |                          |                |                      |
|         | Spindel S1                 | U/min                      |              |                          |                |                      |
|         | Sonst. M-Fkt.<br>Nullpktv. |                            |              |                          |                |                      |
|         | Maßeinheit                 |                            |              | _                        | Δ              |                      |
| ] 🗘 т,: | S,M P20 setzen P0 We       | illp. / Mes<br>erkst / Wer | ssen<br>rkz. | Posi-<br>tion            | Ab-            | Tailstock            |



#### 16.2 Mode Set ZO

The mode "Set ZO" is needed to compare the Z-axis with the workpiece.

Example:

With a turning tool, the frontal face of a workpiece is scratched.



By pressing the softkey Set ZO



| M MAN   | UELL                       |                     |                               |                      |
|---------|----------------------------|---------------------|-------------------------------|----------------------|
| // Rese | et                         |                     |                               |                      |
| WKS ø   | Position                   | [mm]                | T,F,S                         | _                    |
| Х       | 32.000                     |                     | T SCHRUPPER_55 D1<br>11 0.600 | Werkzeuge            |
| Z       | 278.000                    |                     | F 0.000 100%<br>0.000 mm/min  | Nullpunkt<br>versch. |
| ZGS     | 0.000                      |                     | S1 0.000 100%                 |                      |
|         |                            |                     | 0% 100% 200%                  |                      |
| T,S,M.  |                            |                     | Werkzeugname                  |                      |
|         | т                          | D1                  |                               |                      |
|         | Spindel S1                 | U/min               |                               |                      |
|         | Sonst. M-Fkt.<br>Nullpktv. |                     |                               |                      |
| _       | Maßeinheit                 | _                   |                               |                      |
| ] 🗘 т.  | S,M NPV<br>20 setzen       | llp. Alessen Werkz. | Posi-<br>J Ab-<br>tion spaner | Tailstock            |

the current value for the Z-axis is colored



| M MANUELL |                  |                              |         |                       |                |                    |
|-----------|------------------|------------------------------|---------|-----------------------|----------------|--------------------|
| 🥢 Reset   |                  |                              |         |                       |                | Z=0                |
| WKS ø     | Position         | [mm]                         | T,F,    | S                     |                |                    |
| х         | 32.000           |                              | T sc 11 | HRUPPER_55<br>0.600   | D1             |                    |
| Z         | 278.000          |                              | F       | 0.000<br>0.000        | 100%<br>mm/min |                    |
| ZGS       | 0.000            |                              | S1      | <b>0.000</b><br>2000. | 100%           |                    |
|           |                  |                              | 0%      | 100%                  | 200%           |                    |
|           |                  |                              |         |                       |                |                    |
|           |                  |                              |         |                       |                | Löschen            |
|           |                  |                              |         |                       |                |                    |
| _         |                  |                              |         |                       |                | <b>«</b><br>Zurück |
| 🕞 т,ѕ,м   | NPV<br>20 setzen | ullp. Messen<br>erkst Werkz. |         | Posi-<br>tion         | Ab-            | Tailstock          |

Here, by using the machine keyboard, any value can be entered, or the axis is set to zero by pressing the softkey



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|        |                   | M MANUELL | •                |                  |                          |                        |                    |
|--------|-------------------|-----------|------------------|------------------|--------------------------|------------------------|--------------------|
|        |                   | // Reset  |                  |                  |                          |                        | G-<br>Funktion     |
| The ba | sic shift G500 is | WKS ø     | Position [mm]    | Т                | ,F,S                     |                        |                    |
| now ac | tive              | х         | 32.000           | T                | SCHRUPPER_55<br>11 0.600 | D1                     | Hilfs-<br>Funktion |
| now ac |                   | Z         | 0.000            | F                | 0.00<br>0.00             | ⊡<br>100%<br>10 mm/min | Alle<br>G-Funk.    |
|        |                   | ZGS       | 0.000            | s                | 1 0.000<br>2000          | <b>2</b> <u>100%</u>   |                    |
| v      | 22 000            |           |                  | 0X               | 100%                     | 200%                   |                    |
| X      | 32.000            |           |                  |                  |                          |                        | _                  |
| Z      | 0.000             |           |                  |                  |                          |                        |                    |
|        |                   |           |                  |                  |                          |                        |                    |
|        |                   |           |                  |                  | _                        | $\sum$                 |                    |
|        |                   | 📙 т,ѕ,м   | NPV<br>20 setzen | Messen<br>Werkz. | Posi-<br>tion            | 📕 Ab-                  | Tailstock          |

#### 16.3 Zero Point Workpiece

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In this mode, the value for workpiece gauging can be written directly to the desired zero point shift .

| MANUELL       |                            |   |
|---------------|----------------------------|---|
| // Reset      |                            | G-<br>Funktion                                |
| WKS ø         | Position [mm]              | T,F,S   |
| x             | 32.000                     | T SCHRUPPER_55 D1<br>11 0.600 D1<br>Funktion  |
| Z             | 0.000                      | F 0.000 100% Alle<br>0.000 mm/min G-Funk.     |
| ZGS           | 0.000                      | S1 0.000 188%<br>2889. 188%                   |
|               |                            | 8% 100% 200%                                  |
|               |                            |   |
| <b>Т,</b> S,M | NPV<br>20 setzen Po Werkst | Messen Verkz. Posi- J Ab-<br>Werkz. Tailstock |

By pressing the softkey



MANUELL the corresponding input screen form is opened. Nullpunkt versch. 32.000 Х T SCHRUPPER\_55 11 0.600 D1 After selecting the zero z 157.000 point shift F 0.000 0.000 100% mm/min 0.000 💽 100% **S1** 0.000 ZGS in Nullpunktverschiebung Nullpktv. Nullpktv. 1 G54 G54 ZØ abs 0.000 abs Abbruch Nullpktv. G54 0.00 Nullpktv. setzen T,S,M NPV Nullp. Messen Posi- 📕 Ab-Tailstock

