TN020

AKKON CNC SYSTEM

Setup guide for AKKONDesk
Configuration procedures and additional features

Authors: Gerhard Burger
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Table of versions

Version	Date	Remarks
1.0	11.07.2009	first version
1.1	12.07.2009	Added some pictures of a simple reference switch and eliminated typing errors
1.2	18.08.2009	Replaced schematics for reference switch on ARM-Controller
2.0	02.09.2009	Extensions turret, tools and reference point configuration
2.1	08.02.2014	
2.2	6.11.2016	some updates

Table of content

1 Introduction

This document describes the configuration of turret, tool management configuration of reference point R0 as well as some additional features about AKKONDesk.

Configuration of AkkonDesk is done by ini files. The files are located on C:\ProgramData\Akkon (Win 7) and either be modified manually in the text editor as well as in different Dialogs in the AkkonDesk software. However, modification of not all parameters is supported in dialogs.

2 PARAMETRIZATON OF REFERENCE POINT R0

2.1 Introduction

Every time AKKON CNC control system starts up, the system has to be initialized. One part of the initialization procedure is to initialize the coordinate system of the CNC-machine. For that AKKONDesk provide one reference point. Movement to reference point can be done at any time and any position. In most of the cases it is executed after startup of the CNC-machine.

The position as well as the procedure for movement to the reference point R0 can be defined by the user. It can be defined on any other. Following description outlines how to parameterize a procedure for initialization of the reference point.
In the example the reference point R0 is located at maximum position of all axes.

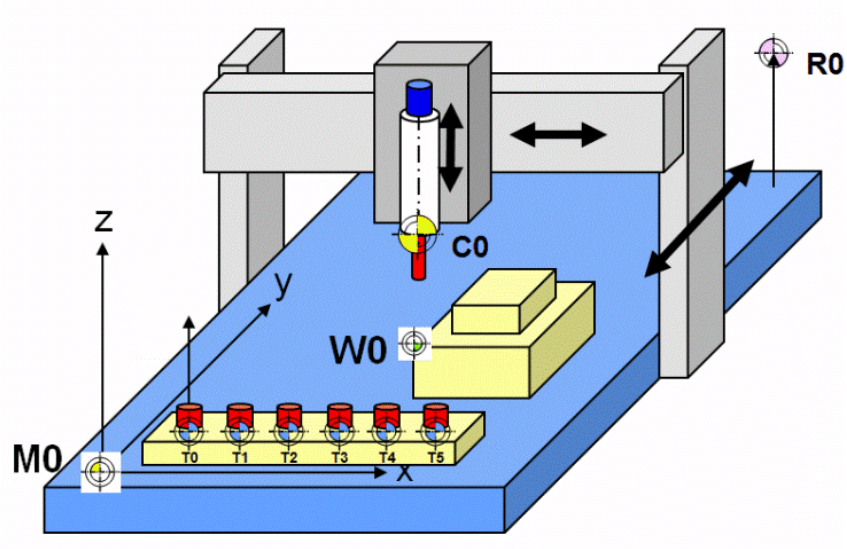


Figure 1: Example position of reference point R0

2.2 Working steps to parameterize reference point R0

Step 1: Move to home position

1.) Run AKKONDesk, connect to CNC controller and move to minimum position 0, 0, 0, …

2.) Set work piece zero point to 0, 0, 0, …

3.) Move to maximum position xMax, yMax, zMax (e.g. x=185; y=330; z=60) and write down maximum coordinates on a paper

5.) Close AKKONDesk

Step 2: Setup coordinates of reference point R0

Open Akkon.ini located in the main path of AKKONDesk and modify the parameters R0.x, R0.y, R0.z and R0.w. Subtract around 5 mm from the maximum coordinates.

Example:

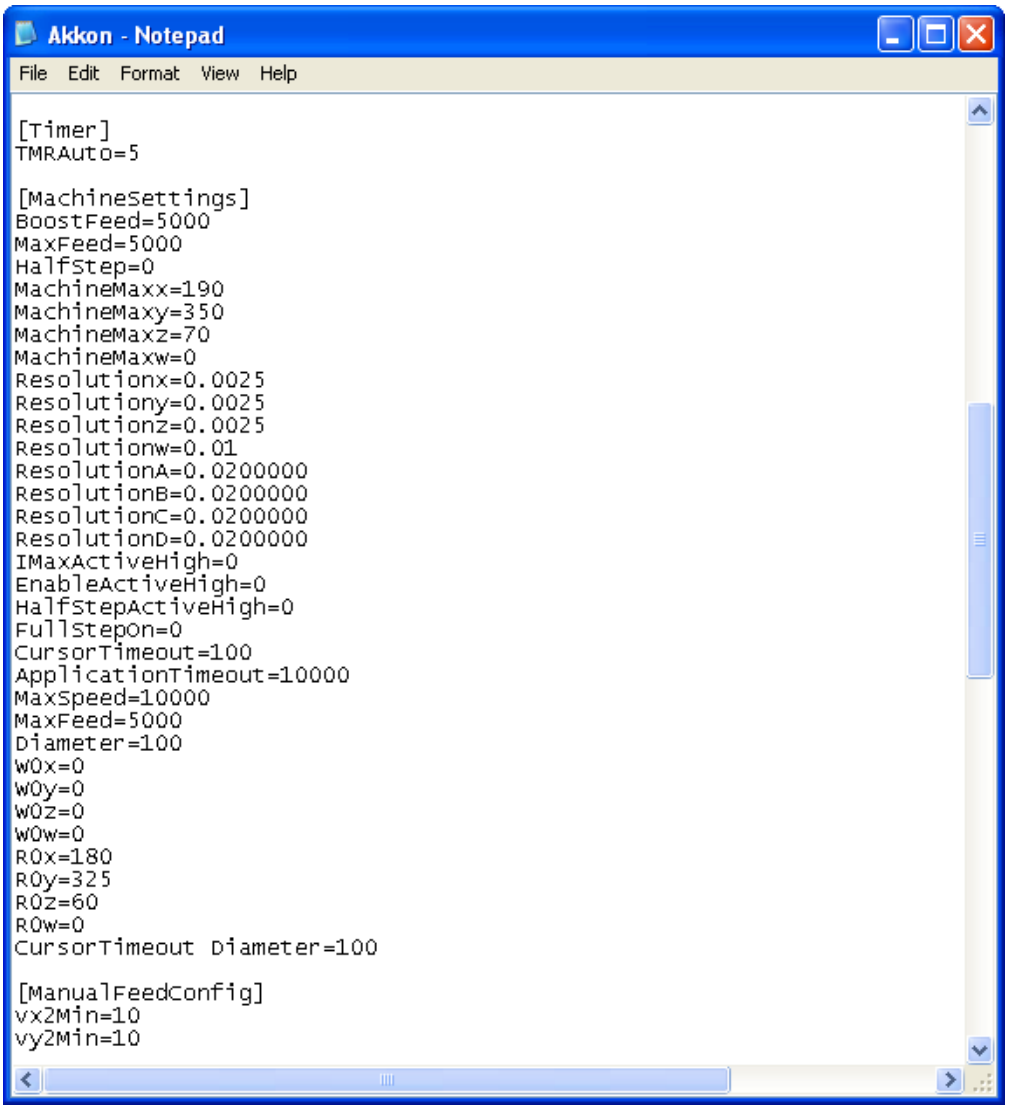


Figure 2: Definition of reference point R0 in AKKON.ini

R0x…R0w defines the position of the reference point in relation to the used Cartesian coordinate system. The values will be set to the current spindle position after reaching the user defined reference point.

Step 3: Define R0-procedure

Open R0.txt in the application directory and write the appropriate G-Code defining the procedure moving to R0. Command M201 indicates, that the spindle is currently in reference position and the coordinate system can be set to the values defined in Akkon.ini. Following code shows an example procedure for a milling machine.

Example:

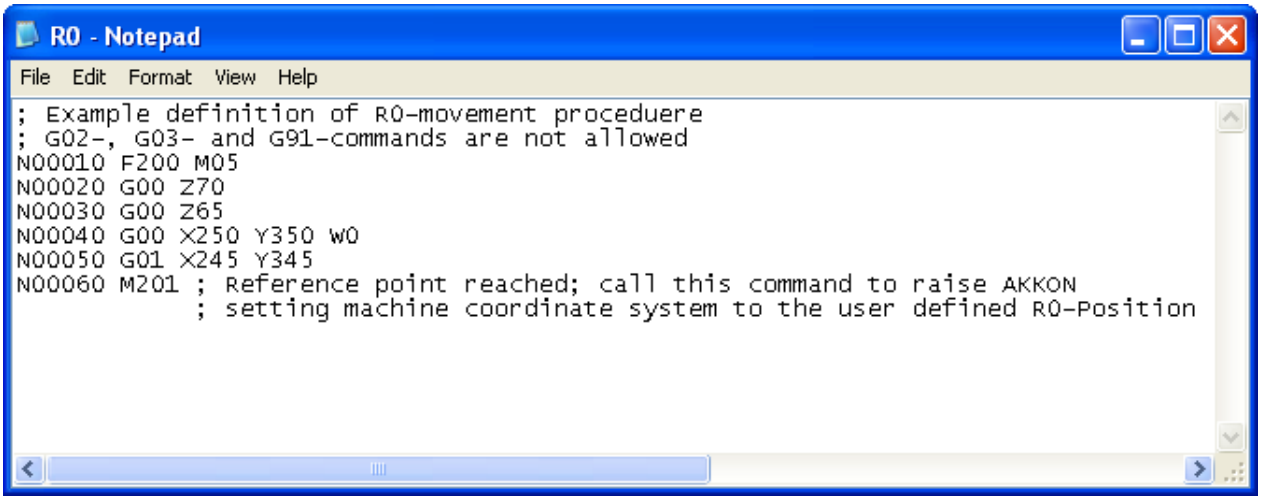


Figure 3: Example procedure for movement to reference point R0

In line N40 of the example code above the machine moves to the maximum coordinate and all limit switches will be reached. After that x, y, z will move 5 mm away from the related limit switch.

Please note: Ensure that the spindle position fits to the coordinates R0.x, R0.y, R0z and R0w before calling the command M201.

Step 4: Test reference point

Run AKKONDesk and press button R0. AKKONDesk calls command G52 which contains the reference point movement procedure.

3 Configuration of turrets

3.1 Introduction

The AKKON CNC system supports four turrets with a variable count of tools. Every turret can be configured for manual or fully automated tool change and handles a variable count of at maximum 32 tools. If the checkbox “Turret x manual mode” is enabled then AKKONDesk will request user response on each tool change.

