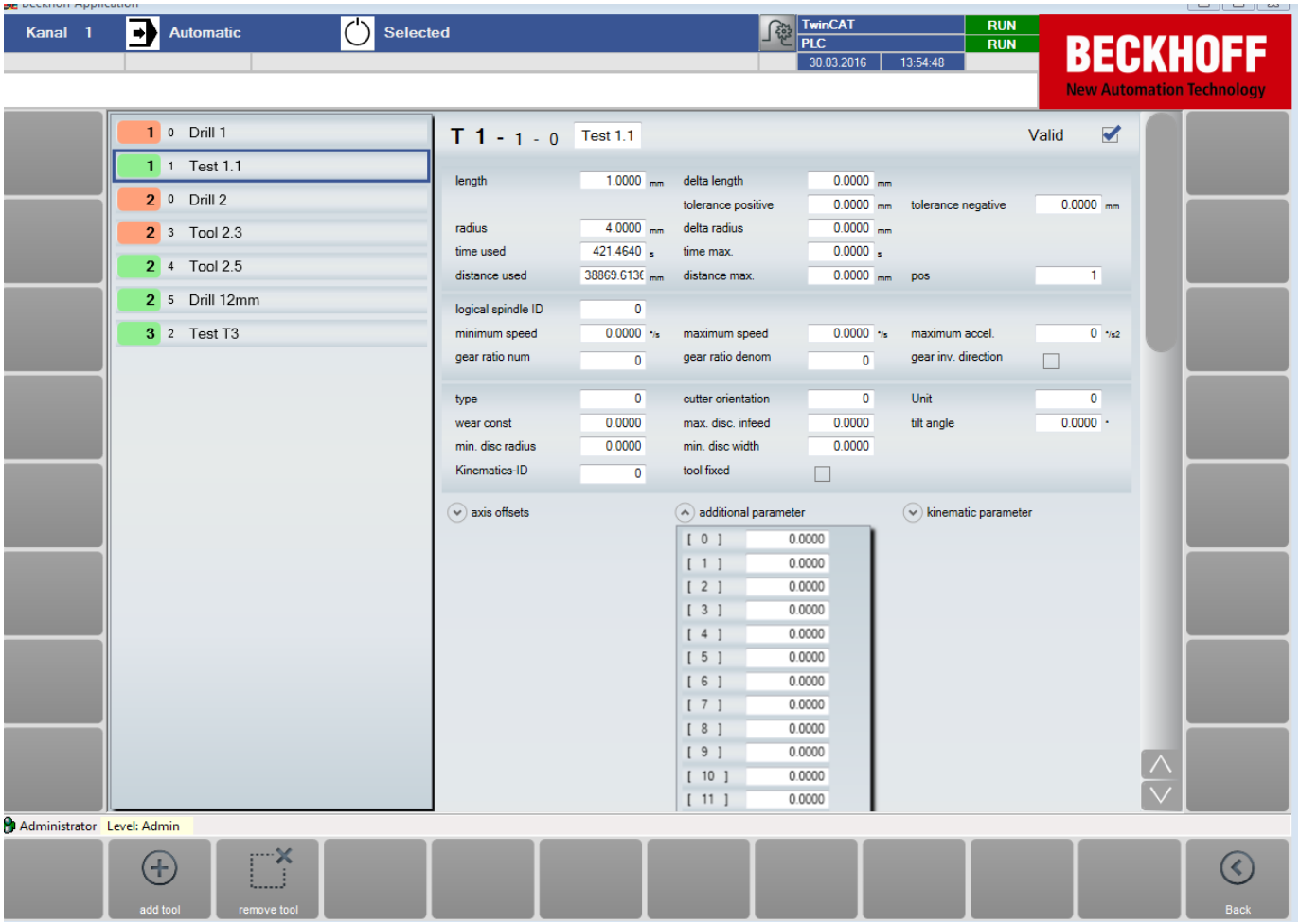
BECKHOFF

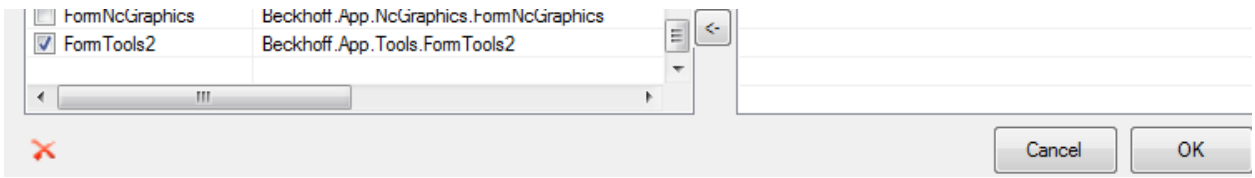
2021.02.10

ToolManagement2 CNC



The plugin „ToolManagement2“ is located in the DLL „Beckhoff.App.Tools.dll“ in folder “Plugins” of the HMI
With the help of „Menumanager“ the form „Beckhoff.App.Tools.FormTools2“ can be included.

It makes sense to check the checkbox „AutoInstance“. The form will be loaded automatically at start of the HMI, if it is checked.



Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

A tool is selected in the left tree.
The tool data is shown in the right window.
This data may be edited, if the actual tool is not used.
The tool data is automatically stored in a XML file “tools.xml” in folder “System\Tools”.