ZØ



#### 16.4 Measuring the Tool

By pressing the softkey

in the operating area



| M MAN   | JELL                       |                                  |      |                        |                |                      |
|---------|----------------------------|----------------------------------|------|------------------------|----------------|----------------------|
| 1/ Rese | t                          |                                  |      |                        |                |                      |
| WKS ø   |                            |                                  | Τ,Ε, |                        |                |                      |
| X       | 32.000                     |                                  | T s  | CHRUPPER_55<br>1 0.600 | D1             | Werkzeuge            |
| Z       | 157.000                    |                                  | F    | 0.000<br>0.000         | 100%<br>mm/min | Nullpunkt<br>versch. |
| ZGS     | 0.000                      |                                  | S1   | <b>0.000</b><br>2000.  | 100%           |                      |
|         |                            |                                  | 0%   | 100%                   | 200%           | _                    |
| T,S,M.  |                            |                                  |      | Werl                   | kzeugname      |                      |
|         | Т                          | D1                               |      |                        |                | _                    |
|         | Spindel Si                 | U/min                            |      |                        |                |                      |
|         | Sonst. M-Fkt.<br>Nullpktv. |                                  |      |                        |                |                      |
|         | Maßeinheit                 | -                                | _    | _                      |                | X<br>Zurück          |
| ] 🗘 т,  | S,M NPV<br>setzen          | ullp. 灯 Messen<br>erkst 🖉 Werkz. |      | Posi-<br>tion          | Ab-            | Tailstock            |

and pressing the softkey



| M MANUELL  | .                |                |                   |             |                       |        |           |
|------------|------------------|----------------|-------------------|-------------|-----------------------|--------|-----------|
| // Reset   |                  |                |                   |             |                       |        | Manuell   |
| WKS ø      | Position         | [mm]           |                   | T,F,S       |                       |        | Handerr   |
| х          | 32.000           |                |                   | T SCI<br>11 | IRUPPER_55<br>Ø.600   | D1     |           |
| Z          | 157.000          |                |                   | F           | 0 000                 | 199%   |           |
|            |                  |                |                   |             | 0.000                 | mm/min |           |
| ZGS        | 0.000            |                |                   | S1          | <b>0.000</b><br>2000. | 100%   |           |
|            |                  |                |                   | 0X          | 100%                  | 200%   |           |
| Messen Wer | kzeug            |                |                   |             |                       |        |           |
|            |                  |                |                   |             |                       |        | _         |
|            |                  |                |                   |             |                       |        |           |
|            |                  |                |                   |             |                       |        |           |
|            |                  |                |                   |             |                       |        |           |
|            | _                | _              | _                 | _           | _                     | Σ      | Zurück    |
| 📙 Т, S, M  | NPV<br>20 setzen | illp.<br>ærkst | lessen<br>lerkz . |             | Posi-<br>tion         | Ab-    | Tailstock |



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### the tool can be measured manually.



### After measuring has been selected in



,

| M MANUEL  | L             |   |
|-----------|---------------|---|
| 🥢 Reset   |               |   |
| WKS Ø     | Position [mm] | T.F.S   |
| х         | 300.000       | T SCHRUPPER_55 D1<br>11 0.600 D                       |
| Z         | 179.000       | F 0.000 100% Position<br>0.000 mm/min                 |
| ZGS       | 0.000         | S1 0.000 P 100% ×                                     |
|           |               | 8N 198N 288N  |
| Länge Man |               | Herkstückkante 2   T SCHRUPPE_55 D1   DP 1 57.000 abs |
|           | ×             | Abbruch   |
|           |               | Werkzeuglänge:<br>X 0.000 Setzen                      |
| 📙 т, s, м | NPV Nullp.    | Messen<br>Narkz Posi- J Ab-<br>tion spanen Tailstock  |

the screen form is displayed with the corresponding display.

The workpiece diameter is entered in the input field.



By pressing the softkey Set Length



the tool is dimensioned in the X-direction.

| <u>m</u> Manueli | L             |  |
|------------------|---------------|--|
| // Reset         |               |  |
|                  |               |  |
| WKS ø            | Position [mm] | T,F,S  |
| х                | 57.000        | T SCHRUPPER_55 D1 Werkzeuge                            |
| Z                | 179.000       | F 0.000 100% Position Merken                           |
| ZGS              | 0.000         | S1 0.000 R 100% ×                                      |
|                  |               | 0% 160% 280%   |
| Länge Man        | uell          | Werkstückkante Ø Z                                     |
|                  | _             | T SCHRUPPER_55 D1                                      |
|                  |               | DP 1   |
|                  |               | x <u>57.000</u> abs                                    |
|                  | x             | Abbruch  |
|                  |               | Werkzeuglänge:   |
|                  |               | X 121.500 Länge  |
|                  |               |  |
| 📙 т,s,м          | NPV Nullp.    | Messen<br>Werkz. Posi-<br>tion Ab-<br>spanen Tailstock |

| Werkzeug | glänge: |
|----------|---------|
| Х        | 121.500 |

| This value for the tool   |
|---------------------------|
| length is assigned to the |
| measured tool in the tool |
| list.                     |

WERKZEUGE

| P1. | Тур | Werkzeugname | DP | 1. Schne | eide    |         |       | . 4            | 53 | Alternat            |
|-----|-----|--------------|----|----------|---------|---------|-------|----------------|----|---------------------|
|     |     |              |    | Länge X  | Länge Z | Radius  | 0     | Plat.<br>länge | 12 |                     |
| 1   |     |              |    |          |         |         |       |                |    | Manuell             |
| 2   |     |              |    |          |         |         |       |                |    |                     |
| 3   |     |              |    |          |         |         |       |                |    | Werkzeug<br>1öschen |
| 4   |     |              |    |          |         |         |       |                |    | · · · · · ·         |
| 5   |     |              |    |          |         |         |       |                |    | Entladen            |
| 6   | 622 | BOHRER_8     | 1  | 11.000   | 45.800  | 8.000   | 118.0 |                | 2  |                     |
| 7   |     |              |    |          |         |         |       |                |    |                     |
| 8   |     |              |    |          |         |         |       |                |    |                     |
| 9   |     |              |    |          |         |         |       |                |    |                     |
| 10  |     |              |    |          |         |         |       |                |    | Schneider           |
| 11  |     | SCHRUPPER_55 | 1  | 121.500  | 0.000   | 0.600 + | 93.05 | 5 11.0         | 2  |                     |
| 12  |     |              |    |          |         |         |       |                |    | Sortierer           |
| 13  |     |              |    |          |         |         |       |                |    |                     |
| 14  |     |              |    |          |         |         |       |                |    |                     |
|     |     |              |    |          |         |         |       |                | Σ  |                     |