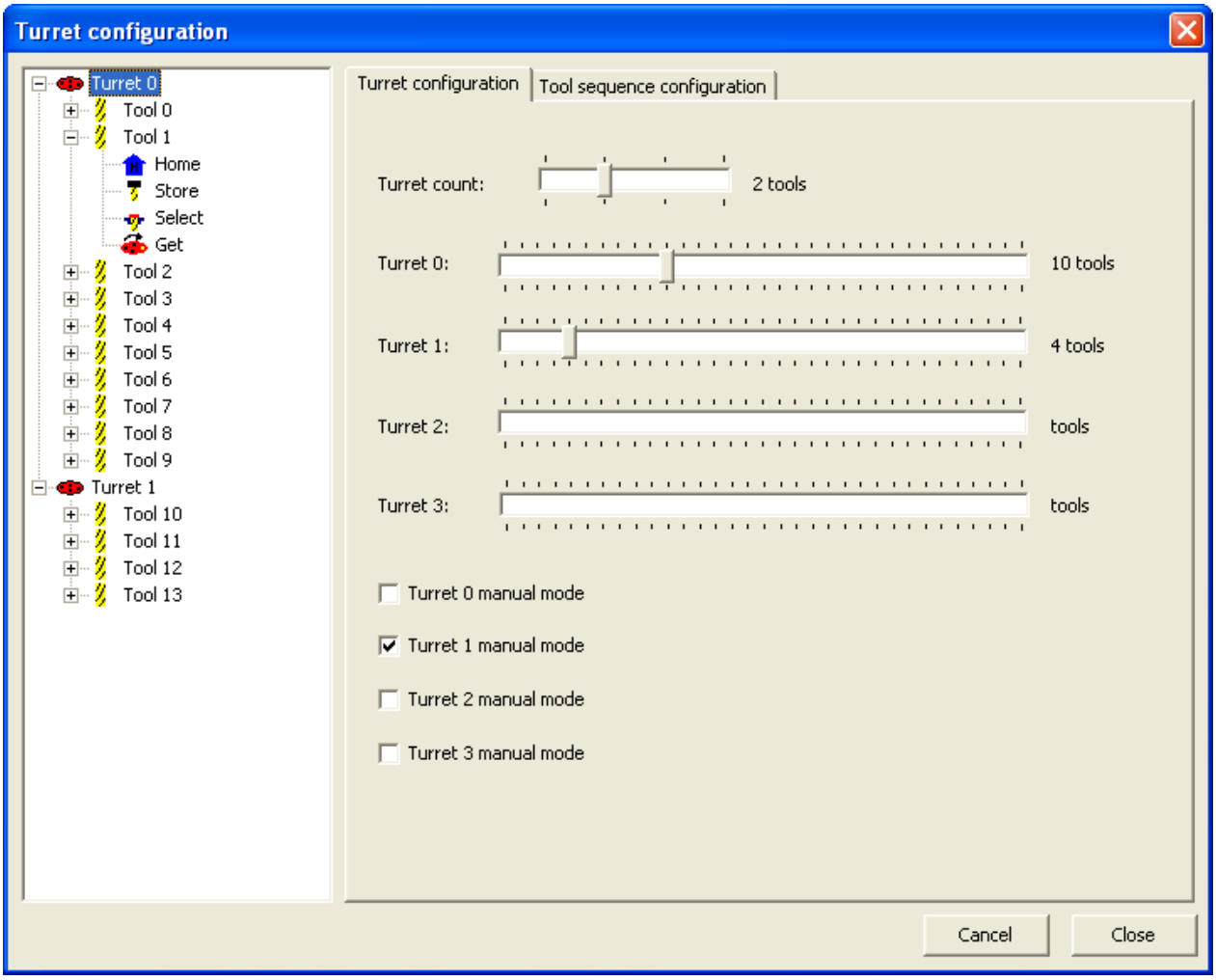


Figure 4: Dialog for turret configuration

3.2 Configuration of tool change sequence

In AKKONDesk every tool has its own tool change sequence. By that way different turret can be defined and handled at the same time.

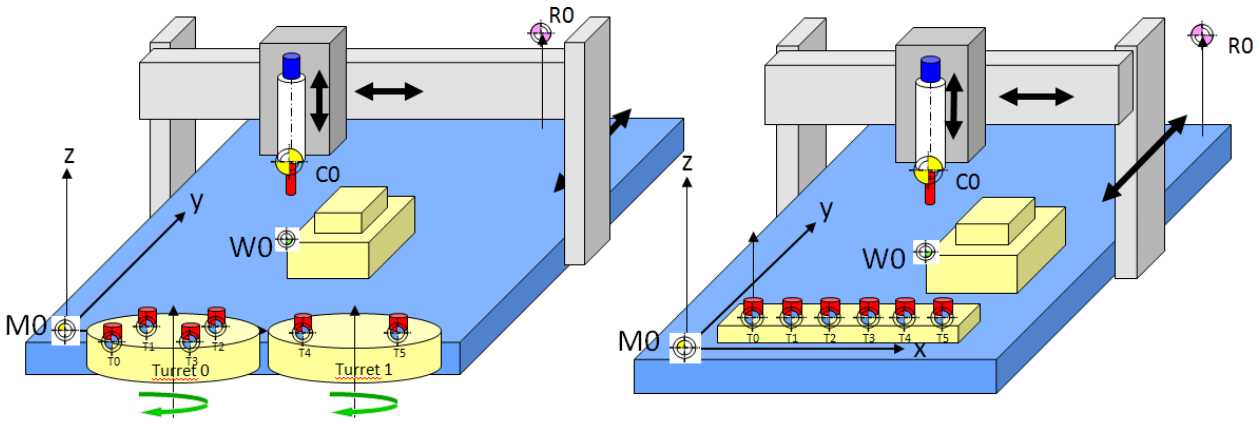


Figure 5: Example of a rotary and a linear turret configuration

A tool change sequence is defined in the following four sub-sequences:

- Home-Sequence: Defines the tasks that how to move to the tool change position.
- Store-Sequence: Defines the tasks how to store a tool in the dedicated turret
- Select-Sequence: Defines the tasks that has to be executed by the turret to select given tool
- Get-Sequence: Defines the tasks how to get a tool form a dedicated turret

Every sequence is defined with a variable number of G-Code. A tool change procedure is processed in the following sequence:

Step 1: Move to home position of current tool Ti

Step 2: Select the free place for tool Ti

Step 3: Store tool

Step 4: If new tool is part of another turret move to tool Tj

Step 5: Select Tj in turret

Step 6: Get tool Tj from turret

Every step can be defined by the user in a separate file that holds lines of DIN 61025 G-Code. All files are located in the subfolder “Turret” of the AKKON application directory. All files that relate to a specific turret are identified by the word Turret plus the number of the Turret.

Turret0_Tool0_Home.txt

A tool that is related to a specific turret is identified by the word Tool plus the number of the tool

Turret0_**Tool0**_Home.txt

Lastly, the sequence is specified by the postfix Home (Step 1), Select (Step 2), Store (Step 3) and Get (Step 4)

Turret0_Tool0_**Home**.txt

Example:

Turret1_Tool2_Store.txt

Specification ot storing tool 2 of turret 1.

Please note: Depending on the used turret, additional hardware is necessary. Following figure shows the definition of the sequence store of Tool 1.

