HEIDENHAIN

NC Solutions

Description for FAQ 1410, tool carrier kinematics for angle head

# 1 Description for FAQ 1410, integrating example angle heads in the TNC 640

The TNC 640 with NC software version 340 59x-06 and higher enables you to assign tool carrier kinematics. This means that the control takes cutter inclinations into account in the kinematics. If you have activated dynamic collision monitoring and described the collision objects, the tool carrier kinematics are also monitored for collisions.
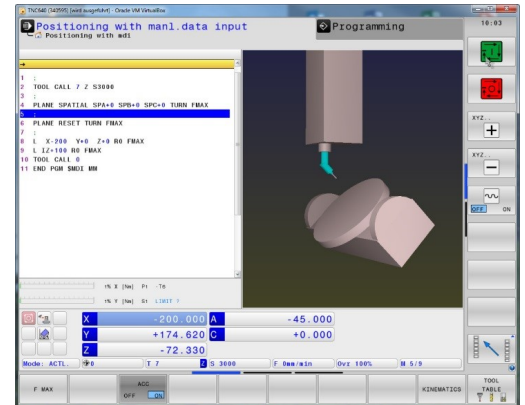

Description

In this example, two different angle heads are available. These angle heads are designed variably so that you can simply adapt the kinematics and the collision objects to your application. Proceed as follows:

▶ Download the "AngleHead".zip folder and extract its contents
▶ Transfer the complete folder contents to the following directory of the control: **TNC:\system\Toolkinematics**
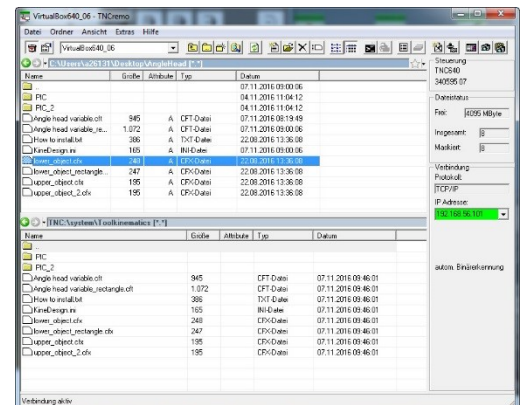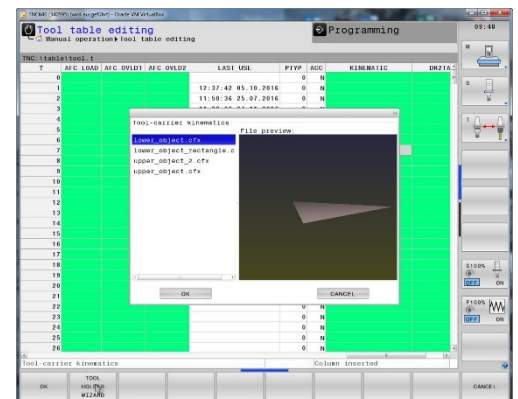