By pressing the softkey

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| M MANUELL                  | .                    |                  |                  |                |                    |
|----------------------------|----------------------|------------------|------------------|----------------|--------------------|
| // Reset                   |                      |                  |                  |                |                    |
|                            |                      |                  |                  |                |                    |
| WKS ø                      | Position [mm]        | T,F              | 7,S              |                |                    |
| Х                          | 57.000               | T :              | SCHRUPPER_55     | D1             | Werkzeuge          |
| -                          |                      |                  | 11 0.600         |                |                    |
| Z                          | 300.000              | F                | 0.000<br>0.000   | 100%<br>mm/min | Position<br>merken |
| ZGS                        | 0.000                | Si               | L 0.000<br>0.000 | ⊠ 100%         | x                  |
|                            |                      | 8%               | 100%             | 288%           |                    |
| Länge Manuell Werkzeugname |                      |                  |                  | z              |                    |
|                            |                      | т                | SCHRUPPER_55     | D1             | _                  |
|                            |                      | DP               | 1                |                |                    |
|                            |                      | х                | 0.000            | abs            |                    |
|                            |                      |                  |                  |                |                    |
|                            |                      |                  |                  |                | Abbruch            |
|                            |                      | Wor              | Werkzeug] änge   |                |                    |
|                            |                      | X                | 121.50           | 3              | Länge<br>setzen    |
| 📙 Т,S,M                    | NPV<br>Setzen Werkst | Messen<br>Werkz. | Posi-<br>tion    | Ab-            | Reitstock          |

, after "scratching" the tool can be moved as required in the working area.



The measured position is saved

| Gemerkte | Position |
|----------|----------|
| х        | 57.000   |

and is automatically balanced against the workpiece diameter that was entered.

| Manuell    |               |                  |  |   |                    |  |  |
|------------|---------------|------------------|--|---|--------------------|--|--|
| // Reset   |               |                  |  |   |                    |  |  |
| WKS ø      | Position [mm] | 1                | F,S                                      |   | _                  |  |  |
| х          | 57.000        | Т                | SCHRUPPER_55<br>11 0.600                 | D1                                      | Werkzeuge          |  |  |
| Z          | 300.000       | F                | 0.000<br>0.000                           | 100%<br>mm/min                          | Position<br>merken |  |  |
| ZGS        | 0.000         | s                | 1 0.000                                  | ⊠ 100%                                  | x                  |  |  |
|            |               | 0X               | 100%                                     | 200%                                    |                    |  |  |
| Länge Manu | ell           | -                | Werl                                     | <zeugname< th=""><th>Z</th></zeugname<> | Z                  |  |  |
|            | x             | DF<br>X          | 1<br>0.000                               | abs                                     |                    |  |  |
| 2          |               | Ge<br>X<br>We    | merkte Positio<br>57.000<br>rkzeuglänge: | in<br>3                                 | Abbruch            |  |  |
|            |               | X                | 121.500                                  | 3                                       | setzen             |  |  |
| 📙 Т,S,M    | NPV Nullp.    | Messen<br>Werkz. | Posi-                                    | Ab-                                     | Reitstock          |  |  |
### 16.5 Positioning with Feed or Rapid Feed

By pressing the softkey



in the operating area



| M MANU        | IELL                       |         |                 |    |             |                   |                |                      |
|---------------|----------------------------|---------|-----------------|----|-------------|-------------------|----------------|----------------------|
| // Rese       | t                          |         |                 |    |             |                   |                |                      |
| WKS ø         | Position                   | [mm]    |                 | Τ, | F,S         |                   |                |                      |
| Х             | 32.000                     |         |                 | T  | SCHRU<br>11 | IPPER_55<br>0.600 | D1             | Werkzeuge            |
| Z             | 157.000                    |         |                 | F  |             | 0.000<br>0.000    | i00%<br>mm/min | Nullpunkt<br>versch. |
| ZGS           | 0.000                      |         |                 | s  | 10          | 2000.             | 100%           |                      |
| <b>T</b> 0 11 |                            |         |                 | 8% |             | 100%              | 288%           |                      |
| 1,S,M         | T                          | D1      |                 |    |             | Werk              | zeugname       |                      |
|               |                            | 01      |                 |    |             |                   |                | _                    |
|               | Spindel S1                 | U/m:    | in              |    |             |                   |                |                      |
|               | Sonst. M-Fkt.<br>Nullpkty. | -       |                 |    |             |                   |                |                      |
|               | Maßeinheit                 |         |                 |    |             |                   |                | X<br>Zurück          |
| ] 🔒 т,:       | S,M PV<br>setzen W         | ullp. 👔 | lessen<br>lerkz |    |             | Posi-<br>tion     | Ab-            | Tailstock            |

#### the target position is entered in the input fields.



#### 16.6 Free Machining Cycle

By pressing the softkey

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in the operating area



the input field for the free machining cycle is selected.