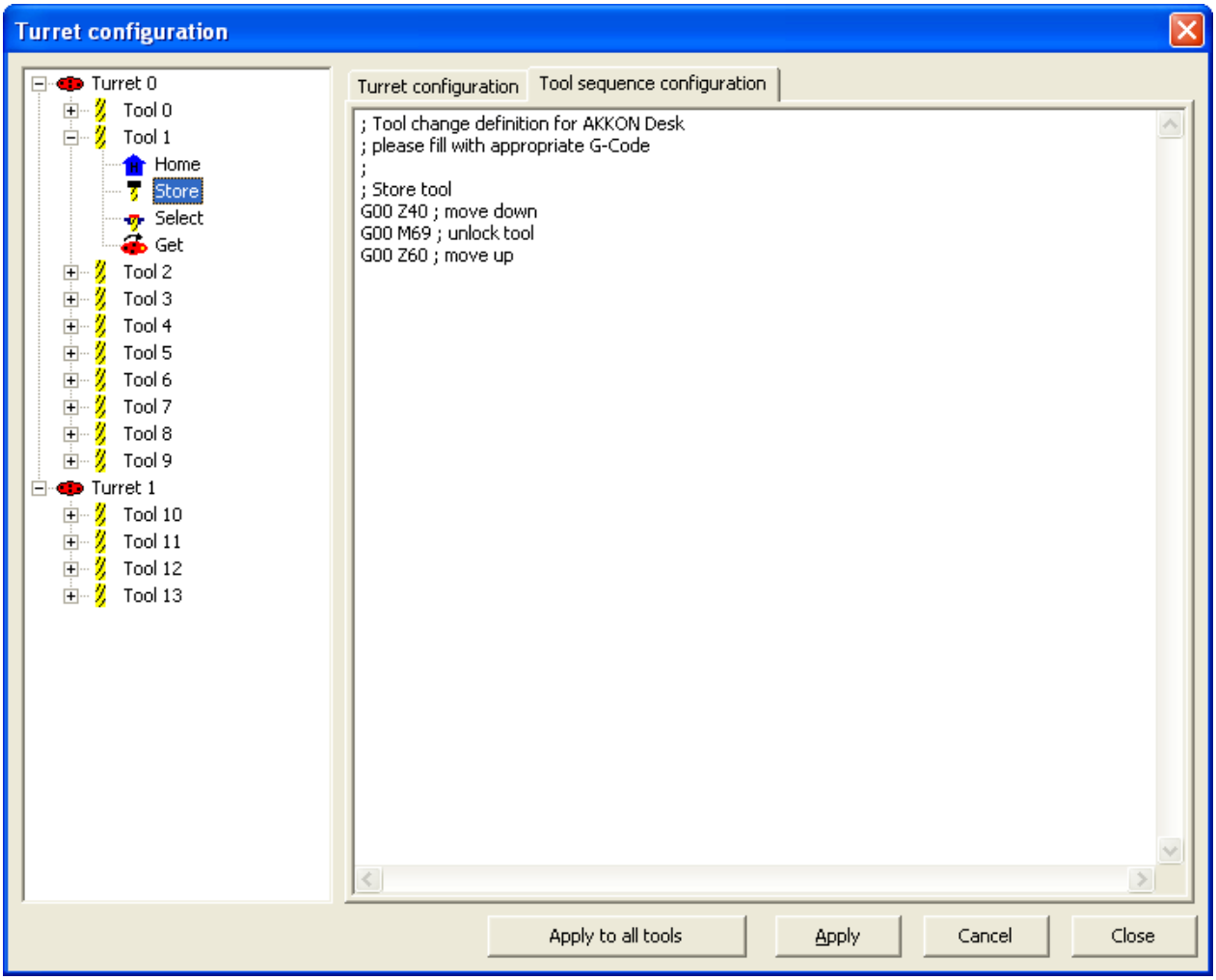


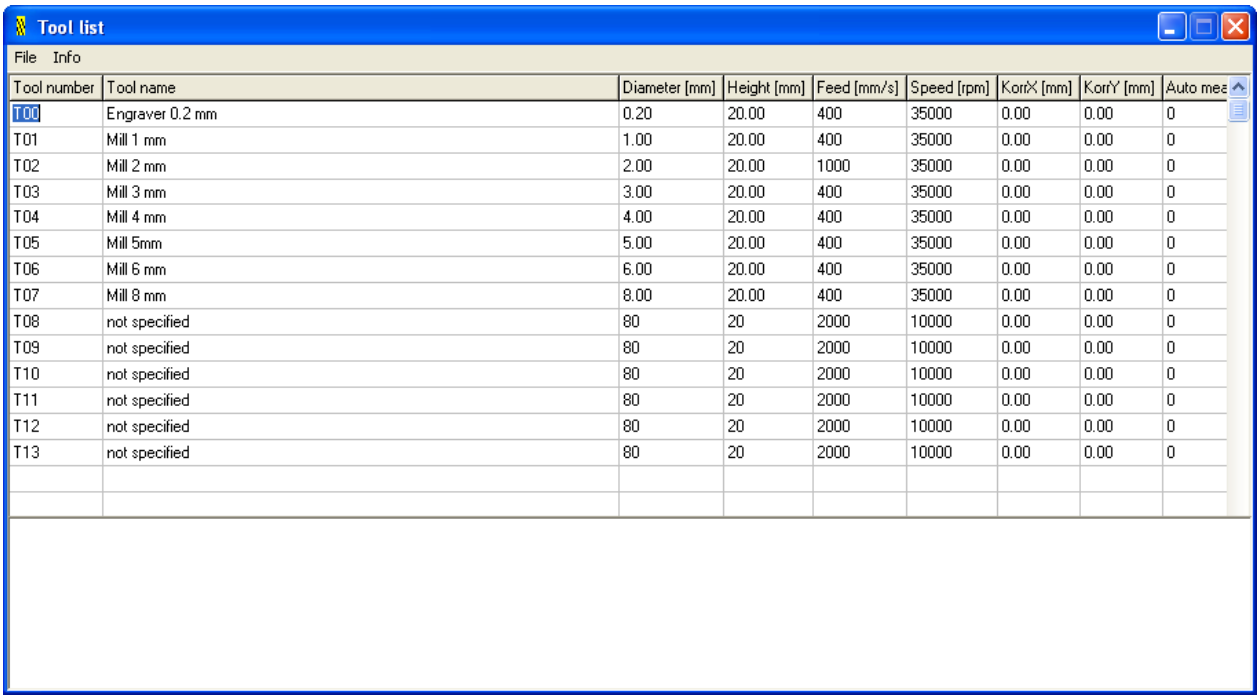
Figure 6: Definition of sequence Store of Tool 1

4 Configuration of tools

AKKONDesk is able to handle 128 tools. The tool configuration dialog can be reached over Menu->Settings->Tool configuration or by clicking the tool symbol in the main toolbar.

Figure 7: Tool configuration selection using main toolbar

The tool list dialogs shows all tools defined in the turret configuration and its processing parameters. Special emphasize can be laid on the parameter “Auto measure”. If the value is set to 1 the real height of the tool will automated be measured using a reference switch. Please see section Automatic Tool Measurement



Tool list

File Info

Tool number	Tool name	Diameter [mm]	Height [mm]	Feed [mm/s]	Speed [rpm]	KorrX [mm]	KorrY [mm]	Auto mea
T00	Engraver 0.2 mm	0.20	20.00	400	35000	0.00	0.00	0
T01	Mill 1 mm	1.00	20.00	400	35000	0.00	0.00	0
T02	Mill 2 mm	2.00	20.00	1000	35000	0.00	0.00	0
T03	Mill 3 mm	3.00	20.00	400	35000	0.00	0.00	0
T04	Mill 4 mm	4.00	20.00	400	35000	0.00	0.00	0
T05	Mill 5mm	5.00	20.00	400	35000	0.00	0.00	0
T06	Mill 6 mm	6.00	20.00	400	35000	0.00	0.00	0
T07	Mill 8 mm	8.00	20.00	400	35000	0.00	0.00	0
T08	not specified	80	20	2000	10000	0.00	0.00	0
T09	not specified	80	20	2000	10000	0.00	0.00	0
T10	not specified	80	20	2000	10000	0.00	0.00	0
T11	not specified	80	20	2000	10000	0.00	0.00	0
T12	not specified	80	20	2000	10000	0.00	0.00	0
T13	not specified	80	20	2000	10000	0.00	0.00	0

Figure 8: Tool list with 14 tools and its processing parameters

5 Configuration of automatic tool measurement

5.1 Introduction

The following description outlines how to setup automatic tool measurement on AKKON CNC system. Automatic tool measurement is a program feature of AKKONDesk that can be used to measure tool height during program operation. This feature can be enabled or disabled specific for each tool. If enabled, every time a tool change has been performed the automatic tool measurement procedure is executed. According to a defined procedure the spindle head moves to the measurement point until the reference switch is enabled. If connected AKKONDesk calculates the current tool height. The parameter is stored in the tool list and included on further processing of G-Code until next tool change.