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

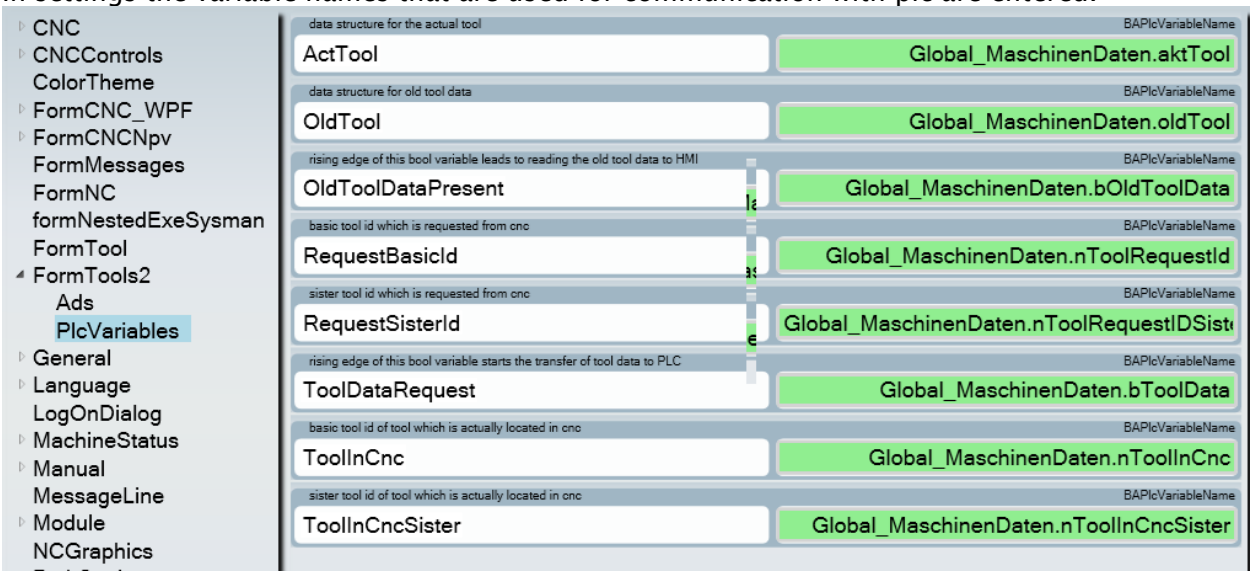
Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

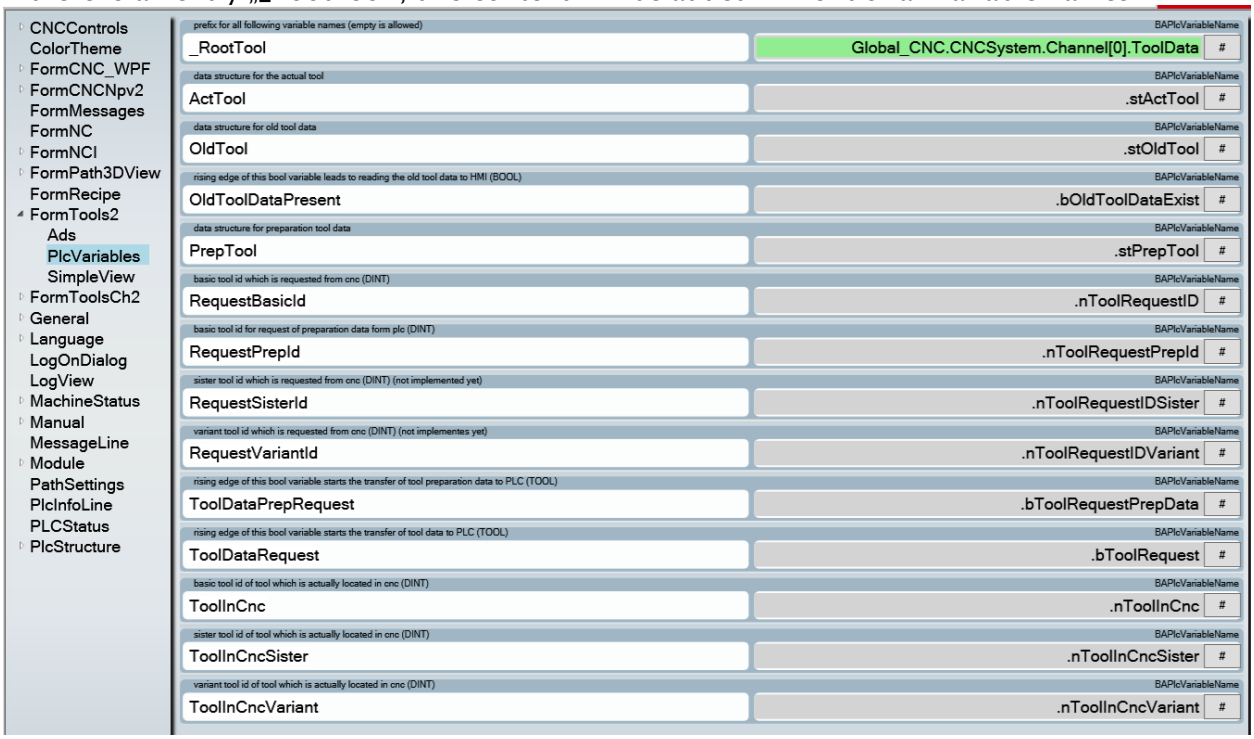
Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

In settings the variable names that are used for communication with plc are entered.



If there is an entry „_RootTool“, this content will be added in front of all variable names.



Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

The function „**add tool**“ (normally F2) is used to create a new tool.
Only new tools that differ in (T) AND (S) from all other tools can be created.

The function “**remove tool**” (normally F3) is used to remove a tool in the left window.