| M MANUE  | ELL              |                            |          |        |                 |                |                      |
|----------|------------------|----------------------------|----------|--------|-----------------|----------------|----------------------|
| // Reset |                  |                            |          |        |                 |                |                      |
| WKS ø    | Position         | [mm]                       | Т        | ,F,S   |                 |                |                      |
| х        | 300.000          |                            | Т        | SCHRUF | PER_80<br>0.600 | D1             | Werkzeuge            |
| Z        | 300.000          |                            | F        | •      | 0.000<br>0.000  | 100%<br>mm/min | Nullpunkt<br>versch. |
| ZGS      | 0.000            |                            | S        | 51     | 0.000<br>0.000  | ⊠ 100%         |                      |
|          |                  |                            | 0x       |        | 100%            | 200%           |                      |
| T,S,M    |                  |                            |          |        | Werk            | zeugname       |                      |
|          | т                | D1                         |          |        |                 |                | _                    |
|          | Spindel Si       | U/min                      |          |        |                 |                |                      |
|          | Sonst. M-Fkt.    |                            |          |        |                 |                |                      |
|          | Nullpktv.        |                            |          |        |                 |                |                      |
|          | Maßeinheit       |                            |          |        |                 |                |                      |
|          |                  |                            | _        | _      | _               | $\square$      | Zurück               |
| ] 🔒 т, s | MPV<br>20 setzen | ullp. I Mess<br>erkst Werk | en<br>z. | <      | Posi-<br>tion   | Ab-<br>spanen  | Reitstock            |



This machining cycle is described in greater detail in the "Programming Example for the Machining Cycle".

#### 17 Manual Functions ShopTurn

In this module, the manual functions are described.





, the following cycles are available.

The machining cycles for face turning and longitudinal turning.



Each of the cycles described here can be processed directly after entering the values. No program need to be generated.

The grooving cycles,

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the thread cycles,

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the cut-off cycle.



In the "manual" mode, the following milling cycles are provided:

Reactangular pocket



Circular pocket



Rectangular spigot



Circular spigot,



TIA Training Document Status: 01/2010







All cycles described here are identical with the cycles used in a ShopTurn program.

In the "manual" mode, it is also possible to operate the machine manually.

After selecting the tool and the technology,

| Т  | SCHRUPPER_8 | 30A D1  |
|----|-------------|---------|
| F  | 0.30        | 10 mm/U |
| F  | 0.00        | 0mm/min |
| S1 | 100         | 0U/min  |
|    | ç           | auto    |
| S4 |             | U/min   |

| 🗹 hand          |               |              |          |          |                  |        |              |                |           |
|-----------------|---------------|--------------|----------|----------|------------------|--------|--------------|----------------|-----------|
| 🐼 Aktiv         |               |              |          |          |                  |        | U U          |                |           |
|                 |               |              |          |          |                  |        | Alternat.    |                |           |
| MKS a           | Posit:        | ion [mm]     |          | T,F,S    |                  |        |              |                |           |
| х               | 76.           | .048         |          | T SCHRUP | PER_88A<br>0.880 | D1     | Herkzeuge    |                |           |
| 7               | 37            | 618          |          |          |                  | -      |              |                |           |
| -               | 0/1           | 010          |          | F 2      | 000.             | 100%   |              |                |           |
|                 |               |              |          | S1 1     | aaa              |        |              |                |           |
|                 |               |              |          |          | 1888.            | I 100% |              |                |           |
|                 |               |              |          | ex .     | 1025             | 2000   |              |                |           |
|                 |               | M HAND       |          |          |                  |        |              |                |           |
|                 |               | Aktiv        |          |          |                  |        |              |                | ()        |
|                 |               |              |          |          |                  |        |              |                | Alternat. |
|                 |               | WKS #        | Position | [mn]     |                  | T,F    | ,S           |                |           |
|                 |               | х            | 76.04    | -8       |                  | T      | CHRUPPER_88A | D1             | Herkzeuge |
|                 | -             | 7            | 44 65    | 7        |                  |        |              |                |           |
|                 |               | 2            | 44.00    | .,       |                  | F      | 2000.        | 100%<br>nn/min |           |
| Hessen<br>Herkz | NPV<br>setzen |              |          |          |                  | S1     | 1000.        | 100% I         |           |
|                 |               |              |          |          |                  | 95     | 1993         | 2000           | Kernal    |
|                 |               |              |          |          |                  | Ŧ      | rechts/      | Links/aus      | drehen    |
|                 |               |              |          |          |                  | F      | 0.300        | MM/U           |           |
|                 |               |              |          |          |                  | F      | 0.000        | mm/min         |           |
|                 |               | <b>A</b>     |          |          |                  | 51     | 1000         | auto           |           |
|                 |               |              | <b>V</b> |          |                  | S4     |              | U/min          |           |
|                 |               | •X           |          |          |                  | Con    | M.F.LA       | _              |           |
|                 |               |              |          |          |                  | 3016   | se. merke.   | _              |           |
|                 |               |              | _        |          |                  |        |              | Σ              |           |
|                 |               | Messen Marka | NPV -    | Gerade 🎫 | Bohren           | Dreher | Frasen       | + Sinu-        |           |

the machine runs with the technology entered.

The motion of individual or several axes -for example, for taper turning- is shown graphically. Feed "green"; rapid feed "red".

In this module, DIN programming under ShopTurn is explained.

Example DIN Programming

10484 30.01.2006 15:16

11361 30.01.2006 16:02

6335 30.01.2006 15:13

8056 06.03.2006 11:26

1 16.03.2006 16:36

10 GBytes NC:

Abbruch

1481128

#### 18 DIN Programming under ShopTurn

In this module, programming in DIN under ShopTurn is explained, using on an example.

INI

INI

INI

MPF

Bitte geben Sie den neuen Namen ein

Festplatte:

WWP

VERZEICHNIS

Ð

Đ

לב) SHOPTURN.WPD\...

GEWINDESTIFT\_TMZ

CENTROPORTET

WELLE DIN

Freier Speicher

NC PA Disk A PA Stick

KUGELGELENKWELLE\_TMZ

ALUFELGE\_64\_GEGEN

Under ShopTurn, we can program according to DIN (DIN 66025) as well as with the cycles of the 840D.

When setting up a new program, the DIN Editor is opened under ShopTurn

by pressing the softkey



The program example is generated by using the standard cycles.

| Programm     |        |        |        |        |        |                     |
|--------------|--------|--------|--------|--------|--------|---------------------|
| WWP          |        |        |        |        |        | 1<br>Markierer      |
| ¶<br>==eof== |        |        |        |        |        |                     |
|              |        |        |        |        |        | Kopieren            |
|              |        |        |        |        |        | Einfügen            |
|              |        |        |        |        |        | Aus-<br>schneider   |
|              |        |        |        |        |        | Suchen              |
|              |        |        |        |        |        |                     |
|              |        |        |        |        |        | Weiteres            |
|              | _      | _      | _      | _      | _      | Rücküber-<br>setzen |
| Edit         | Kontur | Bohren | Fräsen | Drehen | ti Sir | ion Abar-           |

The following G-functions are used to generate the program.