▶ Open the tool table
  If you are using the extended tool management, open TOOL.T in the **Programming** operating mode
▶ Set the **EDIT** soft key to ON
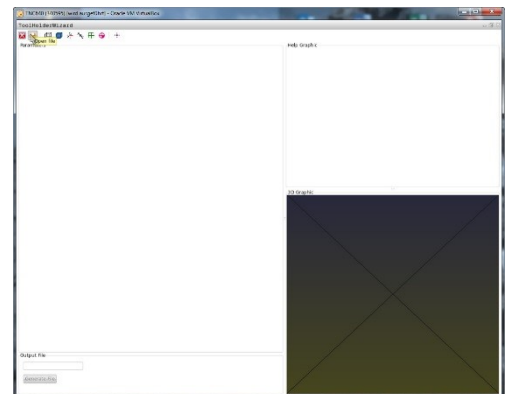▶ Position the cursor on the KINEMATIC column in the row of the tool that you want to assign the tool carrier to
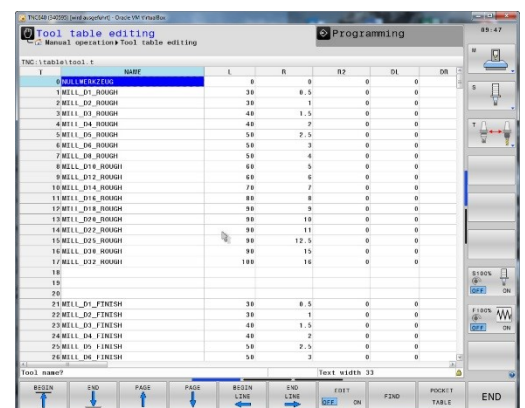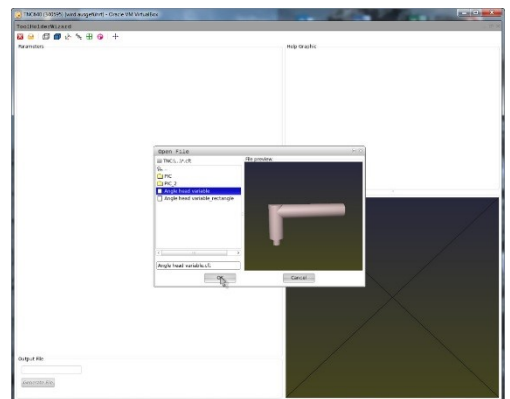
▶ Press the **SELECT** soft key
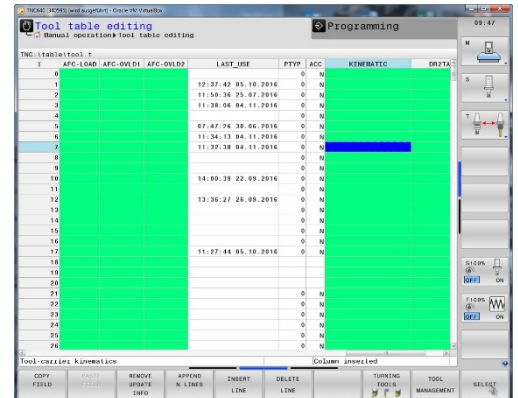
▶ Press the **TOOL HOLDER WIZARD** soft key

> The control opens a third desktop
▶ Select the **Open file** icon

▶ Select the .cft file of the angle head you want to use
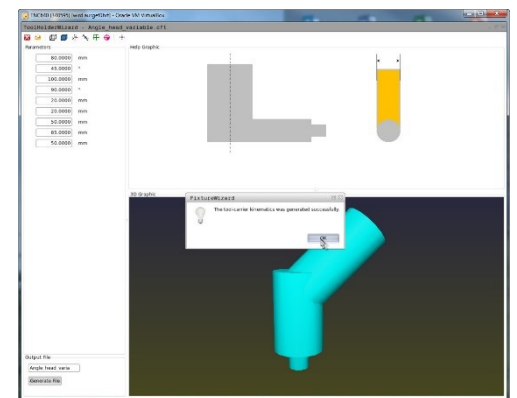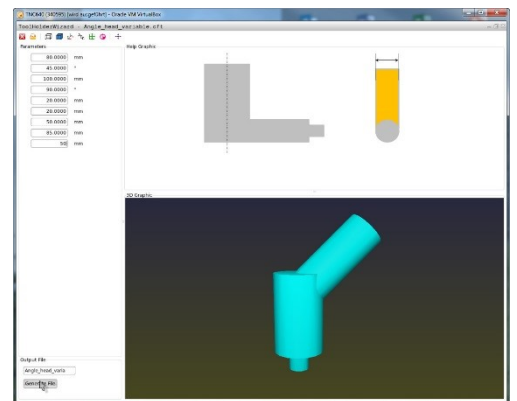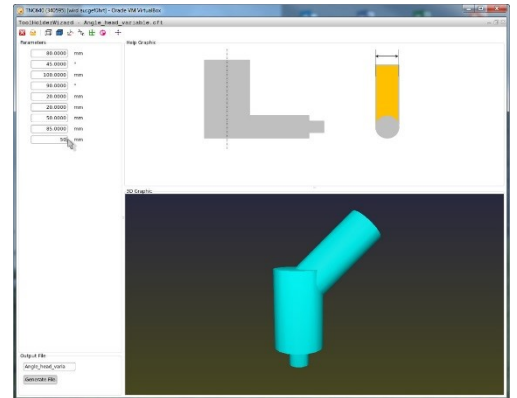▶ Confirm your selection with **OK**

▶ Define the parameters of the angle head so that it corresponds to the angle head you are using

> ℹ️ Please note that the tool data for length and radius from the tool table are effective starting from the end of the angle head.