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

The function „**import from actual NC program**“ (default Alt-F1) is used to import tool data from the header of the selected nc program.
The special header may be created out of a CAM postprocessor.
To make reading of this data possible, the following format is used:

Example:

```
(ToolDataStart)
(T=1;S=1; D=6.;L=57.1; Desc=Zentrierbohren Test;
(T=2; R=2.0025; L=27.1; P=2; Desc=Reibahle;
(T=3; D=11.7; P=3; Desc=Schaftfraser;
(T=5;S=1; D=4.2;Desc=Bohrer;
(T=6; D=5.;Desc=Gewinde;
(T=7; D=5.5;Desc=Bohrer;
(T=8;S=2; D=4.8;Desc=Bohrer;
(T=10; D=8.;Desc=Fasenfraser;
(T=18; D=4.95;Desc=Schaftfraser;
(ToolDataEnd)
```

The area starts with the keyword (ToolDataStart) and ends with (ToolDataEnd). The area is searched in the first 100 lines of the nc program. If it is defined later in the program, it will be ignored.
Every tool is defined in exactly one line. A semicolon (;) separates each entry.
The values of the elements are assigned with the equal sign (=). The order of the values of a line is arbitrary.

This are the possible entries for a tool:

• T	tool number	UINT
• S	tool sister number	UINT
• D	diameter in mm	DOUBLE
• R	radius in mm (alternatively to D)	DOUBLE
• L	length in mm	DOUBLE
• P	position (pos)	INT
• Desc	description	STRING

With the functionalities "Import from File" (Alt-F3) and "Export to File" (Alt-F4) the tool data can be imported or exported to other XML files.

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

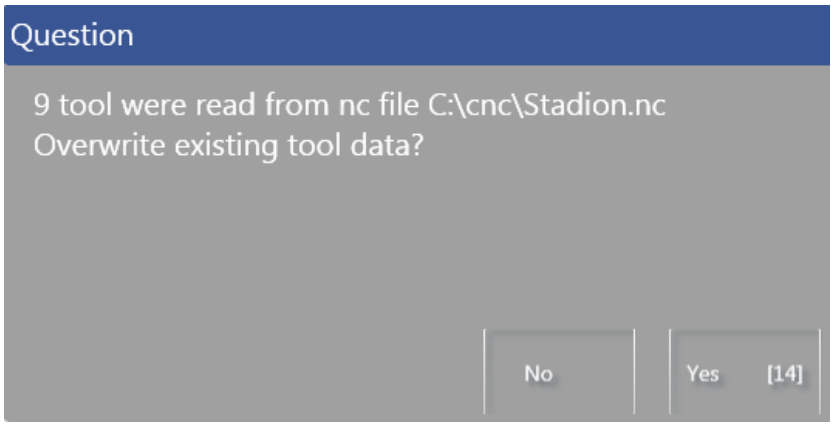
Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

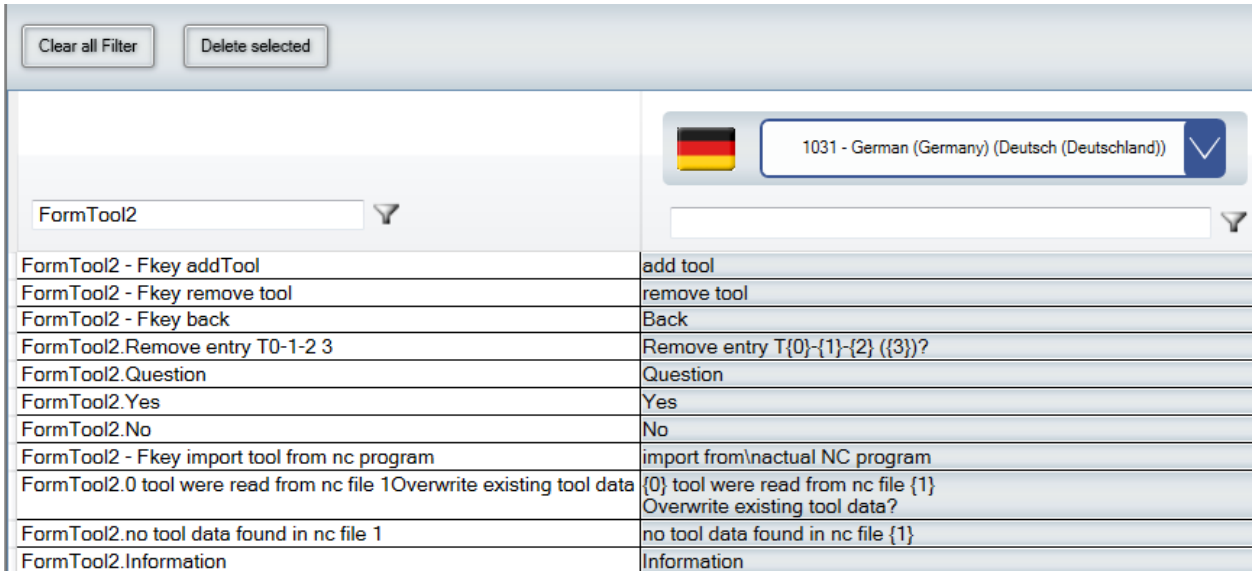
Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

After calling the function a messagebox has to be acknowledged.
All found tool data from the nc file is added to the actual tool data table. Existing tools are updated and new tool are added.



The language texts can be found in the language database under “FormTool2” and can be translated there.