G18- Plane selection XZ plane (turning plane)

- G41- Tool radius correction from the left
- G54- Activation of the first zero point shift
- G90- Programming absolute dimensions
- G95- Feed rate in mm/rev
- G96- Constant cutting speed



With the program "TCP", the tool change point is defined that is approached after machining.

The approach and return cycles are contained in ShopTurn cycles, not in the standard cycles.

After entering the TCP

| PROGRAMM  |                     |
|---|---------------------|
| HHP 18<br>Ge G18 G588 g98 x488 z388 T8 D8 S388 M4 M91                               | Markieren           |
| M17¶<br>¶<br>-G18 Anwahl der Ebene¶   | Kopieren            |
| ;5500 Verschiebungen deaktivieren¶<br>;690 absolute Position ¶                      | Einfügen            |
| ;T0 D0 Werkzeug und Schneidenabwahl]]<br>;M4 Drehrichtung[]<br>;M9 Kühlmittel aus[] | Aus-<br>schneiden   |
| ;H17 Unterprogramm Ende¶<br>==eof==   | Suchen              |
|   |                     |
|   | Weiteres            |
|   | Rücküber-<br>setzen |
| Edit Kontur Bohren Fräsen Drehen tion   | Abar-<br>beiten     |

#### a new program with the name Contour is generated.

| YEF  | RZEICHNIS             |              |              |               |                       |                  |                    |
|------|-----------------------|--------------|--------------|---------------|-----------------------|------------------|--------------------|
|      | Name                  | Тур          | Geladen      | Größe         | Datum/Z               | eit              |                    |
| 5    | SHOPTURN.WPD\         |              |              |               |                       |                  |                    |
| Ľ    | ALUFELGE_64_GEGEN_TMZ | INI          |              | 10484         | 30.01.2006            | 15:16            |                    |
|      | GEWINDESTIFT_TMZ      | INI          |              | 11361         | 30.01.2006            | 16:02            | Programm           |
|      | KUGELGELENKWELLE_TMZ  | INI          |              | 6335          | 30.01.2006            | 15:13            |                    |
| ľ    | ALUFELGE_64_GEGEN     | MPF          | х            | 8056          | 06.03.2006            | 11:26            | G-Code<br>Programm |
|      | CENTROPORTIET         | MDP          | v            | 7550          | oc op 200c            | 44.22            | Trogramm           |
| B    | Neues G-Lode Program  | M            |              |               |                       |                  |                    |
|      | Bitte geben Sie       | den neue     | n Namen e    | in:           |                       |                  |                    |
| _    | -                     |              |              |               |                       |                  |                    |
| B    | F                     |              |              |               |                       |                  |                    |
|      | F Kontur              |              |              |               |                       |                  |                    |
|      | F Kontur              | MPF          | x            | 224           | 16.03.2006            | 16:46            |                    |
|      | F Kontur              | MPF          | x            | 224           | 16.03.2006            | 16:46            |                    |
|      | Kontur<br>WHP         | MPF          | x            | 224           | 16.03.2006            | 16:46            |                    |
|      | Kontur<br>WHP         | MPF          | x            | 224           | 16.03.2006            | 16:46            | Abbruch            |
|      | Kontur<br>WHP         | MPF          | x            | 224           | 16.03.2006            | 16:46            | Abbruch            |
| Fre  | Kontur<br>WHP         | MPF<br>Festp | X<br>platte: | 224<br>10 GBy | 16.03.2006<br>tes NC: | 16:46            | Abbzuch            |
| Free | Kontur<br>HHP         | MPF<br>Fest  | X<br>Platte: | 224<br>10 GBy | 16.03.2006<br>tes NC: | 16:46<br>1481128 | Abbruch<br>OK      |

By pressing the softkey



# the contour calculator for standard programming is opened.

After selecting the starting point

| Star | tpunkt       |       |
|------|--------------|-------|
|      |              |       |
| х    | 26.000       | abs   |
| z    | 0.000        | abs   |
|      |              |       |
|      |              |       |
|      |              |       |
|      |              |       |
|      |              |       |
| Fher | onauswahl ·  | G18   |
| LDCI | iciaus#ant.  | 010   |
|      |              | _     |
| Maßa | angabe Plana | chse: |
| DIAM | 10F Radius   |       |
|      |              |       |
| Star | tounkt       | GØ    |
| otar | . cpuint c   | 00    |

| PRO | )gramm     |       |      |    |    |                                  |                             |    |                      |
|-----|------------|-------|------|----|----|----------------------------------|-----------------------------|----|----------------------|
|     |            |       |      |    |    | St                               | artpunk                     | εX |                      |
|     |            |       |      |    |    | Startpunkt                       |                             | -  |                      |
| END | 80-        |       |      |    |    | X 0.00<br>Z 0.00                 | <mark>0</mark> abs<br>0 abs |    |                      |
|     | 40-        |       |      |    |    | Characteristics                  | 640                         |    |                      |
|     | <b>8</b> - |       | •    |    |    | Maßangabe Plana<br>DIAMOF Radius | u18<br>achse:               | U  | Wert<br>löschen      |
|     | -48-       |       |      |    |    | Startpunkt                       | GØ                          | U  | Pol                  |
|     | -80-       |       |      |    |    | freie Eingabe                    |                             |    |                      |
|     | ∿ø<br>t⇒z  | -48 - | 20 0 | 20 | 49 |                                  |                             |    | Abbruch              |
|     |            | _     |      |    |    |                                  | _                           | i  | Übernahme<br>Element |
|     |            |       |      |    |    |                                  |                             |    |                      |

and pressing the softkey



the workpiece contour (refer to the drawing) is described by using -as in the case of the contour calculator of ShopTurn- the softkeys below.











