

# BENDMATE 2000

## Operating Instructions



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# 1 Introduction

The Bendmate 2000 is designed to process steel rules creating notches, arcs and bends in the rules.

To do this, angle and material tables are created into which the grid points for the positioning of the bending and stamping tool for certain angles are entered. Angles between these gridpoints are linear interpolated. In addition to the tables there are also the parameter files LIMITS.PAR and TOOL.SC6.

Arcs are converted into a draft of traverse with adjustable increment width.

The position of notches, arcs and bends on a rule is determined in job files (\*.cnc).

The installation is controlled by an industrial PC under Windows NT and allows intuitive operator guidance with symbols.

The Bendmate 2000 has many functions that distinguish it from other installations:

- Operating system Windows NT 4.0 – With this control, the machine user can also work with all the programs he knows from using his normal PC. In addition, the machine can easily be linked to an existing network.
- Spindle pitch error compensation – The machine autonomously controls spindle pitch deviations. This increases the accuracy of the milled paths.
- Video clips – The user can access the help menu from any screen in order to read an appropriate help text or to watch a short film for the desired subject.
- Language change on the fly – In our multicultural society it is necessary that the user guidance can be easily adjusted according to the needs of the operator. Pressing a button suffices to select between various languages (German, English, French,...).

A word about this manual: words marked bold usually describe a switch or a field. Sentences *in italics* and those underlined must be taken seriously in order to avoid damage to the machine (or parts thereof) or not to cancel out changes already made.

## 2 Basic operation processes

This chapter describes simple operating sequences, such as those required every day for working with the machine. You will discover that even after a very short period of time you will be able to process the first jobs.

### 2.1 Starting the program

After turning on at the main switch, the computer starts up on its own and several minutes later displays the familiar Windows screen. Double clicking the icon "Bendmate" starts the program.

### 2.2 Operator guidance structure

The basic operator guidance is explained using the start-up screen shown below.

The screenshot shows the machine's start-up interface. At the top left, a red banner displays the error message "1/1: [300] Emergency chain open". To its right, a "Machine set up" window shows "Error" in red. Further right, a "No Ref Drive" warning with a red 'X' icon is visible. Below these are two position display boxes: one for X and C axes showing "0.00 mm" and "0.00 °", and another for Absolute and Relative positions, also showing "0.00 mm" and "0.00 °". A control panel includes buttons for "Position reset" (SHIFT+SPACE), "Go to position" (SHIFT+ENTER), and a "Finish program" button (ALT+F4). A table of parameters is shown on the right, and a bottom toolbar contains various function buttons like "Error reset", "Help", "Continue", "Reference drive", "English", "Diagnostic", "2 point parameters", "3 point parameters", "insert coil", and "Error table".

Offset FBS	0.007156 m
Offset C	-8.8000 °
ContractionX+	100 %
ContractionX-	0 %
Override C	100.00 %

(1) Error messages: If the machine detects an error, this is shown here in plain text. If there is more than one error at the current time then the individual messages are changed approx. every five seconds.

(2) Status display: The name of the current screen is shown in the upper field. The general machine status can be seen in the lower field.

(3) Position display: The current machine axis positions are shown in the two fields.

(4) Position entering: The operator can move the machine to any position within the working area by entering new axis positions and pressing the button Go to position (SHIFT + ENTER).

(5) Function strip: This strip is different for each screen. All important functions are controlled by function keys, which are positioned on these strips. As well as a picture and the caption, the hotkey, with which the button can be activated via the keyboard instead of the mouse, is listed here.

## 2.3 Simple operating sequences

### 2.3.1 Close emergency chain and execute reference drive

You are in the Set up screen.

The emergency chain must be closed after every programme start so that the machine can start up the axes and move itself. Make sure that the emergency stop button on the machine is not locked.

Press ALT+F1 (Error reset) and then the green start button on the machine within five seconds.

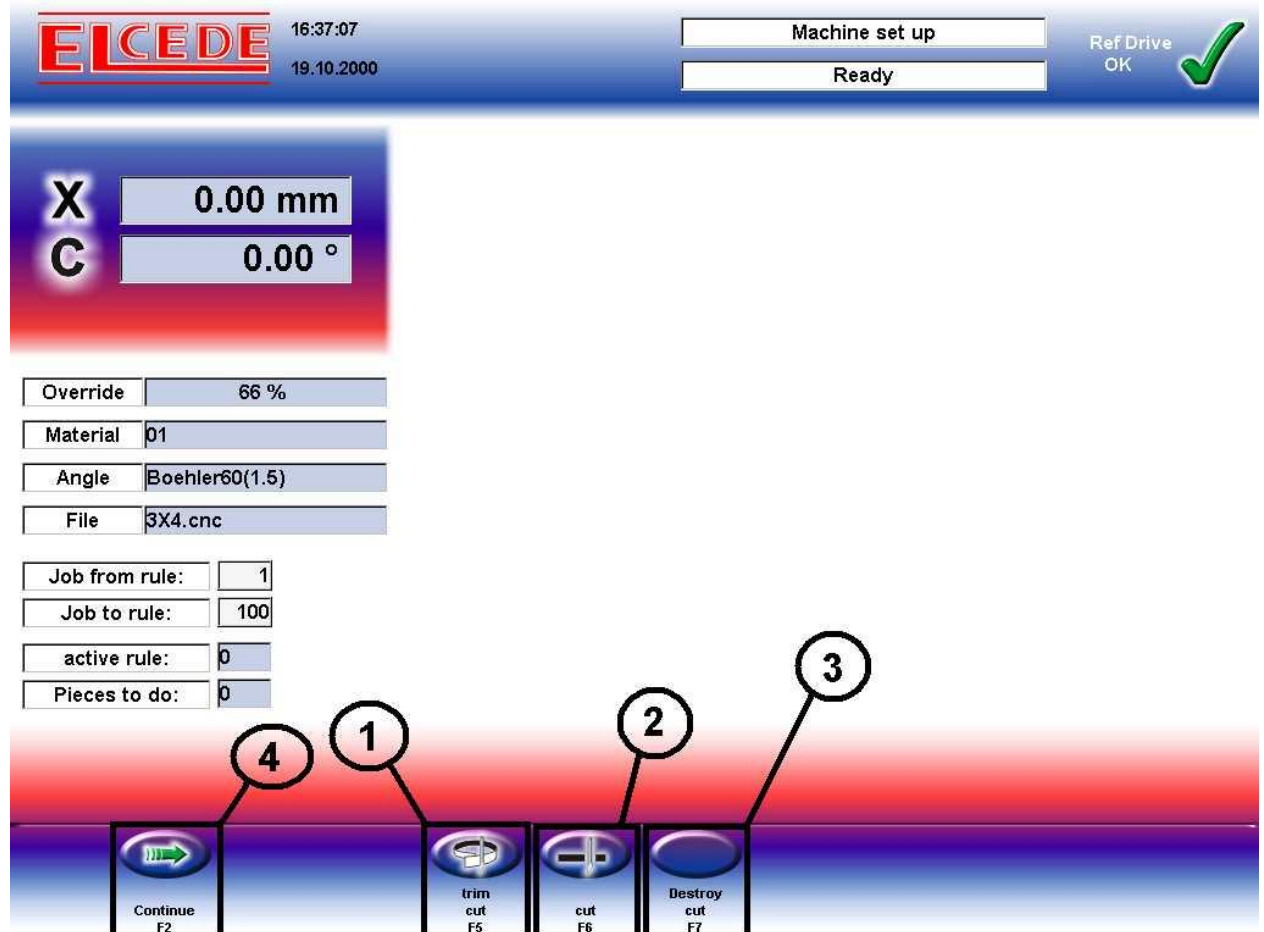
The error message will disappear. However, in order to be able to use the machine, the machine must first carry out a reference drive.

Press Reference drive. The machine goes to its reference position and then to its start position.

Now the machine is ready for operation.

## 2.3.2 Insert coil

You are in the set up screen. A coil always has to be cut when a new coil is inserted. In order to do this, change to the Insert coil screen. Then press Insert coil (F10).



(1) Using the key Cut coil (F5) the coil is cut. Tool 2 is always used to perform this operation. Please take care that the rule has been correctly inserted and that the compressed air is activated!

(2) Via the key Cut (F6) you can explicitly activate the scissors. The terminals of the bending station and the ACS are also activated.