FormTool2 - Fkey addTool	add tool
FormTool2 - Fkey remove tool	remove tool
FormTool2 - Fkey back	Back
FormTool2.Remove entry T0-1-2 3	Remove entry T{0}-{1}-{2} ({3})?
FormTool2.Question	Question
FormTool2.Yes	Yes
FormTool2.No	No
FormTool2 - Fkey import tool from nc program	import from\nactual NC program
FormTool2.0 tool were read from nc file 1Overwrite existing tool data	{0} tool were read from nc file {1} Overwrite existing tool data?
FormTool2.no tool data found in nc file 1	no tool data found in nc file {1}
FormTool2.Information	Information

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

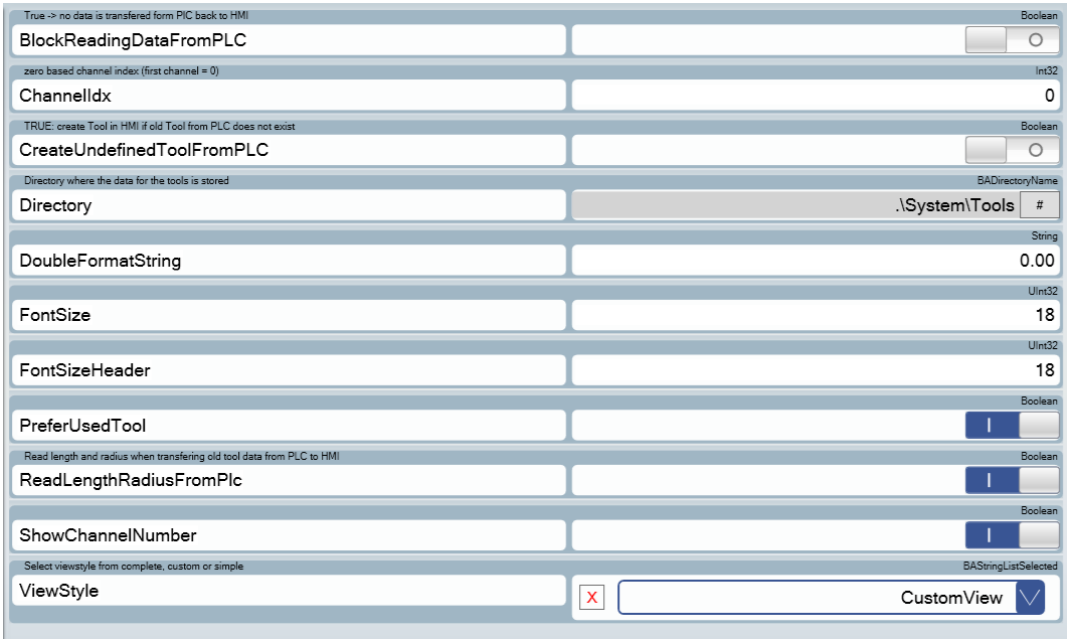
Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

Additional „Settings“

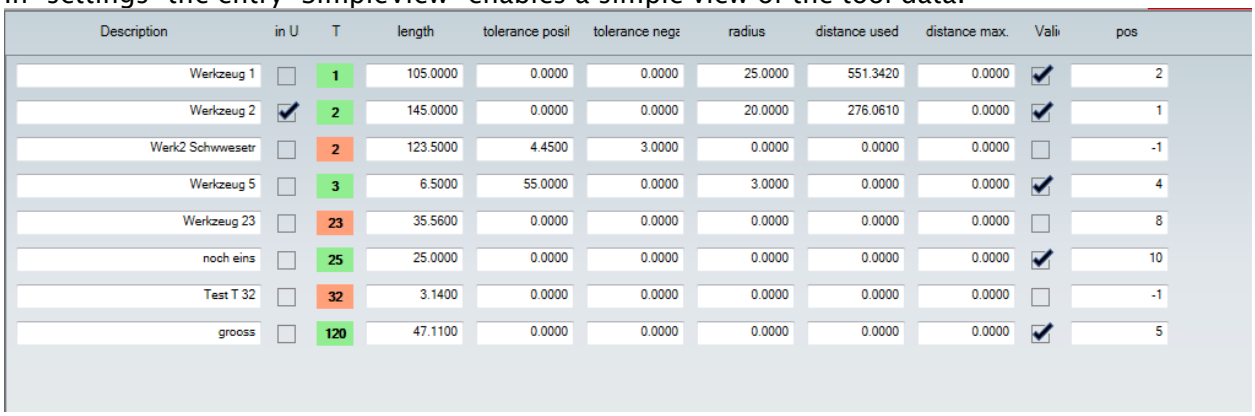


- BlockReadingDataFromPLC if enabled, no data from PLC will be read at all
- ChannelIdx: 0 based index of channel
  (is used for „**import from actual NC program**“)
- Directory: Folder where tool data is stored
- DoubleFormatString: format to show double values
- FontSize: fontsize
- FontSizeHeader: fontsize if header in “SimpleView”
- PreferUsedTool: If sister tools exist, the first one is selected for which DistUsed or TimeUsed is not equal to 0. This means that tools are completely used before a newer one is loaded.
- ReadLengthRadiusFromPLC: only if set to true, length and radius are transferred back from the plc together with used time and used path data.
- ShowChannelNumber: Show the channel number above the displayed data
- ViewStyle: selects the style of view:
  Complete View (all data),
  SimpleView (table with some selected data),
  CustomView (fully customizable table)