-78.0

-76.0

-74.0

68.0

-80.0

Element 11





Free input

The contour is completed. Since this contour is called later as a subprogram in another program, the instruction M17 is used at the program end for "End of subprogram".

By pressing the softkey





it is accepted in the editor.

| PROGRAMM  |                |                   |
|---|----------------|-------------------|
| KONTUR  | 10             |                   |
| -   |                | Markieren         |
| 1 C12 C02 DTOMON  |                |                   |
| G0 70 Y52 ·*GD*1  |                | Kopieren          |
| G1 Z-2 X60 :*GP*1   |                |                   |
| Z-20;*GP*¶  |                | Fin Course        |
| X80 RND=2.5 ;*GP*1  |                | Einfugen          |
| Z-30 X100 ;*GP*¶  |                |                   |
| Z-44 RND=2.5 ;*GP*¶   |                | Aus-<br>schneiden |
| X120 RND=1 ;*GP*[   |                |                   |
| Z-70 RND=1 ;*GP*[]  |                | Ourban            |
| X160 CHR=2 ;*GP*¶   |                | Suchen            |
| Z-100 ;*GP*1  |                |                   |
| ;Dies_ist_die_Endekennung_eines_Konturzuges!!!! ;*uP*  <br>M179 |                |                   |
| =====   |                |                   |
|   |                |                   |
|   |                | Weiteres          |
|   |                |                   |
|   |                | Rücküber-         |
|   |                | CCLEGIT           |
| 🗾 Edit Kontur Bohren Fräsen Drehen 📩                            | Simula<br>tion | Abar-             |

Now, another program with the name

| Neues G-Code Programm                      |   |                |
|--|---|----------------|
| Bitte geben Sie den neuen Namen ein:       |   |                |
|  |   |                |
| METTE DIM                                  | просрани  |                |
|  | PKUUKHMM  |                |
| in a constant                              | Mari  | kierer         |
| is generated.                              | wwp; Werkzeugträger auf Wechselpunkt¶                         |                |
|  | П   | pierer         |
| Next.                                      |   |                |
|  | Ein   | nfügen         |
|  |   |                |
|  | A   | Aus-           |
| wwp; werkzeugträger aut Wechselpunkt)<br>ת | Su  | . ISTOR        |
| we travel to the tool                      | Su  | uchen          |
| abanga paint by calling                    |   |                |
| change point by calling                    |   |                |
| the program "ICP"                          |   |                |
|  | Wei   | iteres         |
|  |   |                |
|  | Rück  | küber<br>etzen |
|  | Bitte warten, selektierter Bereich wird kopiert!              | ol .           |
| The tool is called by                      | Z Edit Kontur Bohren Fräsen Drehen 📩 Simula                   | Abar-<br>beite |
| pressing the softkey                       |   |                |
| processing the control                     |   |                |
|  |   |                |
|  |   |                |
|  |   |                |
|  |   | _              |
|  | P1. Typ Werkzeugname DP1. Schneide Altr                       | O<br>ernat.    |
|  | Länge X Länge Z Radius Plat. 12                               |                |
|  | 1 SCHRUPPER_80 1 100.000 100.000 0.800 ← 95.0 80 11.0 ℃ Pro   | ins<br>ogramm  |
| Weiteres                                   | 2 / SCHLICHTER_35 1 180.000 100.000 0.400 + 93.0 35 11.0 0    |                |
|  | 3 SCHRUPPER_04 1 0.000 0.000 0.400 t 93.0 55 5.0 2            | rkzeug         |
|  | 4 🖏 SCHLICHTER_stirn 1 100.000 100.000 0.400 + 93.0 35 11.0 0 | I IGH          |

and



For programming the tools, ShopTurn tool management is provided.

After selecting a tool,

= FRAESER\_3 1 100.000 100.000 3.000 5 3 Entladen BOHRER\_5 6 1 100.000 100.000 5.000 118.0 7 1 100.000 100.000 0.100 3.000 8.0 O PILZ\_5 8 1 0.000 0.000 2.500 9 1 100.000 100.000 0.200 2 10 STECHER\_Stirn Schneide 8.00 1 100.000 100.000 0.200 2.500 11 DOHRER\_18 1 100.000 100.000 18.000 180.0 12 SCHLICHTER\_1 1 100.000 100.000 0.400 + 93.0 35 3.0 Sortiere 13 14 Ы Werkz. versch Maga- Nullp. R-Para We 1

and

facing machining is programmed.

Drehen

#### By pressing the softkey



the machining cycle is opened.

First, the program name of the contour is entered.

#### NPP KONTUR

Then, the additional entries are made.

| NPP KONTUR    |          |       |
|---------------|----------|-------|
| Bearbeitung   | Schrupp  | ben   |
| Auswahl       | längs    |       |
| Auswahl       | außen    |       |
| Auswahl mi    | t Nachzi | ehen  |
| Zustelltiefe  | MID      | 4.000 |
| Schlichtaufm. | FALZ     | 0.200 |
| Schlichtaufm. | FALX     | 0.200 |
| Schlichtaufm. | FAL      | 0.000 |
| V. Schruppen  | FF1      | 0.120 |
| V. Eintauchen | FF2      | 0.100 |
|               |          |       |
| Verweilzeit   | DT       | 0.000 |
| Weglänge      | DAM      | 0.000 |
| Abhebweg      | VRT      | 2.000 |

These are accepted by pressing







28

Markieren

Kopieren

Einfügen

Ausschneider

Suchen

Weiteres

Rücküber setzen

Simula 🗠 Abartion beiter

### **SIEMENS**

Then, the simulation as under ShopTurn can take place.



Next, the thread undercut is generated.