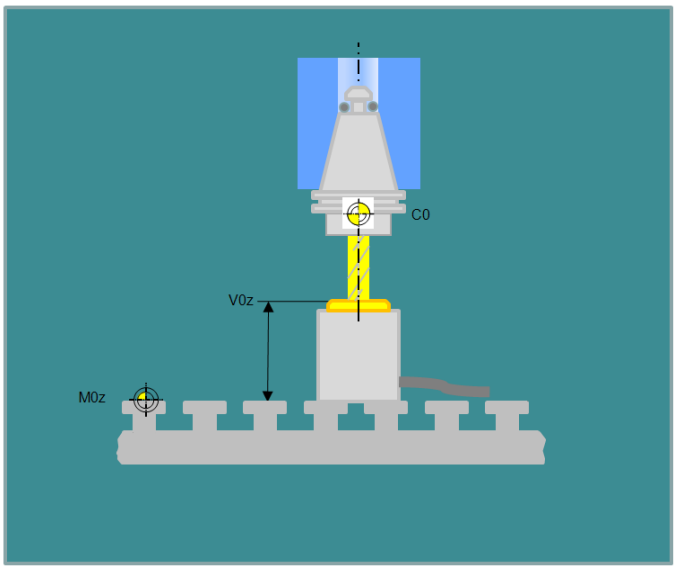


Figure 9: Automatic tool measurement using a reference switch

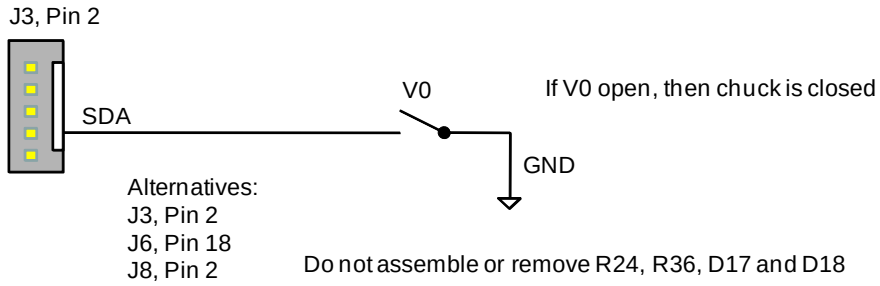
5.2 Hardware setup for automatic tool measurement

Enabling automatic tool measurement a reference switch is required. An example of a simple reference switch is shown in figure 10. The reference switch is based on a limit switch with a lever that is triggered by a plastic bolt. Repetitive accuracy is about 0.01 mm.

Figure 10: Example of a simple reference switch

Depending on the used AKKON controller board the reference switch has to be connected to the according to figure 11.

On AKKON controller board with Pic18F4550 controller:



On AKKON controller board with ARM7 controller:

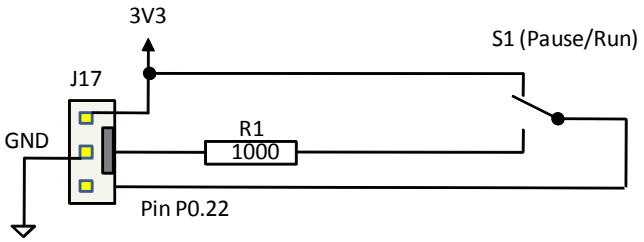


Figure 11: Hardware setup for reference switch

5.3 Software setup for automatic tool measurement

After installation of the reference switch some settings have to be done in AKKONDesk before using the auto tool measurement function. Firstly the absolute height of the reference switch has to be parameterized. This can be done in under menu -> program settings, register card Auto Tool Measurement.

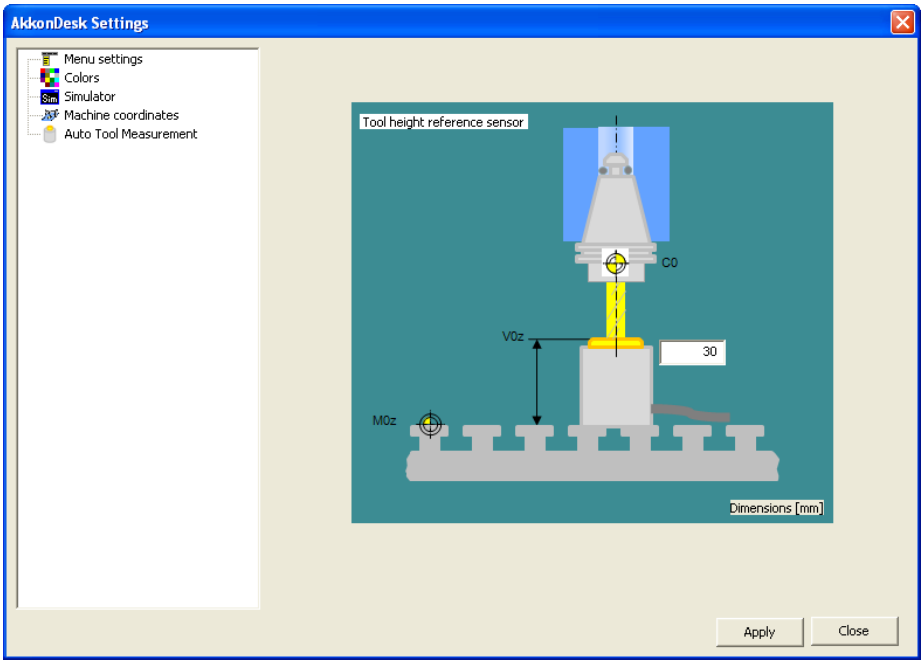


Figure 12: Setup absolute width of reference switch

In a further step the activities of the measurement procedure sequence performing auto tool measurement has to be specified. This can be done by modifying the files TT0_AutoToolMeasurement0_x, located in the directory \Turret relative to the installation path of AKKONDesk same as tool change configuration using turrets.