BECKHOFF

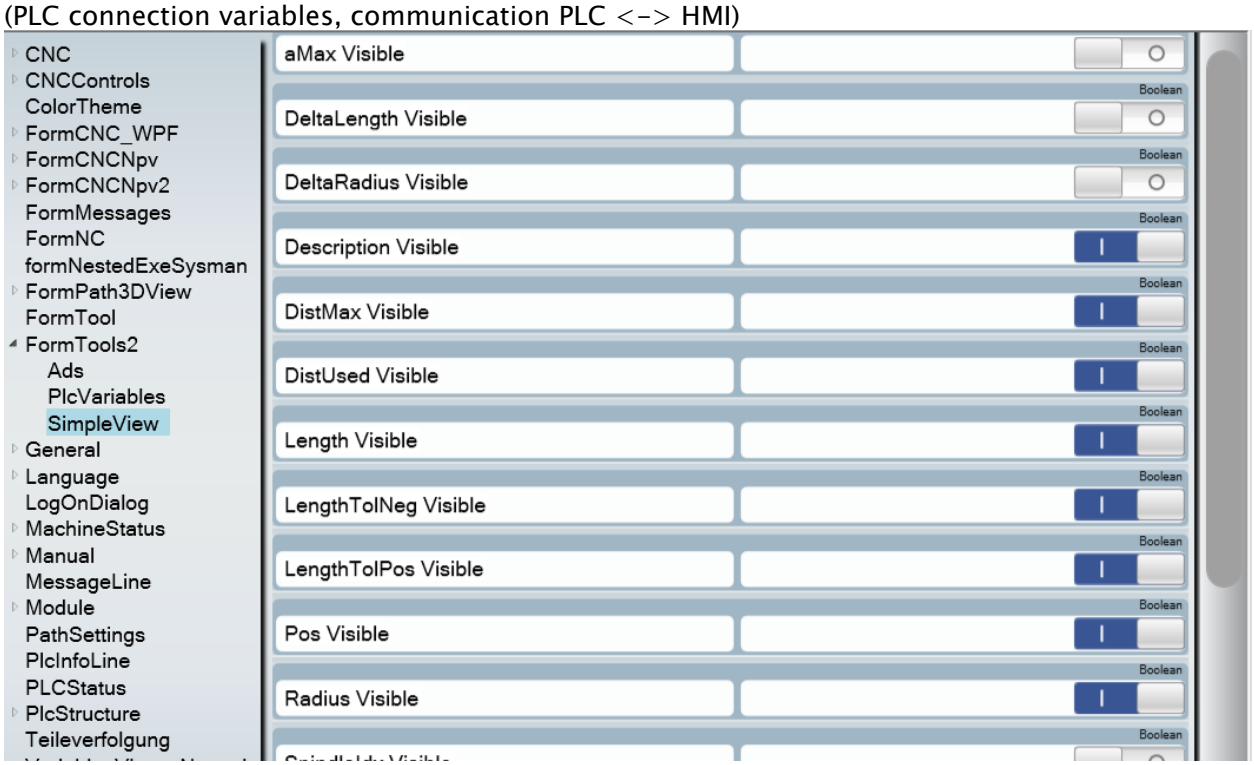
SimpleView

In “settings” the entry “SimpleView” enables a simple view of the tool data.



Description	in U	T	length	tolerance posit	tolerance nega	radius	distance used	distance max.	Vali	pos
Werkzeug 1	☐	1	105.0000	0.0000	0.0000	25.0000	551.3420	0.0000	☑	2
Werkzeug 2	☑	2	145.0000	0.0000	0.0000	20.0000	276.0610	0.0000	☑	1
Werk2 Schwwesetr	☐	2	123.5000	4.4500	3.0000	0.0000	0.0000	0.0000	☐	-1
Werkzeug 5	☐	3	6.5000	55.0000	0.0000	3.0000	0.0000	0.0000	☑	4
Werkzeug 23	☐	23	35.5600	0.0000	0.0000	0.0000	0.0000	0.0000	☐	8
noch eins	☐	25	25.0000	0.0000	0.0000	0.0000	0.0000	0.0000	☑	10
Test T 32	☐	32	3.1400	0.0000	0.0000	0.0000	0.0000	0.0000	☐	-1
grooss	☐	120	47.1100	0.0000	0.0000	0.0000	0.0000	0.0000	☑	5

The “simple” view presents the tool data similar to the old version of tool management in the HMI.
In “Settings” the user can choose which columns are displayed in this view.
The functionality of tool data is not changed and independent from the type of view.
(PLC connection variables, communication PLC <-> HMI)



Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

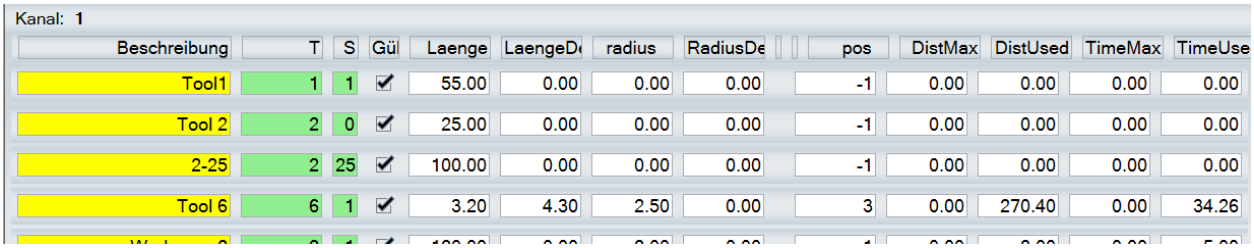
Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