PROGRAMM

wwp[] ;Schlichtbearbeitung[]

G18 G54 G90¶ G0 x32 z0¶ G1 x-0.8 F0.1¶

G0 z211 G0 G42 x22 z211

KONTUR¶ GØ G40 G91 ×2¶ G90¶

G0 z-10¶ F0.07¶

==eof==

📕 Edit

ſ

T="SCHLICHTER\_35"¶ G96 S320 Lims=3000 M4 M8¶

Kontur

CYCLE95("KONTUR",3,0.2,0.2,0.3,0.12,0.1,,201,0,0,0)¶

Bohren

Fräsen

Drehen

After entering the starting point

G90¶ G0 z-10¶ F0.07¶

and pressing the softkey

Drehen

and Undercut

Freistich

the screen form for the undercut is

After entering the

DIAT

30.000

-20.000

| wFreistich/CYCLE96 | Nenndurchmesser, Au | ßendurchm. des Gewind | es              |
|--------------------|---------------------|-----------------------|-----------------|
|                    | Nenndurchmes.       | DIAT <u>30.000</u>    |                 |
| SPL                | Form                | FORM B                | Form            |
| FORM A+B           | Auswahl Lage<br>TH  | _VAR 3                | Form<br>A,B,C,D |
| z                  | •                   |                       |                 |
|                    |                     |                       | Abbruch         |
|                    |                     |                       | ок              |
|                    |                     |                       |                 |

Anfangspunkt SPL Form FORM B Auswahl Lage \_VAR 3

opened.

values

Nenndurchmes.



| After entering the values |          |         |  |  |
|---------------------------|----------|---------|--|--|
| Tabelle                   | metrisch |         |  |  |
| als Gewindeg              | MPIT     | 30.000  |  |  |
| als Wert                  | PIT      | 3.500   |  |  |
| Anfangspunkt              | SPL.     | 0.000   |  |  |
| Endpunkt                  | FPL      | -19.000 |  |  |
| Durchmesser 1             | DM1      | 30.000  |  |  |
| Durchmesser 2             | DM2      | 30.000  |  |  |
| Einlaufweg                | APP      | 0.000   |  |  |
| Auslaufweg                | ROP      | 0.000   |  |  |
| Gewindetiefe              | TDEP     | 1.500   |  |  |
| Schlichtaufm.             | FAL      | 0.100   |  |  |
| Zustellwinkel             | IANG     | 0.000   |  |  |
| Startpunktv.              | NSP      | 0.000   |  |  |
| Schnitte                  | NRC      | 8.000   |  |  |
| Leerschnitte              | NID      | 1.000   |  |  |
| Ouewah1                   | außen    |         |  |  |

| Programm  |                            |
|---|----------------------------|
| WELLE_DIN   | 39<br>Markieren            |
| 60 x82 z2¶<br>₩vp∏<br>CYCLE97(3.5,30,0,-11,30,30,7,2,2.273,0.1,0,0,8,1,1,1,2)¶<br>60 x40¶ | Kopieren                   |
| wwp]<br>n   | Einfügen                   |
| "<br>==eof==  | Aus-<br>schneiden          |
|   | Suchen                     |
|   |                            |
|   | Weiteres                   |
|   | Rücküber-<br>setzen        |
| 📝 Edit Kontur Bohren Fräsen Drehen 🗲 S  | imula 🔍 Abar-<br>ion eiter |

## Auswahl Konst. Zust. Anzahl Gänge NUMT 1.000 Rückzug VRT 2.000

and programming the tool change point

G0 ×40¶ <mark>wwp1|</mark>

the thread is completely programmed and the program done.



#### 19 CAD Reader

#### **19.1 General Function**

The CAD Reader is used for the following: to further edit drawings with the SINUMERIK controller that were constructed with a CAD system. As the format, a DXF file (**D**rawing e**X**change **F**ormat) is entered, and contours or drilling points are filtered out. Parts that are not necessary for editing (such as dimensions, hatching, labeling, frames, etc.) can be removed. The generated contours or drilling patterns are implemented in a way that the geometry processor or cycle support understand them.

#### 19.2 Opening the CAD READER

We are in the basic directory with the following softkeys:

- Machine
- Programs
- Program edit
- Alarm list
- Tool zero point

| VERZEICHNIS         |               |                 |                  |            |       |      |   |
|---------------------|---------------|-----------------|------------------|------------|-------|------|---|
| Name                | Тур           | Geladen         | Größe            | Datum/Zeit |       |      |   |
| CAD_DXF             | WPD           | x               | NCK-Dir.         | 30.03.2008 | 10:54 |      |   |
| CAD_DXF_DREHEN      | WPD           | ×               | NCK-Dir.         | 30.03.2008 | 13:38 |      |   |
| SHOPTURN            | WPD           |                 | NCK-Dir.         | 27.03.2008 | 19:22 |      |   |
| WERKSTUECKE         | WPD           |                 | NCK-Dir.         | 30.03.2008 | 13:57 |      |   |
| Freier Speicher     | Festo         | latte:          | 7.4 GBytes       | NC: 11     | 00352 |      |   |
|                     | restp.        | Lacte.          | /                | 1101 1     |       |      |   |
| schine ro-<br>gramm | Prog.<br>edit | Alarm-<br>liste | Werkz.<br>Nullp. |            |       |      |   |
|                     | <b></b>       |                 |                  |            |       | MENU | > |



With this arrow key toward the right, the softkey bar opens.

| Freier Spe | eicher   | Fe                 | estplatte: | 4.6 GByt            | es NC:        | 1296280 |    |
|------------|----------|--------------------|------------|---------------------|---------------|---------|----|
|            |          |                    |            |                     |               | $\sum$  |    |
| Dienste    | Diagnose | Inbetrieb<br>nahme | Parameter  | Drucken<br>Programm | CAD<br>Reader |         | Be |

| Press the softkey "CAD |  |
|------------------------|--|
| Reader"                |  |

#### 19.3 Open the DXF Drawing from a File



Datei öffnen",

#### 19.4 Toolbar

SIEMENS



The toolbar can be selected by means of the global header "View  $\rightarrow$  Toolbar Display".

#### Operation in General

All CAD Reader functions can be accessed with the keyboard as well as with the mouse. The right mouse key corresponds to the "ESCAPE" function that can be used to reset activated menus or functions.



Operating Sequence Open DXF files With Open, the selected CAD drawing is selected.