TT0_AutoToolMeasure0_Get	.txt	94
TT0_AutoToolMeasure0_Home	.txt	84
TT0_Autotoolmeasure0_Select	.txt	92
TT0_AutoToolMeasure0_Store	.txt	101

Figure 13: Related files for automatic tool measurement procedure

TT0_AutoToolMeasurement0_Home: Specifies the activities that have to be executed moving to the measurement position. An example is show in figure 14.

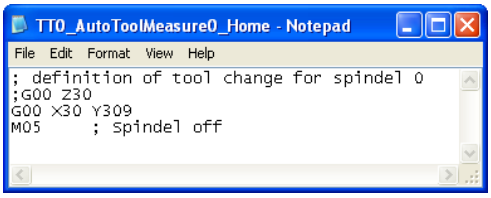


Figure 14: Example code for moving to home position of reference switch

TT0_AutoToolMeasurement0_Store: Specifies the activities that have to be executed performing measurement (Figure 15).

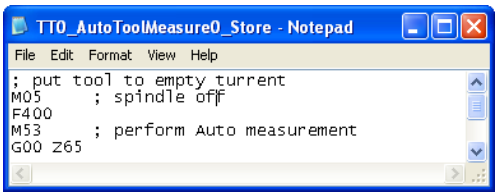


Figure 15: Example code for performing automatic height measurement

TT0_AutoToolMeasurement0_Select: Empty and will be ignored.

TT0_AutoToolMeasurement0_Get: Specifies the activities that have to be executed after successful height measurement (Figure 16).

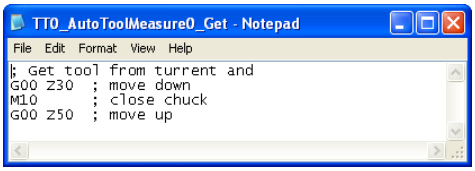
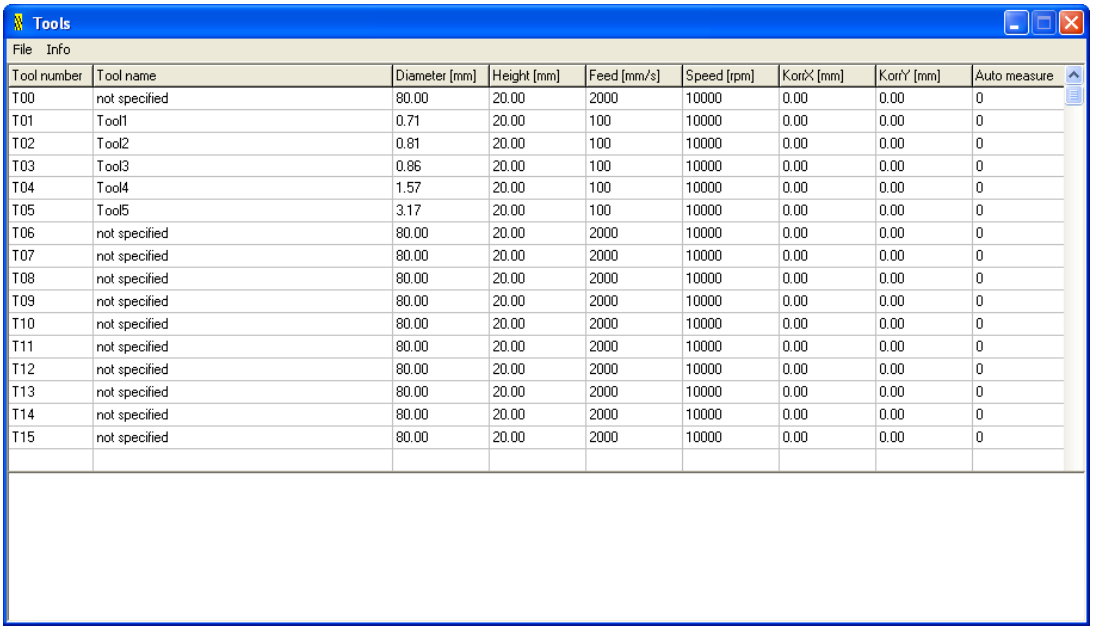


Figure 16: Example code performed after automatic height measurement

Finally the tools that have to be measured on program processing have to be selected. The feature can be enabled in the tools settings dialog, row “Auto measure”. If the value is set to “1” automatic tool measurement is performed (Figure 17).