CustomView

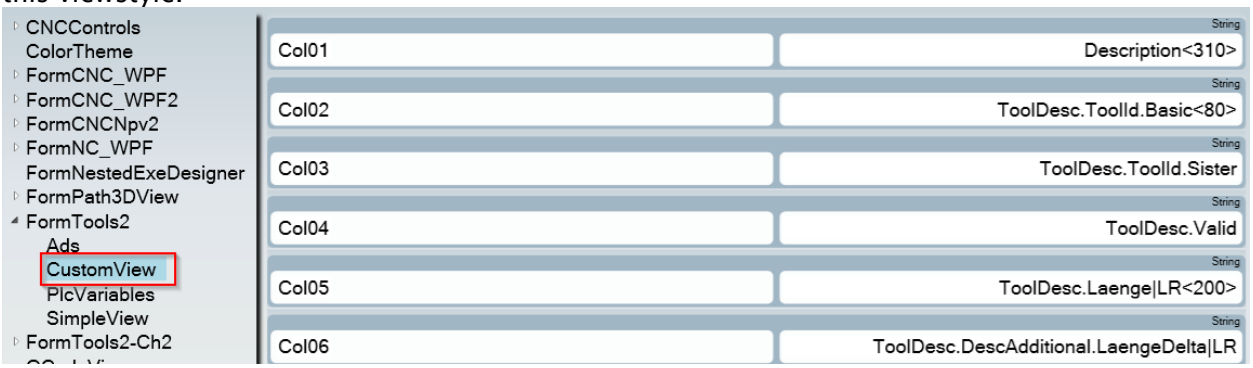


Kanal: 1

Beschreibung	T	S	Gü	Laenge	LaengeD	radius	RadiusDe	pos	DistMax	DistUsed	TimeMax	TimeUse
Tool1	1	1	☑	55.00	0.00	0.00	0.00	-1	0.00	0.00	0.00	0.00
Tool 2	2	0	☑	25.00	0.00	0.00	0.00	-1	0.00	0.00	0.00	0.00
2-25	2	25	☑	100.00	0.00	0.00	0.00	-1	0.00	0.00	0.00	0.00
Tool 6	6	1	☑	3.20	4.30	2.50	0.00	3	0.00	270.40	0.00	34.26

It is not possible to edit the line of the actually “in use” data. (here T:2 S:1)

The custom view is fully customizable in settings. It is possible to show up to 20 columns in this viewstyle.



Only not empty entries are shown in this view. If a value in PLC is a DINT (normally 0.1 µm) an append “|LR “ will force it to be converted to LREAL in the HMI.

For each entry, the column width of the display can optionally be specified as the last element in brackets. Example: ToolsDesc.ToolId.Basic <80>

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

Possible entries:

```
Description
InUse
ToolDesc.Amax
ToolDesc.AxVersatz[x]                    // x [0..31]
ToolDesc.DiscMinRadius
ToolDesc.DiscMinWidth
ToolDesc.DiscTiltAngle
ToolDesc.ExtDiscretLimit
ToolDesc.GearInvDirection
ToolDesc.GearInvDirectionNoStop
ToolDesc.GearRatioDenom
ToolDesc.GearRatioNum
ToolDesc.KinId
ToolDesc.KopfVersatz[x]                  // x [0..31]
ToolDesc.Laenge
ToolDesc.LogAxNrSpdl
ToolDesc.MassEinheit
ToolDesc.Param[x]                        // x [0..59]
ToolDesc.Radius
ToolDesc.RadiusPath2
ToolDesc.SrkLage
ToolDesc.ToolFixed
ToolDesc.ToolId.Basic
ToolDesc.ToolId.Sister
ToolDesc.ToolId.Variant
ToolDesc.Typ
ToolDesc.Valid
ToolDesc.VbMax
ToolDesc.VbMin
ToolDesc.WearConst
ToolDesc.DescAdditional.LaengeDelta
ToolDesc.DescAdditional.Pos
ToolDesc.DescAdditional.RadiusDelta
ToolDesc.DescAdditional.ToleranceNeg
ToolDesc.DescAdditional.TolerancePos
ToolLife.DistMax
ToolLife.DistUsed
ToolLife.TimeMax
ToolLife.TimeUsed
```

The header labels are translated with an index string created width “FormTools-“ and the string behind the last .

Example:

`ToolDesc.ToolId.Basic ->` LanguageId: “FormTools2-Basic”

FormTools2-ToolDesc.KopfVersatz0	ToolDesc.KopfVersatz[0]
FormTools2-Basic	T
FormTools2-Laenge	Laenge
FormTools2-LaengeDelta	LaengeDelta
FormTools2-RadiusDelta	RadiusDelta
FormTools2-AxVersatz0	AxVersatz[0]

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

CustomView with sorting by "Pos"

If “ToolDesc.DescAdditional.Pos” is selected as the first element in the “CustomView” settings, the tool data is shown in a different representation.

The list is sorted according to the entry "Pos" and empty elements are represented by an empty line.

Kanal: 1

pos	Beschreibung	T	Gül	Laenge	LaengeDe	radius	RadiusDe	KopfVers	KopfVers	DistMax	DistUsed	TimeMax	TimeUse
1	Tool with number 9	9	☑	3	0	47	0	0	0	0	0	0	0
2													
3	Tool1	1	☑	56	0	0	0	0	0	0	0	0	0
4	Neues Tool	11	☑	0	0	0	0	0	0	0	0	0	0
5	Werkzeug 2	2	☑	125	0	2	0	47	31400	0	181550	0	2218
6													
7	Test Schwesetr	6	☑	8	0	5	0	0	0	0	0	0	0
8	Test Tool 12.1	12	☑	30	2	4	1	0	5	0	0	0	0
9													
10													
11													
12	Tool3	3	☑	4	0	0	0	0	0	0	116750	0	1508
-1	ein TestTool	15	☑	47	0	0	0	0	0	0	0	0	0

Entries with Pos < 0 are placed at the end of the list.
It is also possible to write the data Pos, T, S, V to an array in the PLC each time the "Pos" entry is changed.
All entries are written if there is space in the array inside the PLC.
The PLC array variable is entered in the settings under "CustomView.PlcVarToolPosArray".
Example (array limits can be freely selected):

```
TYPE ST_ToolPos :
STRUCT
        Pos:            DINT;   (* position in tool holder *)
        ToolID:         DINT;   (* tool id for request *)
        ToolIDSister:   DINT;   (* tool sister id for request, 0 if not needed *)
        ToolIDVariant: DINT;    (* tool variant id for request, 0 if not needed *)

END_STRUCT
```

```
ToolPosCh1:    ARRAY[1..20] OF  ST_ToolPos;
```