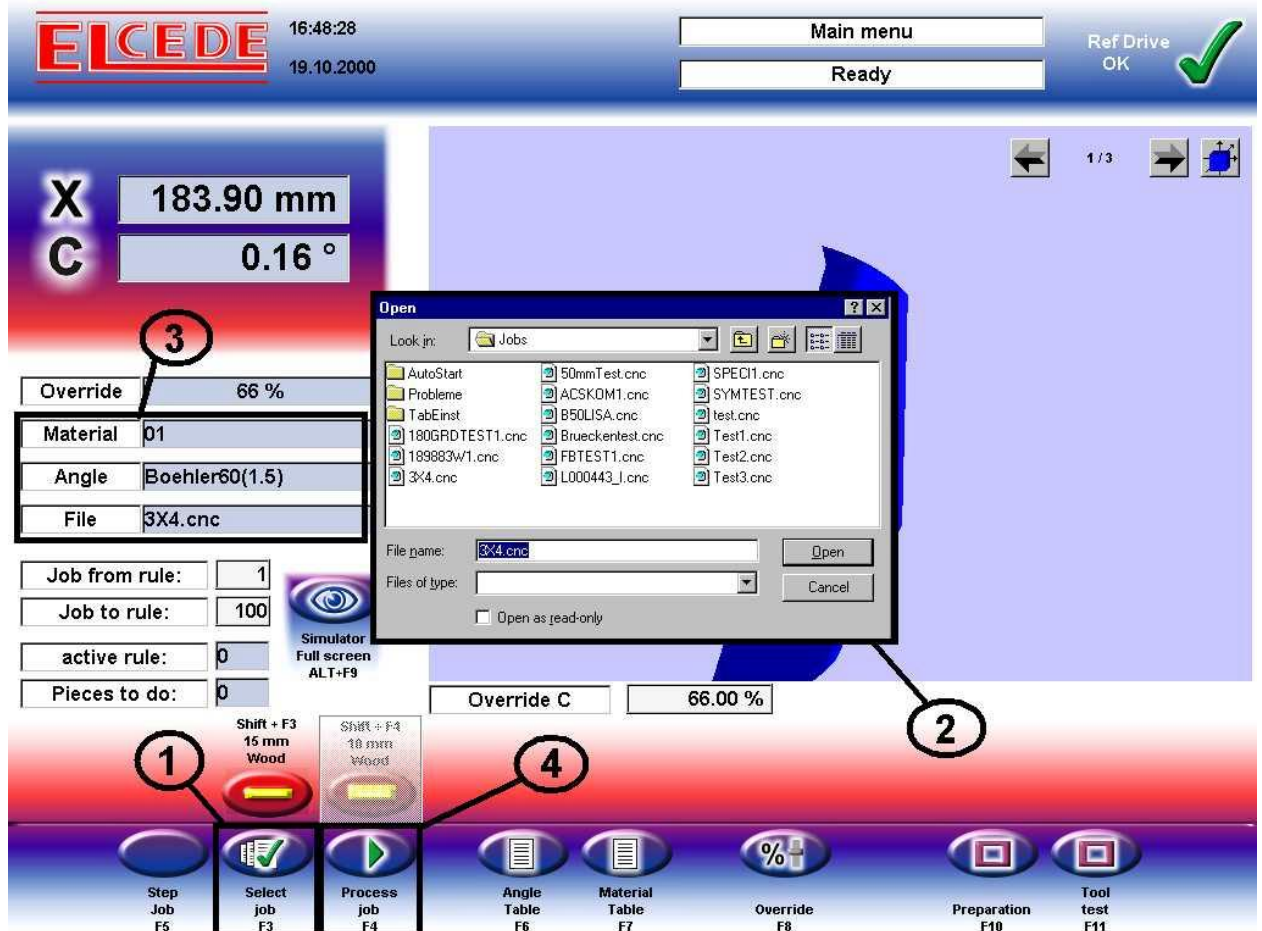
(3) Press Continue (F2) in order to return to the set up screen.

(4) Using the key Crop (F7) you can carry out the coil cut. An approx. 20 cm long rule is cut off. Please take care that the rule has been correctly inserted and that the compressed air is activated!

### 2.3.3 Select job and start

You are in the Set up screen.

Press Continue (F2) in order to return to the Set up screen.



(1) Access the open file dialogue using the key Select Job (F3).

(2) Mark the desired job file (.cnc) and click on the Open key in order to open the file.

(3) If the selected file is opened without errors then the file name and the names of the material used and angle tables appears in these fields.

(4) Using the key Process job (F4) you can cause the job to be processed. You then automatically access the Job is being processed screen.



## 2.3.4 Errors during file opening

You are in the Main menu screen.

You have selected a job but an error occurred when the job file was opened.

If the message "error during conversion of the job" appears in the error window then check to see if the job file is correct. If there is no error in the job file, then consult one of our technicians and state the number in the file D:\VectonumNT\LogFiles\ConvertError.txt.

If a window with the message "the material table XXX does not exist, please select another material table" or "the angle table XXX does not exist, please select another angle table" then your job has a material or angle table defined that does not exist. Now you have 2 possibilities: either you create a table with the name stated or you select an alternative table.

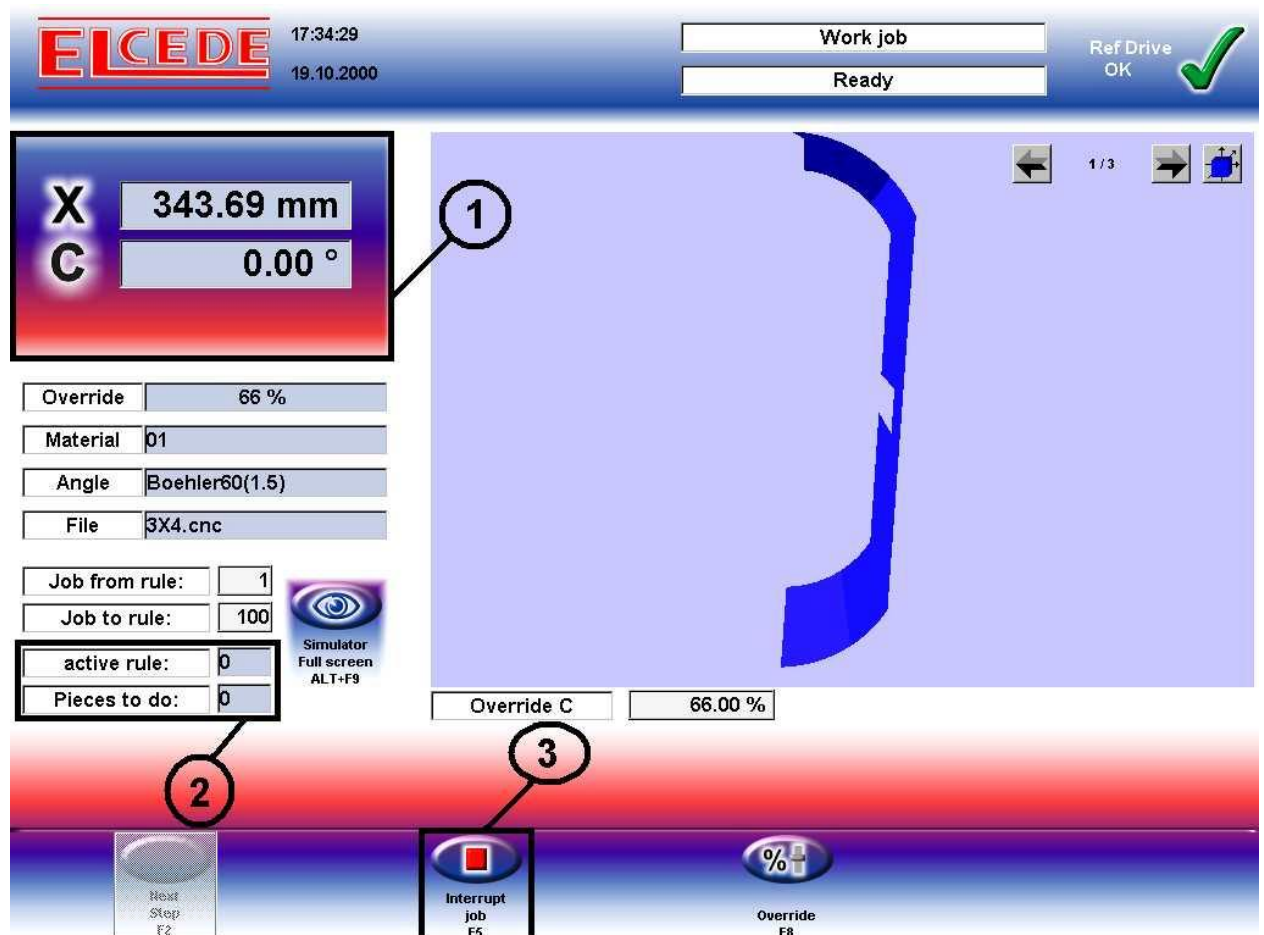


(1) The message appears that an non-existent table has been selected. It is the name in the file which is relevant not the table file name. It is however, helpful when the file and the internal table name are the same!

(2) Select the alternative table here and confirm with Open. The suffix .ARC stands for material table and the suffix .ANG for angle table.