Saving the Generated Program Generated sequences can be saved as data type in the • MPF format (□.mpf)

- SPF format (□.spf)
- ARC format ( ... arc) (SINUMERIK archive)



#### Return

When tracking contours, the last action is reset element by element, or the last intersection, depending on the selection.

#### 19.5 Specifying the Zero Point



To read out the contour as an NC program, it is necessary to define a zero point of the drawing, since in most cases it will deviate from the zero point of the DXF file.

The following options are provided for defining the zero point:

Element Center• Automatically on Element CenterElement Start• Automatically on Element StartElement End• Automatically on Element EndFree input<br/>Mouse position• Direct input of the coordinates; for example. X100, Y100<br/>• Any position by making the selection with the mouse

#### 19.6 Contour Tracking

#### Setting the Contour Starting Point



#### Contour Tracking with Starting Point and End Point

The starting and end point of the contour to be generated is selected depending on the initial position of the technology used:

Element center Start/End point Mouse position

- Automatically on Element Center
- · Automatically on Element Start/End point
- · Directly through selection with the mouse

#### Example



1. Contour direction:

Results from specifying the starting point • and further contour selection. When tracking contours, the attempt is made to select the contour automatically to the greatest extent.

2. Selection if there is a conflict

If automatic contour tracking can no longer uniquely determine a subsequent element, we switch to the interactive mode. The user is asked to specify the next element that continues the contour.



3. Full circle as contour

A full circle can be accepted with contour tracking in both directions.

4. Setting the end point

The end point can be set to any selected contour tracking element and accepted.

#### **Additional Notes**

- Full circles can be accepted as contour or as drill points.
- We can cancel contour tracking either by using the keyboard with the
- "Esc" key, or with the mouse using the right mouse key.



Setting the

Contour Endpoint

Element center Element endpoint Mouse position Current position

#### Setting the Contour Label

Prior to contour tracking, labels can be set by entering start and end labels.

If labels are assigned twice, the CAD reader becomes interactive if the label was assigned once before

- · Regarding contour tracking in contours that are already selected
- In the case of appendixes to files if the label already occurs in the file.

#### Setting Drilling Points

1. Full circle as hole

A full circle can be selected with the function drilling points. The output of the generated G-code corresponds to the cycle format.

#### **Drilling Points Start**

2. By selecting Drilling Pattern, drilling points can be parameterized as

- Any drill position
- · Corresponding to the cycle
- Corresponding to the cycle
- Corresponding to the cycle
- $\oplus$

Any position

Row of holes

Hole spacing

Hole circle

#### **Drilling Points End**

3. Selected drilling points from the selection Drill pattern are accepted.

#### 19.7 Influencing the Graph

#### Selecting the Machining Area:

If a file includes many additional drawings such as cuts, dimensions, hatched area, labeling, detail representations, frames, etc., the selection of the machining area and the number of elements can be reduced by using a "lasso".

#### **Deselecting the Machining Area**

The selected machining area can be canceled with this deselection.







#### Zoom/Keys "+" and "- "

With the mouse key, it is possible to specify a zoom area within a drawing. By clicking on the symbol and using a "lasso" or the "+" and "–" keys, the graph area is centrically enlarged or reduced step by step. The drawing area can be shifted by using the cursor keys.

#### 19.8 Processing the File that was Entered



#### New Drawing/Spacer Key

Reads out the current drawing anew optimized according to the layer selection.

#### Geometry

With a mouse click, the coordinates are read out for the selected element corresponding to the current zero point. If the button Edit is displayed in the display screen form, this element can be edited by selecting this button.



#### Note

This function is suitable for minor changes in the geometry, in order to remedy inadequacies (particularly missing intersections) in the CAD drawing.

For larger changes, use the geometry processor. Once a change is made, it **can not** be reset.



#### Layer Selection

Initially, the selected DXF file is always shown with all its layers. If the file contains several layers, all are shown in the basic view. However, layers without data that is relevant to the contour can be hidden. Likewise, contours ranging over several layers can be selected by means of a selection screen form for contour tracking.

Layer selection can not be canceled.



#### Contouring

By activating this icon, the drawing is rotated around the specified zero point by 90 degrees respectively, corresponding to the presetting. Contour characteristics that were already generated are not rotated.



#### **Insert Hatched Areas and Measurements**

Is used to remove or insert hatched areas and measurements in the CAD drawings.

With another mouse click, this function is reset.



#### **Deleting Contour Tracking**

Defined contours can be selected or completely deleted. The function "Delete contour" is activated with the initial operation of this icon, and deactivated by operating the icon again. Deleting finished contours:

Select icon: activate Delete contour Select contour: contour is deleted



#### **Deleting the Geometry Element**

With this function, individual geometry elements can be deleted. The function "Delete geometry element" is activated with the initial operation of this icon and deactivated by operating the icon again.

Deleting the geometry element:

Select icon: activate Delete geometry element Select elements: geometry element is deleted



#### **Deleting the Geometry Area**

By means of a rectangle set up with the mouse (corresponds to the area to be deleted) a whole area can be deleted from the geometry.

This function is deactivated autonomously with each deletion und has to be reactivated each time with this icon.

Select icon: activate Delete the geometry area Select the area: geometry area is deleted



#### 19.9 Setting the Workpiece Zero Point



Contour tracking



### 19.10 Transferring the Contour Elements to the Directory and the Contour Calculator

- -Save as -SI\_Train -dh -wks.dir
- -Select the directory where the contour is to be stored.



#### 20 Sample Drawings - Turning

#### 20.1 Bolt



#### 20.2 Pin


### 20.3 Shaft Outside-Contour Contour Calculator





### 20.4 Shaft Groove



### 20.5 Shaft Rectangular Pocket Frontal Face





### 20.6 Shaft Raw Part Contour Available



### 20.7 Shaft with Holes on the Frontal Face



### 20.8 Step Shaft Grooves Threats



#### 20.9 Cone



### 20.10 Cardan Shaft



### 20.11 Kidney/Face End





### 20.12 Stamp/Face End





#### 20.13 Fitted Shaft