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

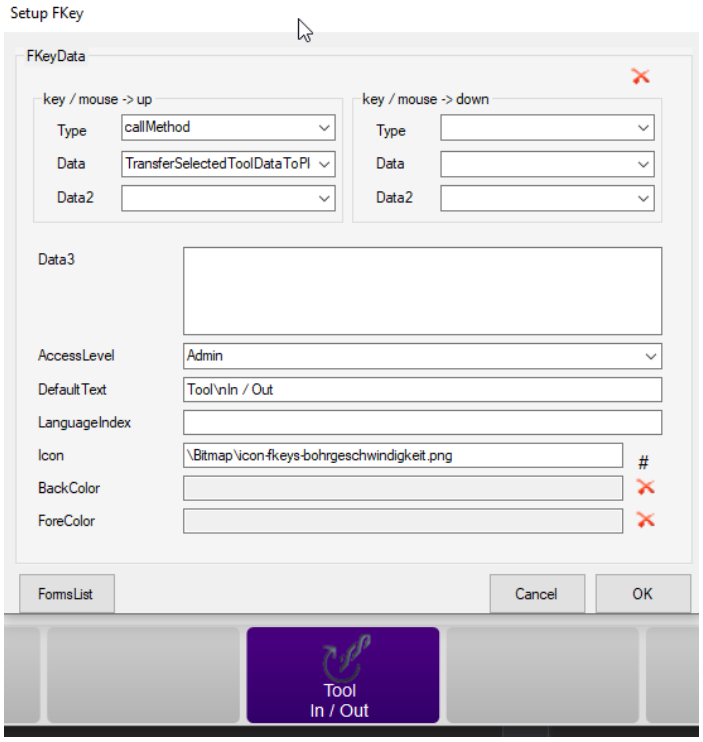
Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

With the help of the menu manager, the "TransferSelectedToolDataToPlc" function can be assigned to a key with "callMethod":



The currently selected tool is then transferred to the PLC.There are two cases that have to be distinguished:

1. Tool with Pos> 0: The data of the selected tool is written into the structure that is defined in the settings with "PlcVarStOut".
2. Tool with Pos < 1 : A dialog is displayed in which a position must be entered. The data of the tool is written into the structure that is defined in the settings with "PlcVarStIn". The entered position is written into "PlcVarNPos".

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

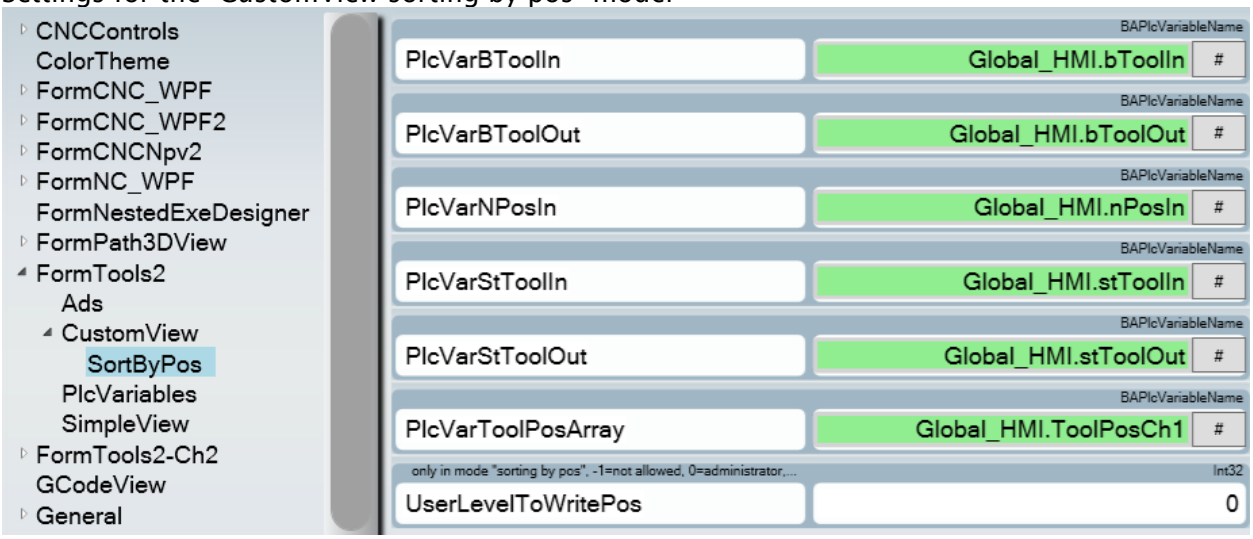
Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

Settings for the "CustomView sorting by pos" mode:



PlcVarBToolIn: is written to TRUE when new data has been written to the "PlcVarStToolIn" structure. Type: BOOL

PlcVarBToolOut: is written to TRUE when new data has been written to the "**PlcVarStToolOut**" structure. Type: BOOL

PlcVarNPos: is written with the value entered via dialog together with PlcVarBToolIn. Type: INT.Typ: INT.

PlcVarStToolIn: SPS Variable type „ST_CNC_TOOL_DATA_EXT".

PlcVarStToolOut: SPS Variable type „ST_CNC_TOOL_DATA_EXT".

PlcVarToolPosArray: PLC variable name of the array into which the tool position is written.

UserLevelToWritePos: User level that allows the position to edited in the HMI.
The following applies:
-1: no level allows writing
0: administrator
1: supervisor
...etc.

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

Communication HMI <-> PLC

Communication takes place by means of the following global variables:

```
(* Tooldata *)
aktTool   : ST_CNC_TOOL_DATA_EXT;    (* stActTool *)
oldTool   : ST_CNC_TOOL_DATA_EXT;    (* stOldTool *)
nToolRequestID   : DINT;
bToolData   : BOOL;                  (* bToolRequest *)
bOldToolData   : BOOL;               (* bOldToolDataExist *)
```

In "aktTool" the currently in-use tool data is retained. The PLC can request data from the HMI, which in nToolRequestID requested tool number is written.