## 2.3.5 Interrupting or cancelling a job

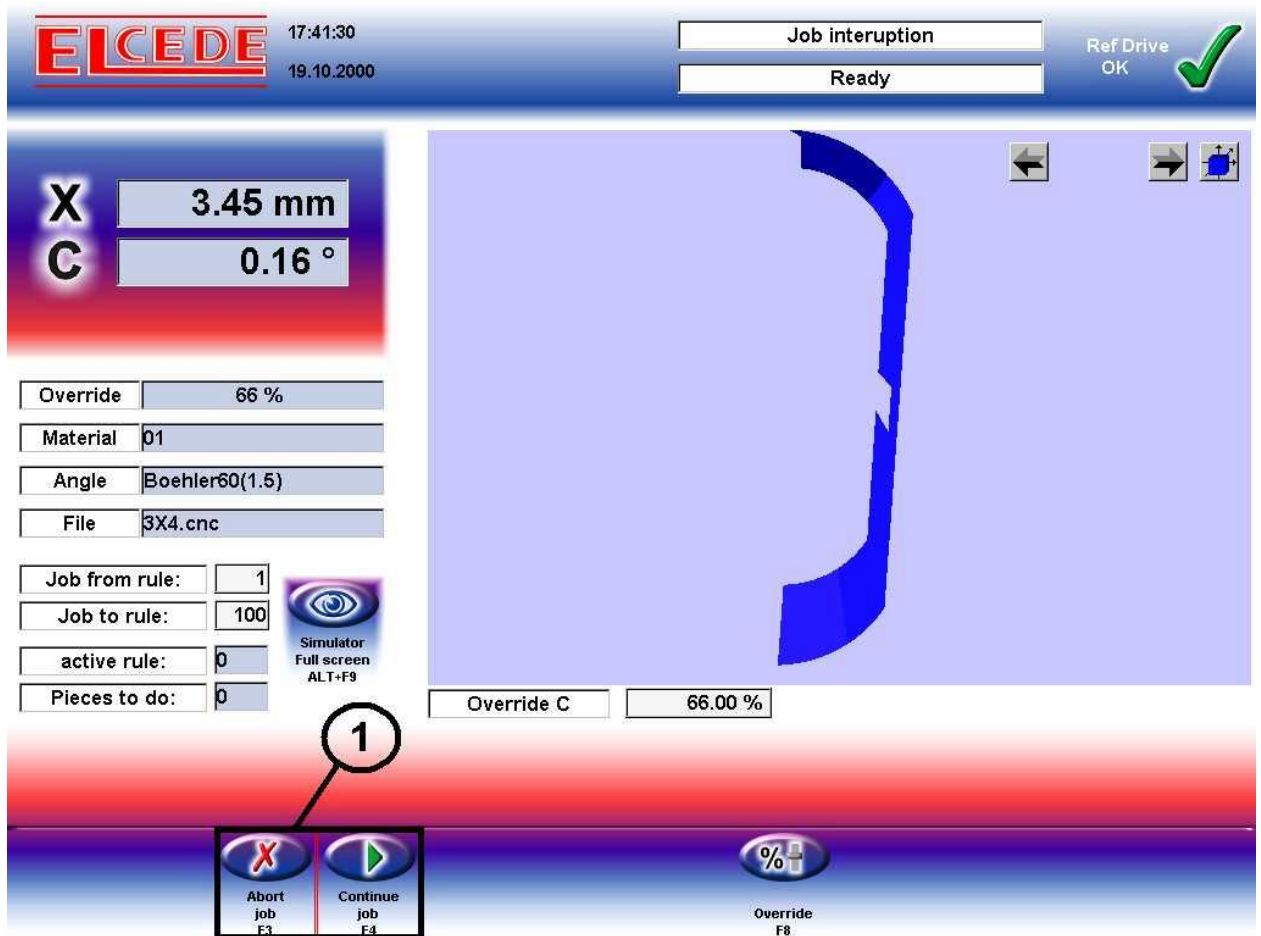
You are in the Job is being processed screen.



(1) The position window shows the current axis position.

(2) This window shows the line number currently being processed and if several parts of a line are being produced, the residual quantity of the parts still to be produced.

(3) The job can be stopped using the key Interrupt job (F5). This also takes you automatically into the next screen:



(1) Now you can finish the job completely with Cancel job (F3) and return to the Main menu screen, e.g. in order to select another job or you can press Continue job (F4), in order to allow the job to continue processing.

Once the machine stops press Cancel job (F3) and you will return to the Main menu screen.

The press Set up (F10) in order to access the welcome screen.

## 3 Further operating sequences

This chapter describes the remaining operating sequences. You will not need most of these activities for every day working. Some, however, will make the daily operating sequence easier.

### 3.1 Functions in the set up screen

#### 3.1.1 Absolute and relative axis positioning

You are in the Set up screen.

The screenshot shows the 'Machine set up' screen with the following elements:

- Header:** ELCEDA logo, time 17:46:36, date 19.10.2000, 'Machine set up' and 'Ready' status bars, and 'Ref Drive OK' with a green checkmark.
- Axis Positioning:** A central panel with two tabs: 'Absolute pos.' and 'Relative pos.' (which is selected). Below the tabs are input fields for X and C axes, both showing '0.00 mm' and '0.00 °' respectively.
- Control Buttons:** A vertical stack of buttons: a green circle, 'SHIFT+SPACE Position reset' (with a red arrow pointing down), and 'Go to position SHIFT+ENTER' (with a green double-headed arrow).
- Parameter Table:** A table on the right side of the screen:
 

Offset FBS	0.007156 m
Offset C	-8.8000 °
ContractionX+	100 %
ContractionX-	0 %
Override C	66.00 %
- Clamp Controls:** A small table at the bottom left:
 

clamp Material supply on Alt+S	clamp carriage on Alt+B
clamp Material supply off S	clamp carriage off B
- Footer:** A row of function key buttons: Help (F1), Continue (F2), Reference drive (F4), English (F5), insert coil (F10), and Error table (F12). Above the F10 and F12 buttons are icons for 'Diagnostic', '2 point parameters', and '3 point parameters'.

Annotations in the image: A circle with '1' points to the 'Go to position' button, and a circle with '2' points to the axis position input fields.

(1) Using the keys Absolute pos. or Relative pos. you can determine whether the machine should go to the position you have given (absolute) or whether the machine should move the axes by the values you have entered (relative). The values can be entered in the fields marked X, Y and Z. The keys SHIFT+SPACE (Position reset) set the values in the entry fields to 0. The key Go to position (SHIFT+ENTER) moves the machine to the position you have specified.

(2) This window shows the current axis position.

Check to see if the machine is at Absolute positioning. If not, change the setting.

Enter the value 500 in the X field, 50 in the C field.

Press Go to position (SHIFT+ENTER). After executing the command the machine will stand at the specified position.

The program checks to see if the entries are plausible. Invalid entries such as letters and symbols are not allowed in the numerical entry fields. All entries, which are syntactically correct, are then checked for area limits.

Set the program to Relative positioning.

Then try to move the x-axis by 300 mm by changing the value in the X field to 300 and pressing the key Go to Position (SHIFT+ENTER).

### 3.2 Adjustments specific to the machine

You are in the Set up screen.

The screenshot shows the ELCEDE machine setup interface. At the top, it displays the time 17:46:36 and date 19.10.2000. The main title is "Machine set up" with a status of "Ready". A "Ref Drive OK" indicator is shown with a green checkmark.

Positioning controls are shown in two columns: "Absolute pos." and "Relative pos." (which is selected with a green checkmark). Each column has input fields for X (mm) and C (degrees), both currently set to 0.00. A "Go to position" button (SHIFT+ENTER) is located between the columns.

On the right, there is a "Finish program" button (ALT+F4) with a red 'X' icon.

Below the positioning controls, there are two tables:

Offset FBS	0.007156 m
Offset C	-8.8000 °
ContractionX+	100 %
ContractionX-	0 %
Override C	66.00 %

Table 1 (circled with '1') is a 2x2 grid of clamp controls:

clamp Material supply on Alt+S	clamp carriage on Alt+B
clamp Material supply off S	clamp carriage off B

At the bottom, there is a row of function keys: Help (F1), Continue (F2), Reference drive (F4), English (F5), insert coil (F10), and Error table (F12). The insert coil (F10) and Error table (F12) keys have additional labels: "Shift+F10 Diagnostic" and "Shift+F11 2 point parameters" / "Shift+F12 3 point parameters".

(1) So that you do not have to move the material by hand the keys Clamps material supply on/off and Clamps carriage on/off are available. The material is clamped in the carriage using the key Clamps carriage on (Alt+B). If you now move to a position with the X-axis then the material is pulled with the axis. Using the keys Clamps material supply on (Alt+S) and the key Clamps carriage off (B) will clamp the material at material supply and release it at the carriage. Now the X-axis can be positioned without moving the material. Important: Under no circumstances should you move the X-axis when both keys Clamps material supply on (Alt+S) and Clamps carriage on (Alt+B) are active! Please note that when the material is in the bending station and the C-axis is moved then the material will be bent. If you now move the X-axis in the wrong direction then it is possible that the material could get wedged in the bending station!

(2) Offset FBS: During machine manufacture small deviations in the distance between the ACS- and the FBS-Station can occur. These can be corrected using the FBS Offset.

Offset C: The offset for the C-axis. This is used to adjust the symmetry of the C-axis.