Tool number	Tool name	Diameter [mm]	Height [mm]	Feed [mm/s]	Speed [rpm]	KorrX [mm]	KorrY [mm]	Auto measure
T00	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T01	Tool1	0.71	20.00	100	10000	0.00	0.00	0
T02	Tool2	0.81	20.00	100	10000	0.00	0.00	0
T03	Tool3	0.86	20.00	100	10000	0.00	0.00	0
T04	Tool4	1.57	20.00	100	10000	0.00	0.00	0
T05	Tool5	3.17	20.00	100	10000	0.00	0.00	0
T06	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T07	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T08	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T09	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T10	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T11	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T12	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T13	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T14	not specified	80.00	20.00	2000	10000	0.00	0.00	0
T15	not specified	80.00	20.00	2000	10000	0.00	0.00	0

Figure 17: Configuration dialog for enabling automatic tool measurement on selected tools

6 Debugging with AKKONDesk

6.1 Introduction

AKKONDesk hast rudimentary functionality for debugging. Following steps describe how to use the debugging functions.

6.2 Debugging with breakpoints

Step 1: Enable Debugging mode

Enable debugging mode be AKKONDesk main Menu->Tools->enable debugging.

Step 2: Load G-Code file

Step 3: Set breakpoints

Enable or disable related breakpoint by using double clicking the left mouse button.

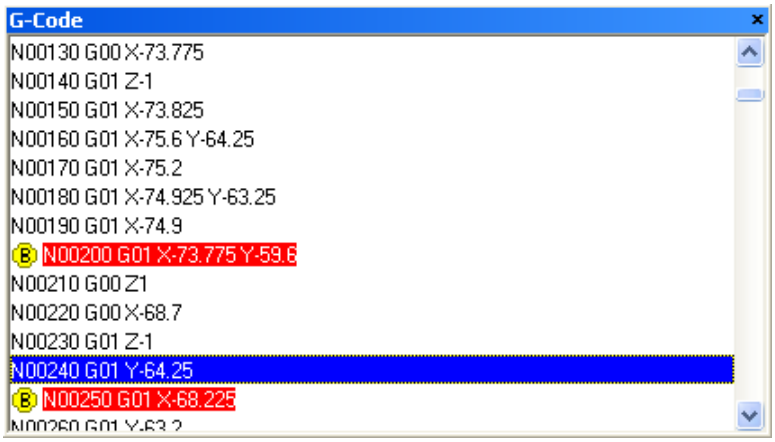


Figure 18: Example program with two breakpoints

Step 4: Run program

Akkon will stop at each break point. After disabling the break point the program will proceed.

7 Debugging Monitor

7.1 Introduction

Visualization of programs is usually very helpful to detect errors in the G-Code program. However, there can be some program errors that can not directly be detected. Especially commands that are not visualized e.g. an M-command. Using the debugging monitor the communication between AKKONDesk and the AKKON CNC-Controller can be monitored. Following description outlines how to use the debugging monitor. There can also be the situation, that the G-Code parser of AKKONDesk does not deliver the related results expected by the user.

7.2 Using debugging monitor

Step 1: Open debugging monitor

Enable debugging mode be AKKONDesk main Menu->Tools->View Debugging Monitor.

Step 2: Enable Debugging Monitor

Step 3: Run CNC-program

Open CNC-Program and execute it.

Figure 19: Example program that will be monitored using the debugging monitor

During program execution the debugging monitor shows the commands that are sent to the AKKON CNC-Controller including all G-, M-, T-, S-, F-Commands. The commands are ordered in sequence that the AKKON CNC controller will process it. Following picture shows the generated debugging output for the program before.

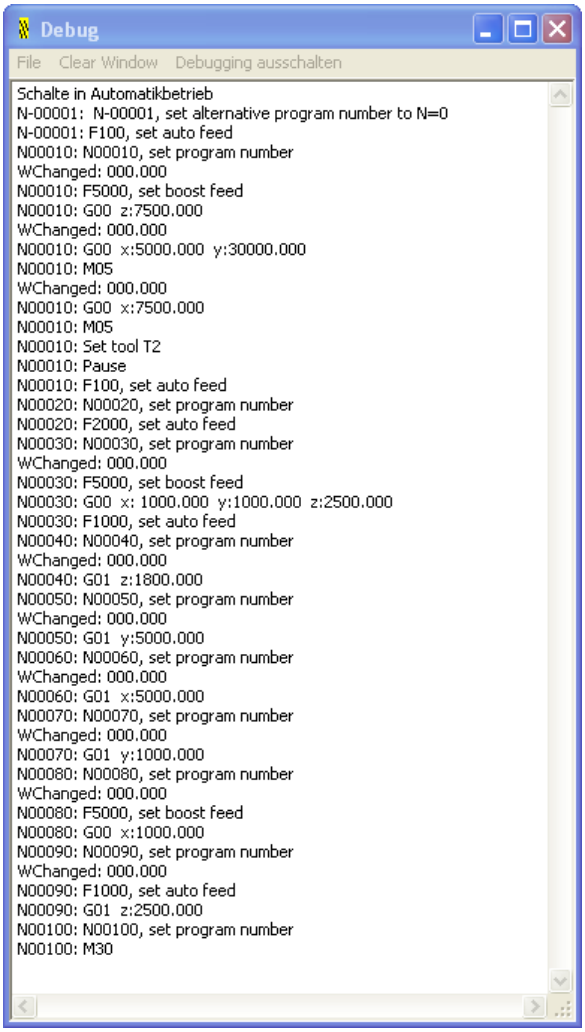


Figure 20: Output of debugging monitor from a monitored program

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