A rising edge on the BOOL variables bToolData then requests the data from the HMI. Once the data is in the PLC are available, bToolData is set by the HMI back to FALSE. From the HMI a tool is supplied with the = Basic_ID nToolRequestID and pos! = 0 If such a tool does not exist, then the HMI provides a tool with the flag valid = false. The PLC can update tool data in the database. The data which is in “oldTool” is transferred.
With a rising edge of the variable btoolDataChangeBufferSize -> TRUE the data from the MMI are accepted.
Once this process is completed, the HMI variable btoolDataChangeBufferSize is set back to FALSE.

The tooldata structure (new version; TC3.1 sample PLC Project) is located in each channel structure in Global_CNC.CncSystem:

ToolData	ST_CNC_ToolChannel			Data for tool handling
bToolRequest	BOOL	FALSE		rising edge starts request of tool data from HMI, HMI resets to false after read
nToolRequestID	DINT	2		tool id for request
nToolRequestIDSi...	DINT	0		tool sister id for request, 0 if not needed
nToolRequestIDV...	DINT	0		tool variant id for request, 0 if not needed
bToolRequestPre...	BOOL	FALSE		rising edge starts request of tool data to structure stPrepTool
nToolRequestPre...	DINT	0		tool id for pepRequest
bOldToolDataExist	BOOL	FALSE		rising edge commands the HMI to read oldData from stOldTool
stActTool	ST_CNC_TOOL_DATA_EXT			complete tool data for actual tool that will be transfered FROM HMI
stOldTool	ST_CNC_TOOL_DATA_EXT			complete tool data for odlTool that will be transfered TO HMI
stPrepTool	ST_CNC_TOOL_DATA_EXT			complete tool data for preTool that will be transfered FROM HMI
stActT	ST_CNC_TOOL_DATA_EXT			(internal) tool data for the actual requested T
nToolInCnc	DINT	2		main tool id of tool actually in cnc
nToolInCncSister	DINT	1		sister tool id of tool actually in cnc
nToolInCncVariant	DINT	2		variant tool id of tool actually in cnc
bResetToolRequest	BOOL	FALSE		
TCommand	ITF_ToolAction	16#0000000000000000		the method Commit is called before data for T is transfered to CNC. The process
DCommand	ITF_ToolAction	16#0000000000000000		the method Commit is called before data for D is transfered to CNC. The process
ToolLifeCommand	ITF_ToolAction	16#0000000000000000		the method Commit is called before data for ToolLife is transfered to HMI. The p

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -149
Fax Vertrieb: -198
Fax Anlagentechnik: -379
Fax Service: -479
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400

BECKHOFF

With the help of the interface ITF_ToolAction it is possible to interrupt the communication and change data if needed.

Example:
Exercise: Add 3.14mm to each tool that is requested from the cnc core.

```
VAR
        fbDInfo: Command_D_Info;
END_VAR

CNCSystem.Channel[0].ToolData.DCommand := fbDInfo; // add interface implementation to DCommand
```

Command_D_Info

```
FUNCTION_BLOCK Command_D_Info IMPLEMENTS ITF_ToolAction
VAR_INPUT
END_VAR
VAR_OUTPUT
END_VAR
VAR
    _tool : TC3_CNC.ST_CNC_TOOL_DATA_EXT;    // internal tool variable
END_VAR
```

```
;
```

Command_D_Info.Commit

```
{warning 'add method implementation'}
(* Commits the tool data transfer action if it returns true*)
METHOD Commit : BOOL
VAR_INPUT
    t    : TC3_CNC.ST_CNC_TOOL_DATA_EXT;
END_VAR
```

```
_tool := t;                                          // copy t to internal variable
_tool.tool_desc.laenge := t.tool_desc.laenge + 31400;        // add 3.14mm (31400 *0.1µm) to tool length
Commit := TRUE;                                      // return true
```

Command_D_Info.Tool.Get

```
VAR
END_VAR
```

```
Tool := _tool;      // return local variable
return;
```

Every time the cnc requests a tool with a D command and the HMI has send the data to plc, the method “Commit” is called automatically.
The transfer to CNC core is interrupted until “Commit” returns true.
The transferred tool data is the “TOOL” from “ToolGet”

BECKHOFF

External tool management ISG

In the standard PLC project with the mechanisms described above, the external tool management of ISG core can be operated (see documentation ISG).
The communication is managed in the PLC program "HLI_InitToolConfig".

When a request from the CNC for a tool (eg T2), the required parameters are passed via the PLC to the MMI and given a corresponding tool from the database via the MMI via PLC to the CNC.

For a change, the current state of art stuff times and tool life of the tool previously used by the PLC via HMI is written to the database.

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany

Postfach 11 42
33398 Verl

Telefon: +49 (0) 52 46/9 63-0
Fax Zentrale: -1 49
Fax Vertrieb: -1 98
Fax Anlagentechnik: -3 79
Fax Service: -4 79
E-Mail: info@beckhoff.de
www.beckhoff.de

Geschäftsführer:
Dipl. Phys. Hans Beckhoff
Arnold Beckhoff
Registergericht: Gütersloh HRB 1803
Ust.-Id.-Nr.: DE 126787444
Finanzamt Wiedenbrück
St.-Nr. 347/5819/0016

Kreissparkasse Verl
BLZ 478 535 20
Kto.Nr. 4 000 766
SWIFT WELADED1WDB
IBAN DE114785352
00004000766

Deutsche Bank Gütersloh
BLZ 480 700 43
Kto.Nr. 371 / 7014
SWIFT DEUTDE3B480
IBAN DE854807004
00371701400