Contraction X+,

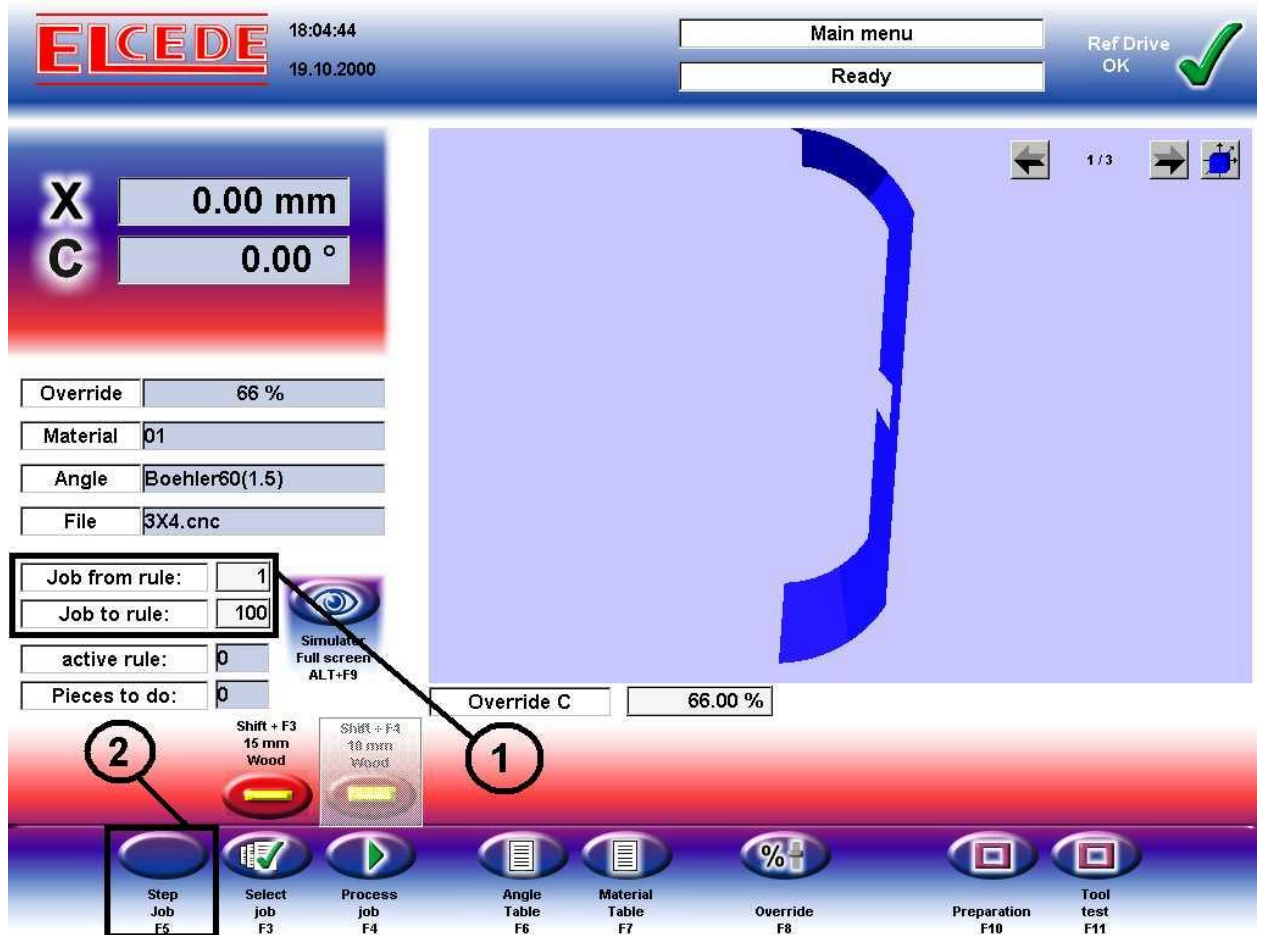
Contraction X-: This indicates the distribution of the surplus material caused by bending. Contraction X+ = 100% and Contraction X- = 0% means that all the surplus material is taken into account before bending.

Override C: An offset which is added to each bend. If the Override C > 100%, then the material is overbent, if Override C < 100%, then the material is bent less.

### 3.3 Functions in the main menu screen

#### 3.3.1 Carrying out a job step by step

You are in the Main menu screen.



(1) Job from line field: Here you indicate the line number from which the job should be processed. This possibility is also available in normal mode.

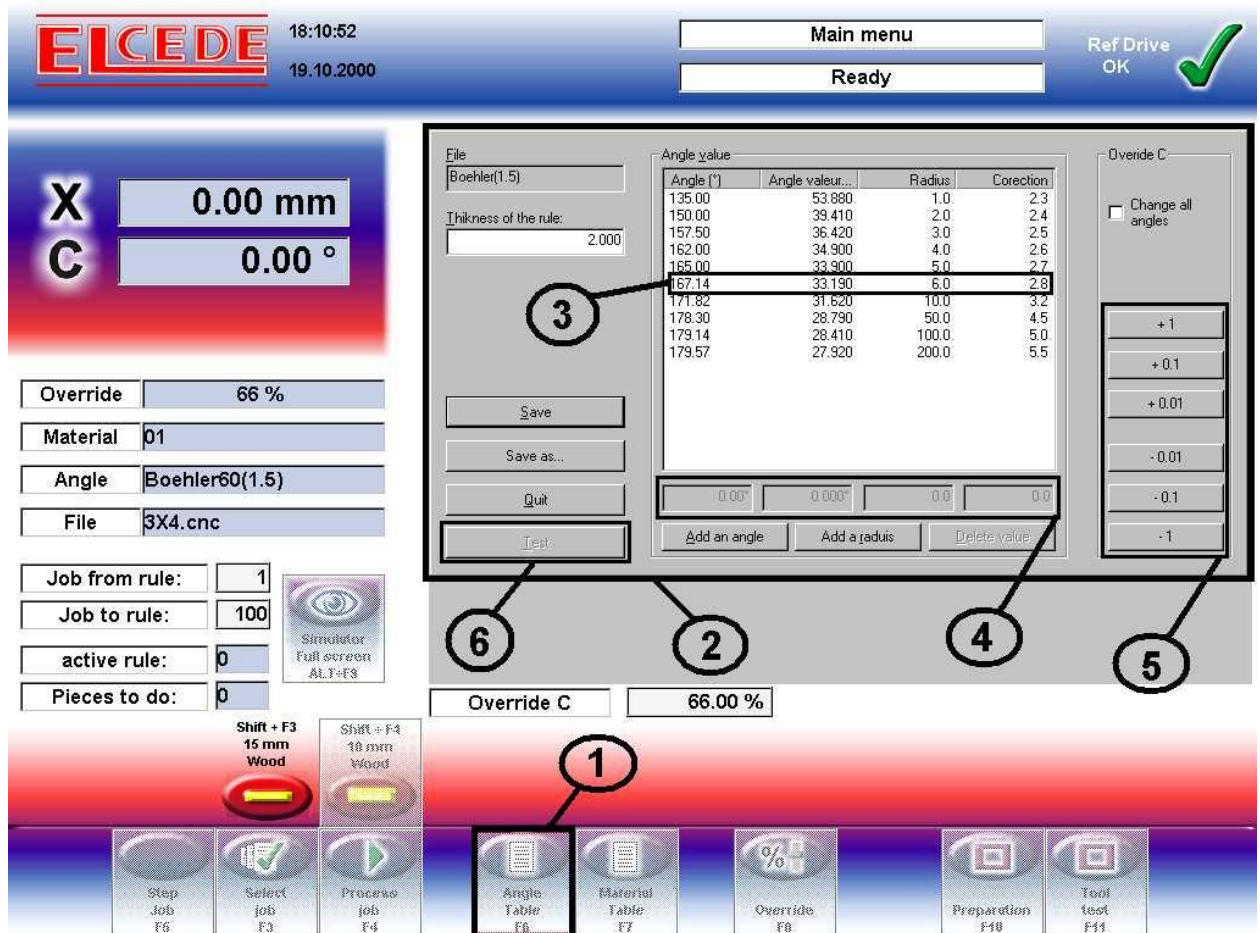
Job to Line field: Indicate the line number where the job should stop.

(2) Using the key Step Job (F5) the job is processed step by step. I.e. when the first line of the job is finished, the machine will stop. If there are further lines to be processed the operator can start processing of the next line by pressing the key Next step (F2).

The operating elements and functions familiar from chapter 2.3.3 *Select job and start* are also available in step mode.

### 3.3.2 Editing an angle table

You are in the Main menu screen.



- (1) Using the key Angle table (F6) will start a dialogue in which you can select an angle table. Pressing the key Open will open the selected table.
- (2) If the angle table is error free then the table editor will appear.
- (3) In order to edit an existing entry a line must be selected.
- (4) The values of the selected lines can be changed in these fields.
- (5) Using these keys the infeed in the selected lines can be modified in different step increments.
- (6) If a line is selected and the values not changed a test bend can be carried out. If the values have been changed then the table must first of all be saved using the key Save. Only then can a test bend be carried out.



The table can be saved under a different name by using the key Save as. After activating the key Save as you will be asked to enter a new table name. Please note that the suffix (1.5) or (B) always stand at the end of the table name! After saving the file has the same name as the table with the suffix .ANG .

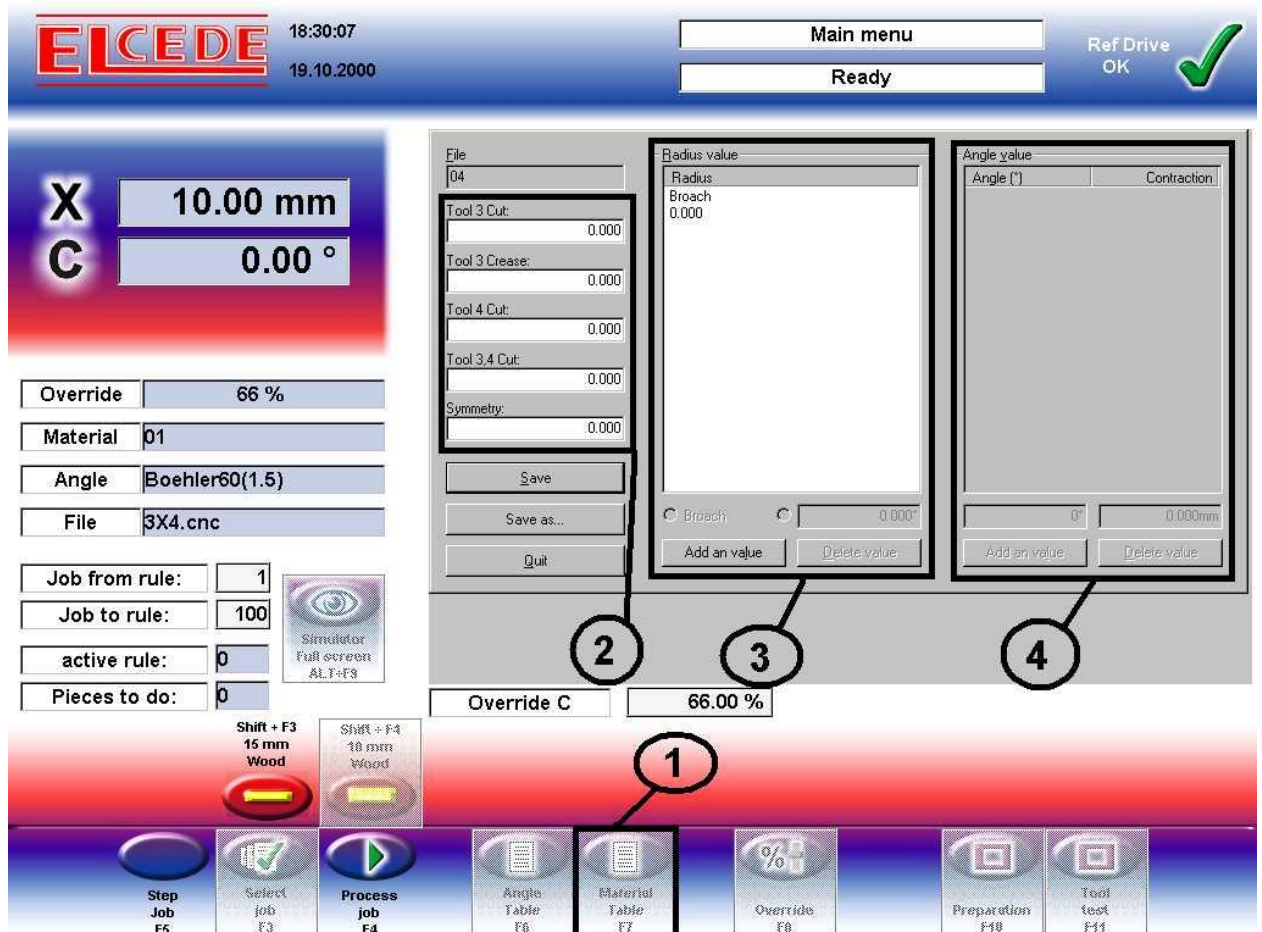
You can create new lines with new values using the keys Add angle and Add radius.