▶ Under **Output File**, specify the name to be used for saving the defined tool carrier kinematics as .cfx file
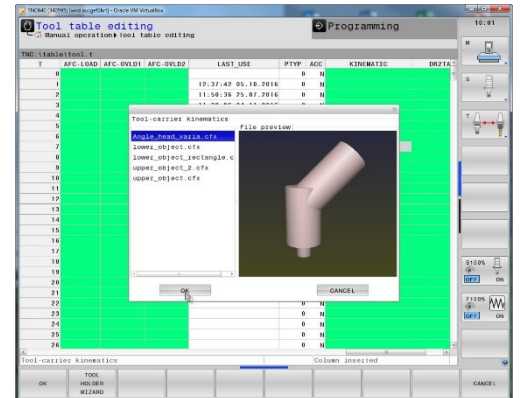▶ Click **Generate File**

> The control reports that the tool carrier file has been generated successfully
▶ Click **OK**
▶ Close the third desktop
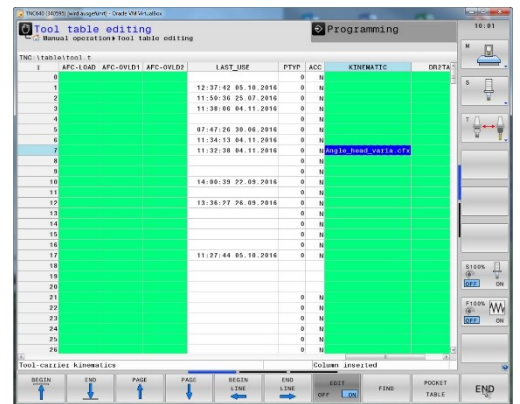

▶ Click the **SELECT** soft key in the tool table again

▸ Select the created .cfx file in the pop-up window
▸ Confirm your selection with **OK**

> The control enters the name of the .cfx file in the KINEMATIC column
▸ Close the tool table or edit further tools

▸ In the program, call the tool with a **TOOL CALL** block
▸ Use a PLANE function to align the workpiece coordinate system to the tool axis
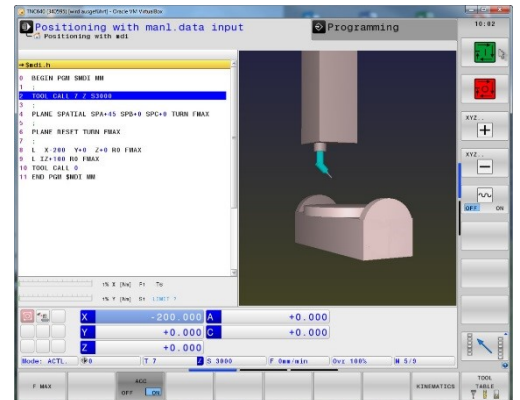
> With spatial angle **SPA0 SPB0 SPC0**, the control inclines the head axes or table axes depending on the machine kinematics in such a way that the tool axis is perpendicular to the workpiece surface.
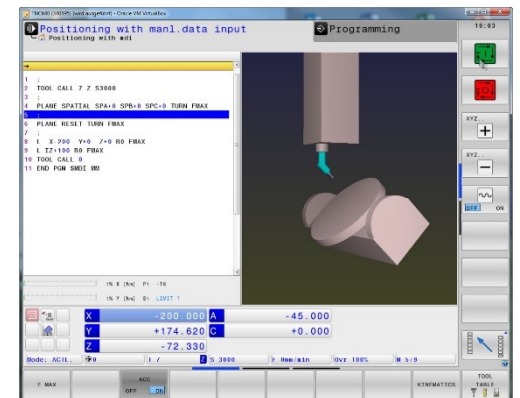
2

Excerpt from the
User's Manual:

2.1 Fundamentals

You can create and manage tool carriers using the tool carrier management. The control factors the tool carriers into the calculations.

On machines with 3 axes, tool carriers for right-angled angled heads help processing on tool axes **X** and **Y**, as the control takes the dimensions of the angle heads into consideration.

You must carry out the following steps so that the control can factors the tool carriers into the calculations:

- Save tool carrier templates
- Assign input parameters to tool carriers
- Allocate parameterized tool carriers

2.2 Save tool carrier templates

Many tool carriers only differ from others in terms of their dimensions, but their geometric shape is identical. So that you don't have to design all your tool carriers yourself, HEIDENHAIN supplies a range of ready-made tool carrier templates. Tool carrier templates are 3-D models with fixed geometries but changeable dimensions.

The tool carrier templates must be saved in **TNC:\system \Toolkinematics** and have the extension **.cft**.

> **i** If the tool carrier templates are not available in your control, please download the data you require from:
> **http://www.klartext-portal.com/nc-solutions/en**

> **i** If you need further tool carrier templates, please contact your machine manufacturer or third-party vendor.