You can exit the table editor using the key End.

Important: Save the table before ending, otherwise modifications could be lost!

### 3.3.3 Editing material tables

You are in the Main menu screen.



(1) Use the key Material Table (F7) to start a dialogue in order to select a material table. Use the Open key to open the selected table. If the table is error free the table editor will appear.

(2) Additional correction values for the tools can be entered in this section.

(3) You can create new arcs in this section using the key Add entry. A line must be selected if you want to edit an existing line.

(4) If a line is selected in the section Arc entries, then the appropriate bend entries will appear here. In this section you can also create new bends using the key Add entries. A line must be selected if you want to edit an existing entry.

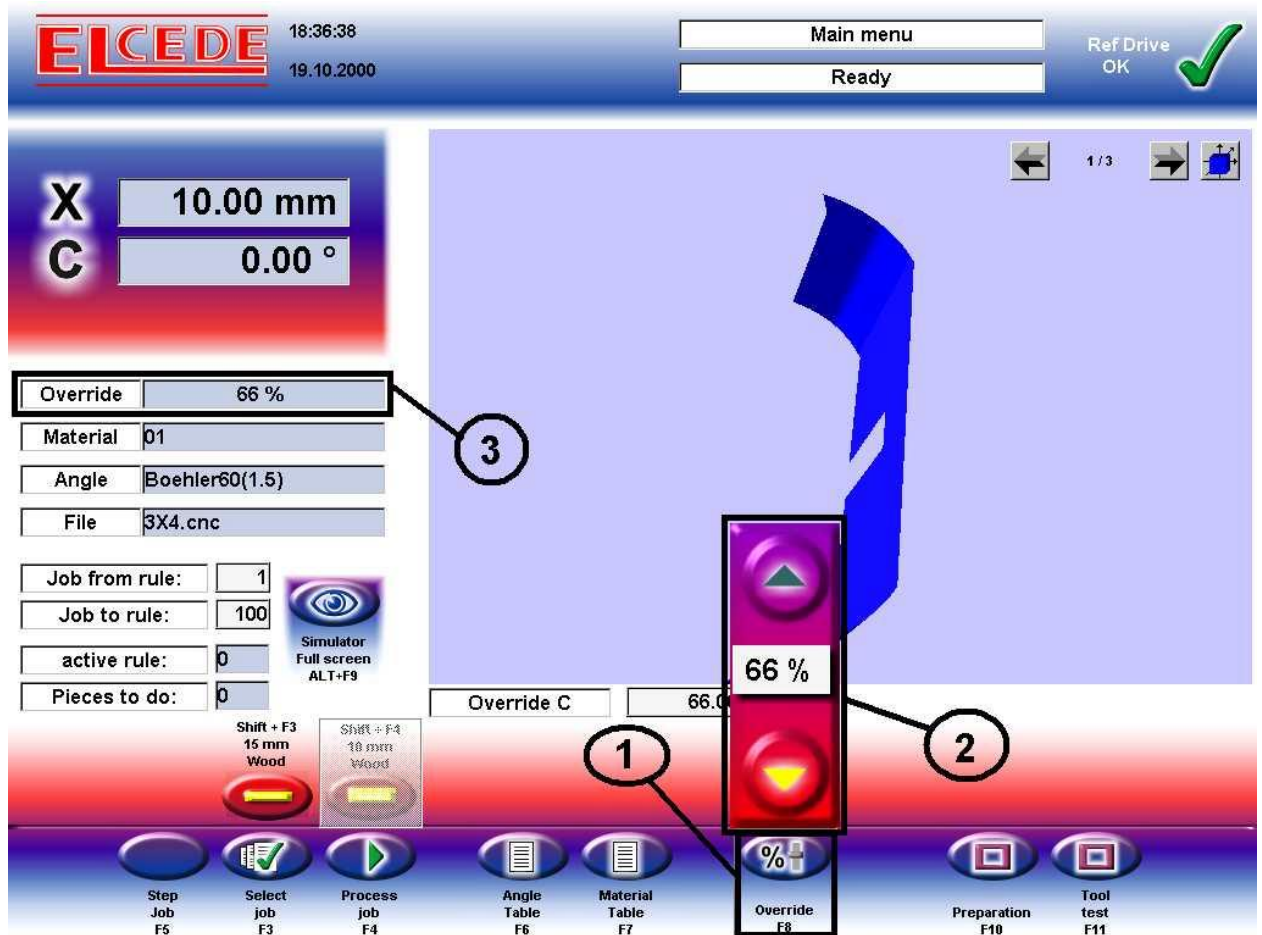
The table can be saved under a different name by using the key Save as. After activating the key Save as you will be asked to enter a new table name. After saving the file has the same name as the table with the suffix .ARC.

You can exit the table editor using the key End.

*Important: Save the table before ending, otherwise modifications could be lost!*

### 3.3.4 Setting Override

You are in the Main menu screen.



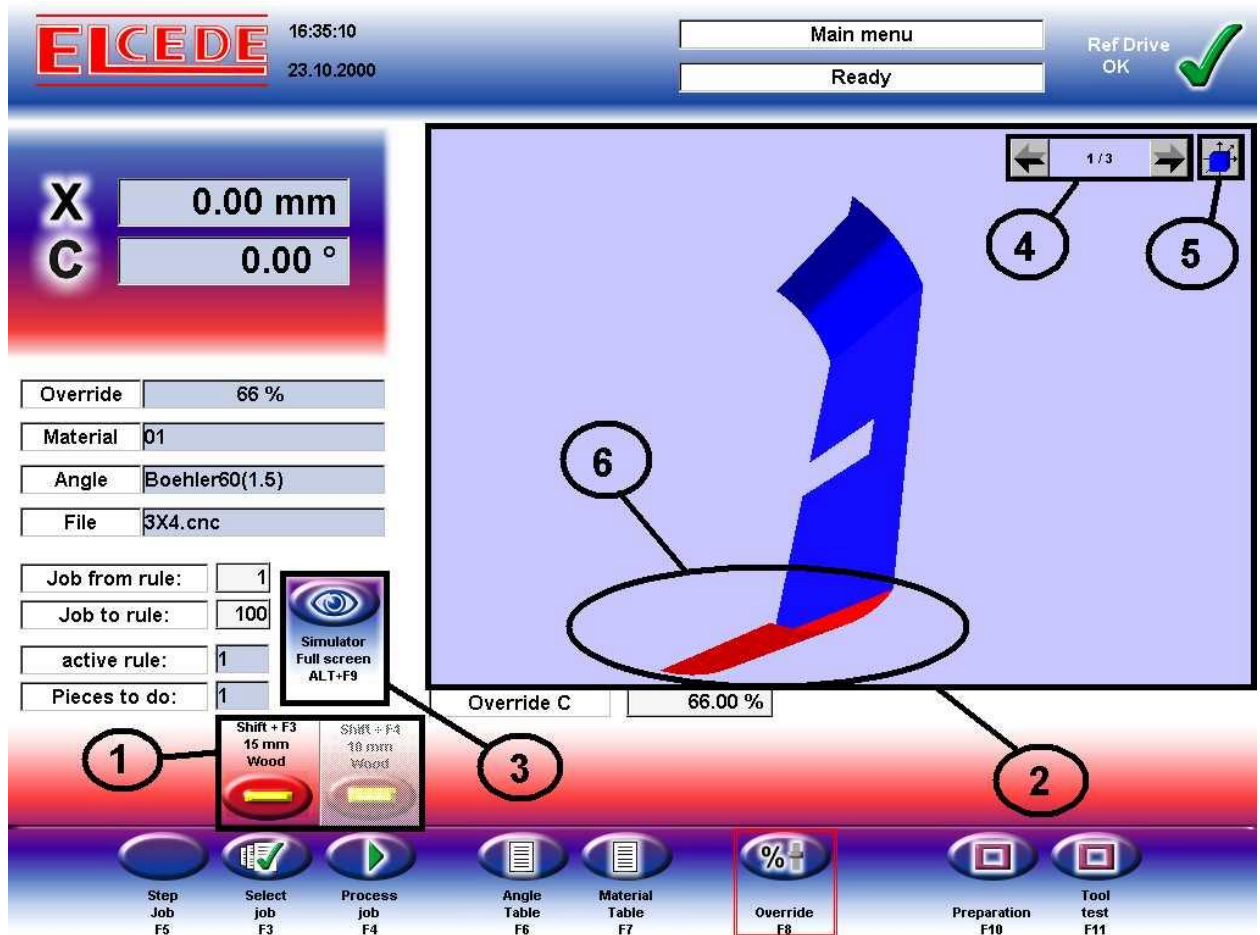
(1) In order to process the job faster or more slowly you can set the override using the key Override (F8).