> **i** The tool carrier templates may consist of several sub-files. If the sub-files are incomplete, the control will display an error message.
> **Do not use incomplete tool carrier templates!**

2.3   Assign input parameters to tool carriers

Before the control can factor the tool carrier into the calculations, you must give the tool carrier template the actual dimensions. These parameters are entered in the additional **ToolHolderWizard** tool.

Save the parameterized tool carriers with the extension **.cfx** under **TNC:\system\Toolkinematics**.

The additional **ToolHolderWizard** tool is mainly operated with a mouse. Using the mouse, you can also set the desired screen layout, by drawing a line between the areas **Parameter**, **Help graphics** and **3D graphics** by holding down the left mouse button.
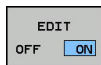
The following icons are available in the additional **ToolHolderWizard** tool:

Icon	Function
	Close tool
	Open file
	Switch between wire frame model and solid object view
	Switch between shaded and transparent view
	Display or hide transformation vectors
	Show or hide names of collision objects
	Display or hide test points
	Show or hide measurement points
	Return to starting view of the 3-D model
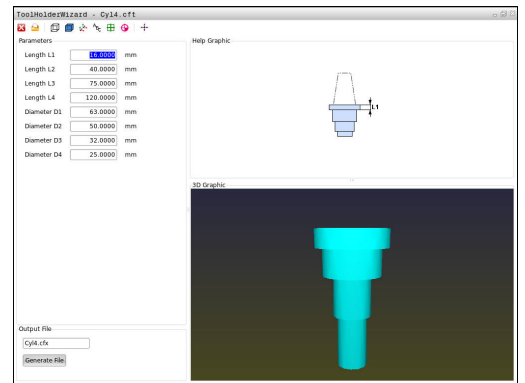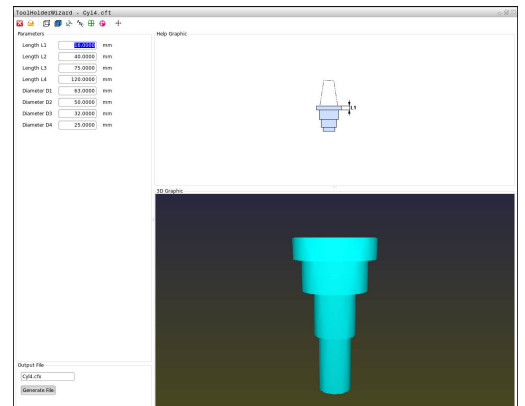
> ℹ️ If the tool carrier template does not contain any transformation vectors, names, test points and measurement points, the additional **ToolHolderWizard** tool does not execute any function when the corresponding icons are activated.

Proceed as follows to parameterize tool carrier templates and
save these parameters:

▶ Mode of operation: Press the **Manual operation** key

▶ Press the **TOOL TABLE** soft key

▶ Press the **EDIT** soft key

▶ Move the cursor to the **KINEMATIC** column

▶ Press the **SELECT** soft key

▶ Press the **TOOL HOLDER WIZARD** soft key
> The control opens the additional **ToolHolderWizard** tool in a pop-up window

▶ Press the **OPEN FILE** icon
> The control opens a pop-up window
▶ Select the desired tool carrier template using the preview screen
▶ Press the **OK** button
> The control opens the selected tool carrier template
> The cursor goes to the first parameterizable value
▶ Adjust values
▶ Enter the name for the parameterized tool holder in the **Output file** area
▶ Press the **GENERATE FILE** button
▶ If required, reply to the message on the control
▶ Press the **CLOSE** icon
> The control closes the additional tool

2.4 Allocate parameterized tool carriers

To allow the control to factor a parameterized tool carrier into calculations, you must allocate the tool carrier to a tool and **call the tool again**.

> **i** Parameterized tool carriers can consist of several sub-files. If the sub-files are incomplete, the control will display an error message.
>
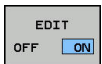> **Only use fully parameterized tool carriers!**

Proceed as follows to allocate a parameterized tool carrier to a tool:

[🖐] ▶ Mode of operation: Press the **Manual operation** key

[TOOL TABLE] ▶ Press the **TOOL TABLE** soft key

[EDIT OFF ON] ▶ Press the **EDIT** soft key

[→] ▶ Move the cursor to the **KINEMATIC** column of the required tool

[SELECT] ▶ Press the **SELECT** soft key
  > The control opens a pop-up window with parameterized tool carriers
  ▶ Select the desired tool carrier using the preview screen
  ▶ Press the **OK** soft key
  > The control copies the name of the selected tool carrier to the **KINEMATIC** column

[END] ▶ Exit the tool table