(2) In order to reduce or increase the override by 5% press the Up or Down key or enter the exact value in the entry field.

(3) The current override is shown in this field.

### 3.3.5 Switching 15/18mm Wood; Simulator

You are in the Main menu screen.



(1) Using the keys 15 mm Wood (Shift+F3) and 18 mm Wood (Shift+F4) you can decide whether the notches should be made for 15 or 18 mm thick wood.

(2) The simulator displays the design which will be seen in the material after the job has been processed. Those parts of the line currently being processed are shown in red ±. Holding the left mouse key down and moving the mouse will cause the picture to rotate in order to be able to see it from all perspectives. Holding the right mouse key down and moving the mouse you can zoom in and out of the picture.

(3) Use the key Simulator full picture (ALT+F9) to enlarge the simulator picture over the whole window.

(4) This field displays the total number of lines and the number of the line just displayed. Using the right or left cursor keys you can move the next or the previous line.

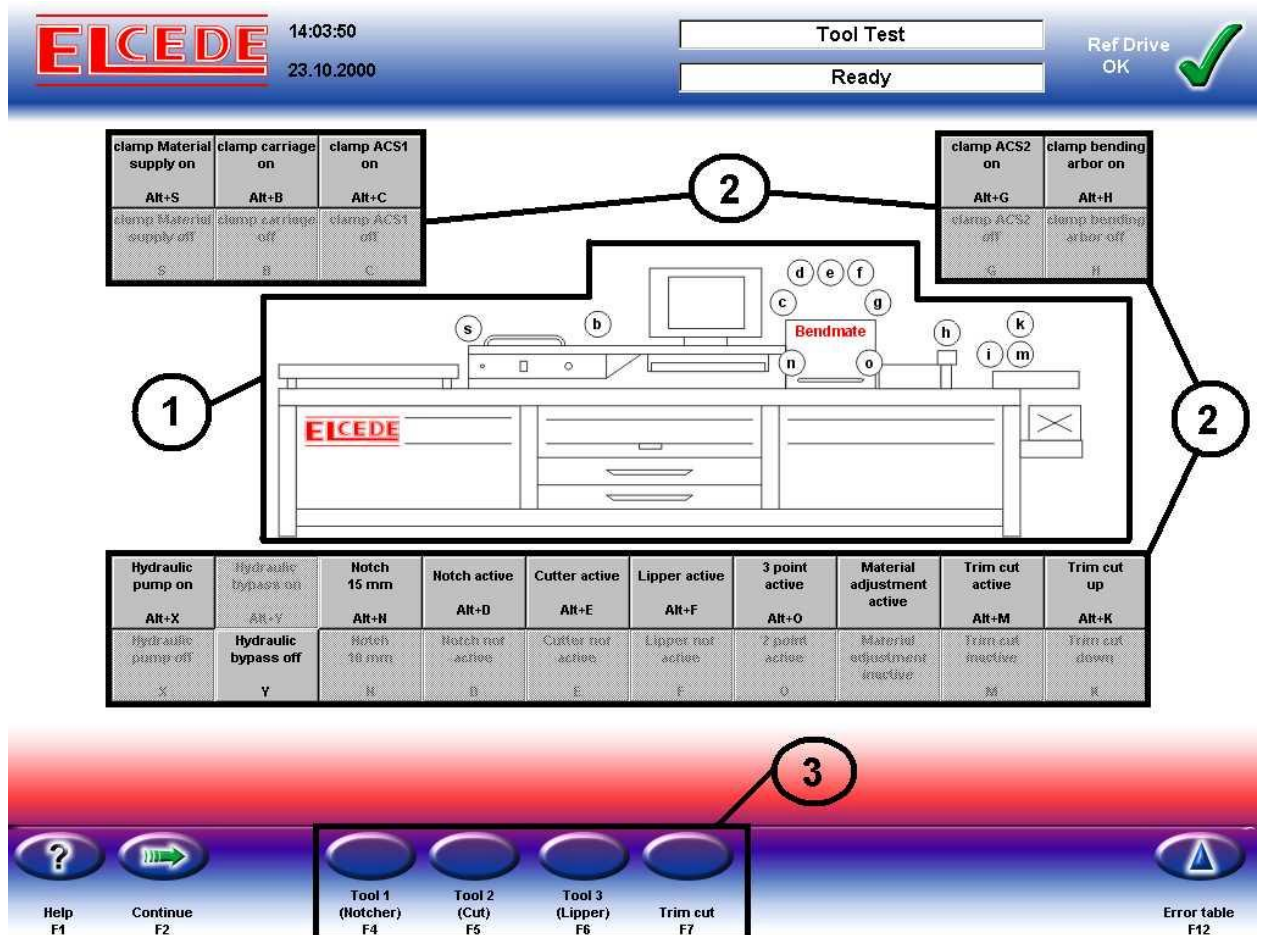
(5) Using this key you can bring the picture into the starting position.

(6) Shows the symmetry of the active rule element.

## 3.4 Functions in the tool test screen

### 3.4.1 Tool test

You are in the Main menu screen. Using the key Tool test (F11) you can access the Tool test screen.



(1) The approximate positions of the individual tools are shown in this illustration, e.g. S corresponds to the keys Clamps mat. supply on (Alt+S) and Clamps mat.-supply off (S).

(2) Using these keys it is possible to turn the clamps, tools, scissors, hydraulic pump and the circulation on and off. If the pump is off and the circulation on, then it is not possible to activate the tools and the scissors!

(3) These keys are for automatically activating the tools and the scissors. I.e. the pump turns on automatically, the circulation is turned off and then the selected tool or the scissors are activated.

### 3.5 Evaluating error messages

There are exactly four reasons why the emergency chain is opened:

1. The program has finished. The emergency chain is opened automatically at program end in order to prevent the machine moving in an uncontrolled manner.
2. The user has for some reason opened the emergency chain.
3. The machine has travelled over the given limits and thus triggered one of the limit switches.
4. The program has recognised an error and switched off the control.

There are various errors that cause the program to open the emergency chain. For example, a deviation that is too great from the specified set point or an output current from an amplifier, which is too high. In order to find the cause of the error there is the Error record screen.

You are in the Set up screen.

Press the key Error record (F12) in order to access the Error record screen.

1/2: [1101] Axis C: deviation error Motoraxis			
▶	2000 10 23 14:33:46	300	Emergency chain open
▶	2000 10 23 14:33:45	1101	Axis C: deviation error Motoraxis
▶	2000 10 23 14:33:14	300	Emergency chain open
▶	2000 10 23 14:33:12	300	Emergency chain open

The error record consists of four columns:

(1) Error status – Red arrow pointing right: There was an error. Green arrow pointing left: Error has been solved. Blue check mark: The user acknowledged the error.

(2) Date and time – The date format is YYYY MM DD. Following the date is the time at which the error occurred.

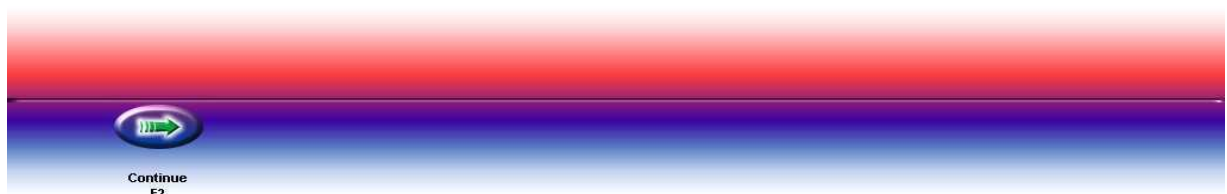
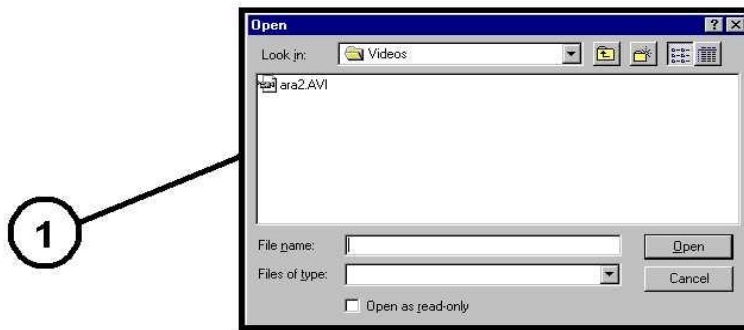
(3) Error number – This number identifies the error. Even if the error message is written in another language, the error number is always the same.

(4) Error message – Plain text. The user can read here what caused the emergency chain to open.

Press Continue –(F2) in order to exit the Error screen.

### 3.6 Using help

The user can select the help menu from any screen. You are in the Set up screen. The Help menu screen appears when you press Help (F1).



(1) You can select a help video from a dialogue. This will then be shown in the white area.

Press Continue (F2) in order to return to the previous screen.

### 3.6.1 Language change

At the moment the machine can offer operator guidance in German, English and French. At the end of a program the current language setting is saved and loaded again at the next program start.

You are in the Set up screen.

Press German (F5). The machine will change to another language. Repeat this procedure until you reach the desired language. When the original language reappears you have exhausted all the possibilities.



## 4 The meaning of and setting of the machine specific parameters

### 4.1 The file Bendmate.ini

This file is located in the control in the folder D:\VectonumNT\EndUserSpecific. All machine specific data, which could change during the program running time are stored here. The data are available as text file in ANSI format and correspond to the conventions for configuration files under Windows.

The file is divided into individual section ("[...]"). One or more key words can be in each section (...=...). These keys can contain character strings (Strings), whole numbers (integrals) or floating point numbers (Real) as values. Comments begin with ";".

Here an example file from a test machine. The meaning of the individual sections and keys is explained at the beginning of each section:

```
;Machine: Bendmate 2000
;(c) 2000, ARADEX AG
;Unit-System: MKS ([m], [kg], [s], [°])
```

```
[ActiveFiles]
```

All the data last loaded for job, material table and angle table are saved here.

```
JobFile=D:\VECTONUMNT\EndUserSpecific\Jobs\180GRDTEST1.cnc
ConvFile=D:\VectonumNT\EndUserSpecific\Conv\180GRDTEST1.acc
AngleTable=D:\VectonumNT\EndUserSpecific\Tables\Null(B).ang
MaterialTable=D:\VECTONUMNT\EndUserSpecific\Tables\04.arc
AngleFile=Boehler(1.5)
MatFile=01
JobFromLineNr=1
```

```
[ConfigData]
```

The data described in chapter 3.1.2 *adjustments specific to the machine* are saved here.

```
ContractionX+=100.00000000
ContractionX-=0.00000000
OffsetX=0.00000000
OffsetC=-8.85000000
OverrideC=100.00000000
OffsetFBS=0.00630000
```

```
[Override]
```

The override has an influence on the general processing time of a job. At 100% the job is processed as fast as possible. At 50% at half speed. The processing then takes twice as long.

```
Value=100
```

```
[Limits]
```

The software limits for the C-axis are stored here.

```
AxisCmin=-58
AxisCmax=58
```

[Language]

The language was last selected is saved here. This language is loaded when starting a program.

Aktuell=Deutsch

## 4.2 The file Limits.par

This file is located in the control in the folder D:\VectonumNT\EndUserSpecific\Tables. It contains parameters, which are taken into account during the job conversion. The individual parameters are a good example of what must be taken into account during conversion. The individual file lines and their meaning are described below:

25      Min Winkel bei Bends

Bends in the job, which are less than this angle will be ignored *without error message*.

180     Max Winkel bei Bends

Bends in the job, which are greater than this angle will be ignored *without error message*.

0        Min Winkel bei Arcs

*An error message* will appear if arcs in the job have a smaller angle.

180     Max Winkel bei Arcs

*An error message* will appear if arcs in the job have a greater angle.

0.5     Min Radius bei Arcs

*An error message* will appear if arcs in the job have a smaller arc.

-1300   Min Position einer Biegung \*

Maximum position of a bend in the job referring to the machine co-ordinates. If a bend is out of limits then *an error message* will appear.

15.5    Max Position einer Biegung \*

Minimum position of a bend in the job referring to the machine co-ordinates. If a bend is out of limits then *an error message* will appear.

0        Min Bogenschritte im Polygonzug

Minimum number of arc increments in a draft of traverse. If a draft of traverse has not many increments then the machine will attempt to work with smaller part increments. This is only possible if there is a corresponding angle table available.

80      Min Winkel im Polygonzug

Minimum bend angle of part bends of a draft of traverse. If the angles of the draft of traverse are smaller then the machine will try to work with smaller step widths. This is only possible if there is a corresponding angle table available.

179.99 Max Winkel im Polygonzug

Maximum bend angle of part bends of a draft of traverse. If the angles of the draft of traverse are greater then the machine will try to work with larger step widths. This is only possible if there is a corresponding angle table available.

0.29    Min Abstand zweier Biegungen

States how close together two bends on a line may be. If two bends are too close together then an error message is generated. If a bend and an arc or two arcs are too close together then the last angle on one arc will be cancelled (end angle).

1.99 Radius, ab dem ein Radius zur Biegung wird

Radius, at which point an arc becomes a bend.

### 4.3 The file Tool.sc6

This file is located in the control in the folder D:\VectonumNT\EndUserSpecific\Tables. It contains tool parameters that are taken into account during job conversion.

Machine("SC6")

File beginning and machine name.

Tool(2)

Tool number.

Begin

Beginning of tool description.

Toolname("Tool2")

Tool name.

Width(4.00)

Tool width in [mm].

Coverage(2.50)

If a notch is wider than the tool then the tool has to punch several times. The maximum permissible tool offset is the *Coverage*.

Symmetrie(2.00)

Defines the center of the tool position which is half of the tool width in [mm].

Offset(0.5)

States the tool position.

OverlapTool(False)

States whether the tool may overlap other tools.

OverlapRule(False)

States, whether the tool may overlap the rule begin.

```
MinimumDisplace(1.000)
```

If a notch is wider than the tool then the tool has to punch several times. The minimum permissible tool offset is the *MinimumDisplace*.

```
End
```

End of tool description.

```
Tool(3)
```

```
Begin
```

```
Toolname("Tool3")
```

```
Width(2.560)
```

```
Coverage(1.30)
```

```
Symmetrie(1.28)
```

```
Offset(60.50)
```

```
OverlapTool(False)
```

```
OverlapRule(False)
```

```
MinimumDisplace(1.000)
```

```
End
```

```
Tool(4)
```

```
Begin
```

```
Toolname("Tool4")
```

```
Width(2.885)
```

```
Coverage(2.885)
```

```
Symmetrie(1.4425)
```

```
Offset(120.50)
```

```
OverlapTool(False)
```

```
OverlapRule(False)
```

```
MinimumDisplace(1.000)
```

```
End
```

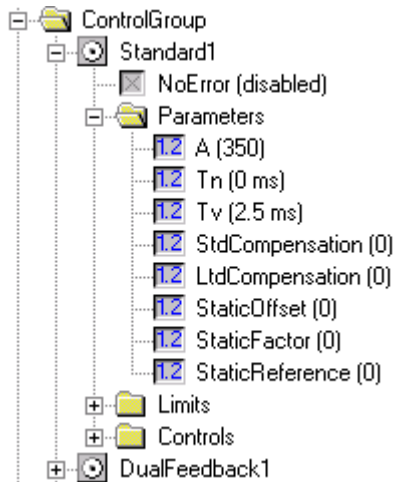
## 4.4 The file Machine.par

This file is located in the control in the folder D:\VectonumNT\EndUserSpecific. It stores all data, which the machine utilises but which cannot be modified during the program running time. If these data are to be modified, the program must be exited beforehand. The data are available in the format for ARADEX parameter files and can be viewed with the parameter editor or the configuration manager by any trained operator. Only service technicians and programmers from ARADEX can make modifications.

*Important: Only change the parameters described here in the manner specified here. Changing undocumented parameters can lead to the machine malfunctioning or to damage to the machine!*

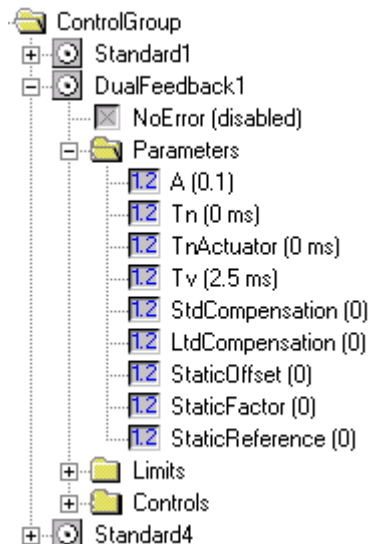
#### 4.4.1 Axis parameters

Change to the folder Parameter/ControlGroup.



A: The kp-value of the x-axis. This value is reciprocal to the set block cycle time. The value of 350 is valid for a block cycle of 500 $\mu$ s. If, for example, the block cycle time is increased by 1/6 to 600 $\mu$ s then the A-factor must be reduced by 1/6 to 292 accordingly.

*Important: All other settings in the parameters folder may not be changed in order not to impair the optimally adjusted control characteristics for this machine!*



A: The kp-value of the C axis. This value is reciprocal to the set block cycle time. The value of 0.1 is valid for a block cycle of 500 $\mu$ s. If, for example, the block cycle time is increased by 1/6 to 600 $\mu$ s then the A-factor must be reduced by 1/6 to 0.083 accordingly.

*Important: All other settings in the parameters folder may not be changed in order not to impair the optimally adjusted control characteristics for this machine!*

## 4.4.2 Analyser

Change to the folder Parameter/Analyser.



Samples: Number of the latest values of each analysed variable.

Period: The time in which the values are to be recorded.

Supposing the user would like to see the status of a variable for the last 2 seconds by pressing a button, he first of all has to determine with which block cycle time (MinimumCycleTime) the control is running.

Then he carries out the following calculation:

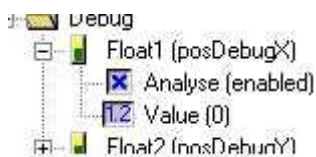
$$\text{Samples} = \text{Time} / (\text{MinimumCycleTime} * \text{Period})$$

$$N = 2 \text{ seconds} / (0.5 \text{ ms} * 1) = 4000$$

Therefore, he has to set the value for samples to 4000. If an accuracy of 2 block cycles per value is sufficient, then he can set the value for samples to 2000 and change the value for period to 2 cycles.

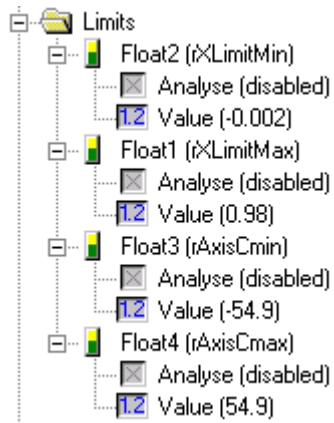
*Important: The value for samples should not be too high, as otherwise the data quantity is so large that the systems memory is not adequate. In this case the program either no longer starts or the emergency chain opens when saving an analyser file!*

A variable whose values are to be stored in the analyser file must be registered in the parameter file:



### 4.4.3 Area limits for machine movements

Change to the folder Parameter/SoftInOut/VV/WindowSetup/Movement/Limits.

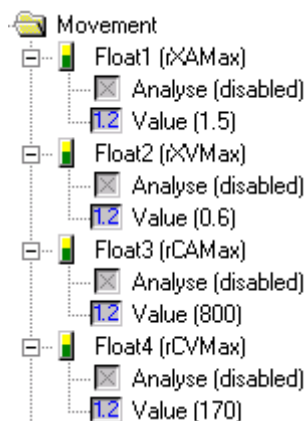


rXLimitMin, rXLimitMax: Minimum and maximum area limits for the X-axis, in which the machine may move. Unit [m].

rAxisCMin, rAxisCMax: Minimum and maximum area limits for the C-axis, in which the machine may move. Unit [m]. Important: Please be aware that these 2 parameters are overwritten after program start by the parameters AxisCMin and AxisCMax out of the file Bendmate.ini.!

### 4.4.4 Max. acceleration and max. speed

Change to the folder Parameter/SoftInOut/VV/WindowSetup/Movement.



rXAMax,

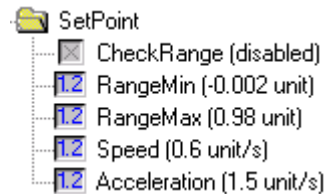
rCAMax: These variables contain the value for the maximum acceleration of the X- and C-axis movements.

rXVMax,

rCVMax: These variables contain the value for the maximum speed of the X- and C-axis movements.

Together with these four variables you have to change the values of the following axis parameters.

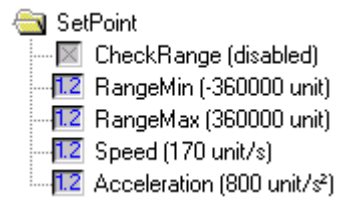
Change to the folder Parameter/ControlGroup/Standard1/Limits/SetPoint.



Acceleration: This variable contains the value for the maximum acceleration for the X-axis movements.

Speed: This variable contains the value for the maximum speed for the X-axis movements.

Change to the folder Parameter/ControlGroup/DualFeedback1/Limits/SetPoint.



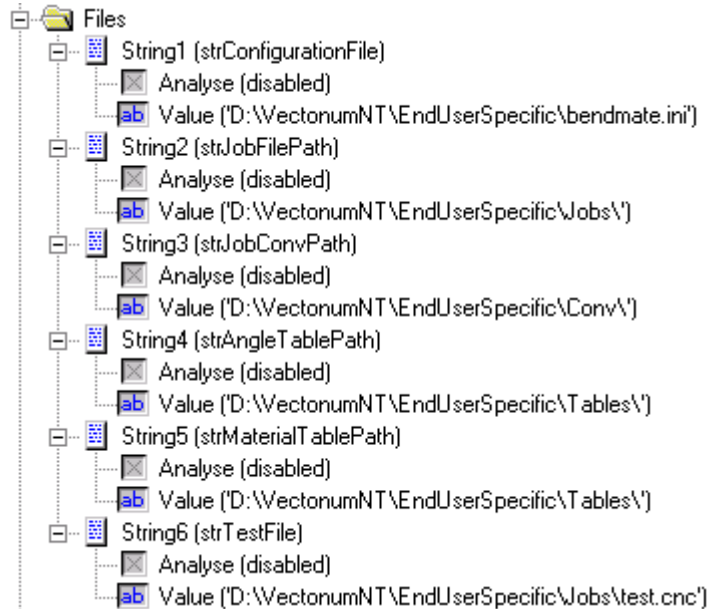
Acceleration: This variable contains the value for the maximum acceleration for the C-axis movements.

Speed: This variable contains the value for the maximum speed for the C-axis movements.



#### 4.4.5 Folder and file names

Change to the folder Parameter/SoftInOut/VV/Files.



strConfigurationFile: This variable contains the full name for the configuration file Bendmate.ini.

strJobFilePath: This variable contains the locate path into which the program first branches for loading and saving jobs.

strJobConvPath: This variable contains the locate path into which the program first branches for loading and saving converted jobs.

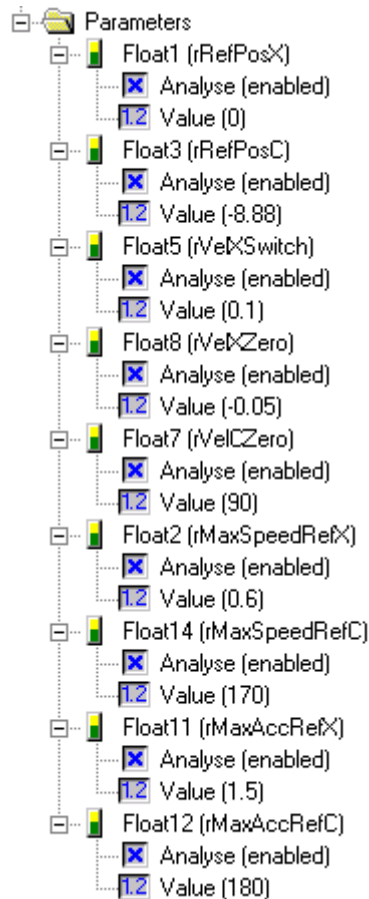
strAngleTablePath: This variable contains the locate path into which the program first branches for loading and saving angle tables.

strMaterialTablePath: This variable contains the locate path into which the program first branches for loading and saving material tables.

strTestFile: This variable contains the full name of the file which is generated when editing angle tables for testing bends or arcs.

#### 4.4.6 Reference drive

Change to the folder Parameter/SoftInOut/KPlcCommunication/Reference/Parameters.



rRefPosX: Offset in X-direction, which the machine has to travel after locating the load encoder zero pulse in order to reach the reference position. Reference point is the zero pulse. Unit [m].

rRefPosC: Offset in C-direction, which the machine has to travel after locating the load encoder zero pulse in order to reach the reference position. Reference point is the zero pulse. Unit [m].

*Important: Please be aware that these parameter are overwritten after program start with the parameter OffsetC from the file Bendmate.ini.!*

fVelXSwitch: Speed at which the machine moves the X-axis in order to locate the reference switch. Unit [m/s].

fVelXZero: Speed at which the machine moves the X-axis in order to leave the reference switch and to locate the zero pulse. Unit [m/s].

fVelCZero: Speed at which the machine moves the C-axis in order to leave the reference switch and to locate the zero pulse. Unit [m/s].

dMaxSpeedRefX: The maximum speed with which the X-axis moves to her reference position after locating the zero pulse.

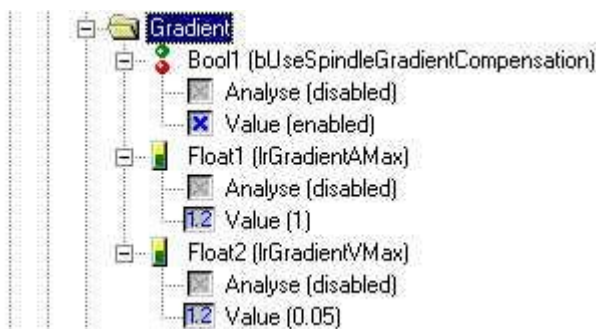
dMaxSpeedRefC: The maximum speed with which the C-axis moves to her reference position after locating the zero pulse.

dMaxAccRefX: The maximum acceleration with which the X-axis moves to her reference position after locating the zero pulse.

dMaxAccRefC: The maximum acceleration with which the C-axes moves to her reference position after locating the zero pulse.

#### 4.4.7 Spindle pitch compensation

Change to the folder Parameter/SoftInOut/Parameter/Gradient.



bUseSpindleGradientCompensation: This parameter is used to switch the spindle pitch compensation on and off.

lrGradientAMax: The machine may only travel and brake with a certain maximum acceleration during the measurement of the spindle pitch deviation. The value follows the performance capacity of the external measuring equipment. (Laser-Interferometer). [m/s<sup>2</sup>].

lrGradientVMax: The machine may only travel and brake with a certain maximum speed during the measurement of the spindle pitch deviation. The value follows the performance capacity of the external measuring equipment. (Laser-Interferometer). Unit [m/s].

## 5 ELCEDE service

If your company is based in Germany please contact the main works in Kirchheim/Teck about spare parts or problems with your machine.

Your contact person is:

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Fax: +49(0)7021/56338  
[www.elcede.com](http://www.elcede.com)

ELCEDE GmbH  
P.O.Box 1104  
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Fax: +49(0)7021/958039  
E-Mail: [service@elcede.de](mailto:service@elcede.de)

If your company is based outside Germany please contact your authorized national representative first.

If there is no such representative in your country please contact ELCEDE Germany.