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# **ContourTrace Help**

*Release 2.1.0*

**KUHN ENGINEERING**

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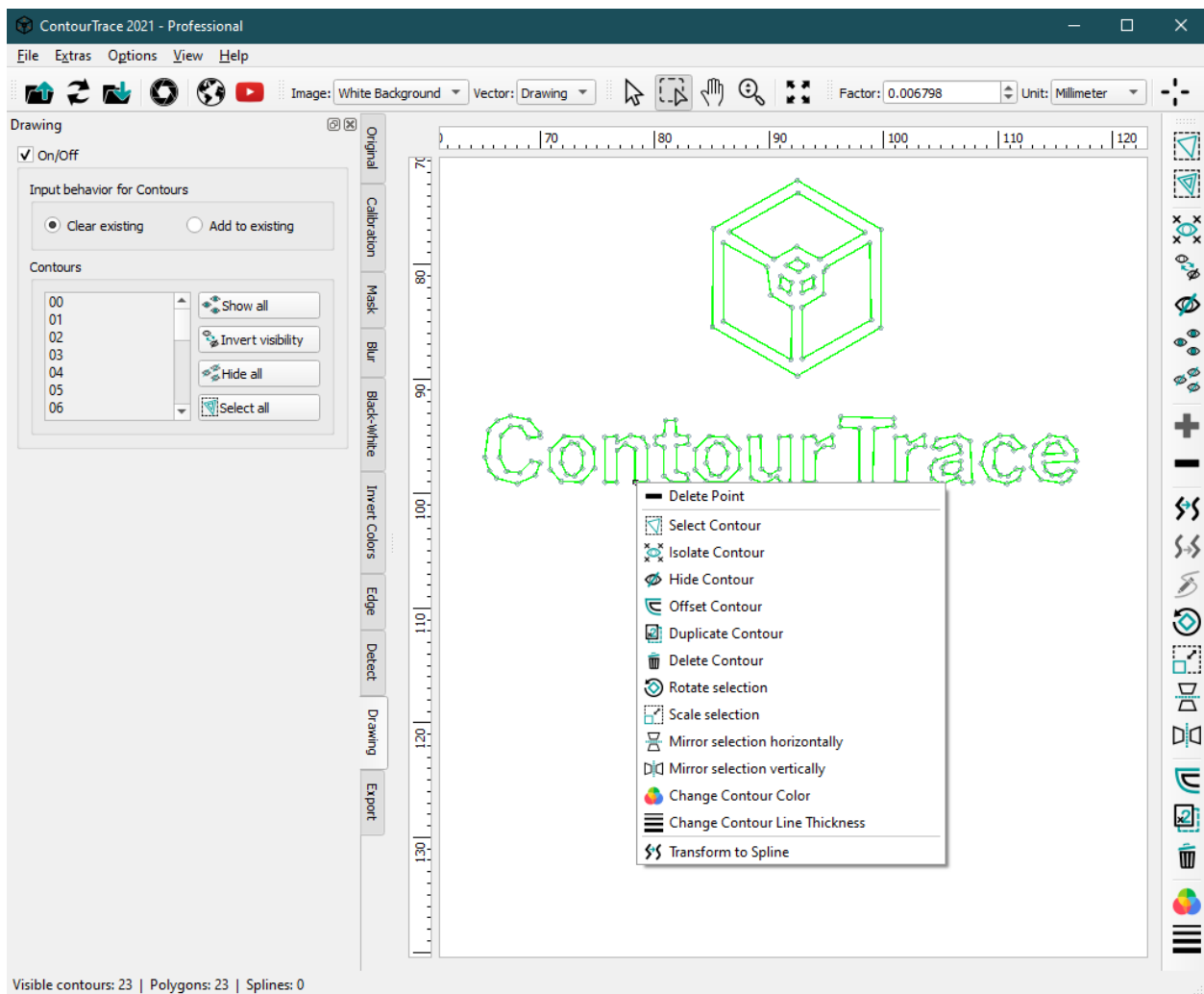
## GETTING STARTED

To get started with ContourTrace, we recommend watching the following playlist on YouTube: [ContourTrace - Training](#)



## WHAT'S NEW

With version 2.1.0 we have released the Draw workspace for ContourTrace. In this area the contours can be changed, duplicated, deleted, colored and much more. See the picture below.







## **ABOUT THIS HELP**

The following document contains information according to the selected release of ContourTrace as well as further details about the operation as well as the workflows in ContourTrace.



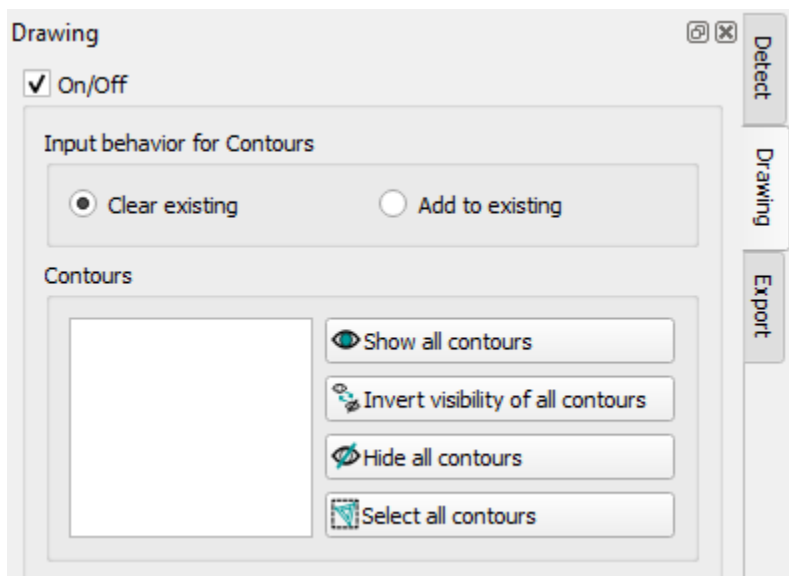
## INSTALLATION

To install ContourTrace follow the instructions in the following Youtube video: [ContourTrace Installation, Lizenzmanager und Software-Updates](#)








## DRAWING AREA

We are happy to announce a huge improvement in the functionality of ContourTrace by simplifying the overall appearance with combining the Contour and Spline Menu to the new Drawing Menu.







### 5.1 Modes Toolbar functionalities

ContourTrace provides now the separation between several modes during image processing. The following table contains a summary of the specified functionalities.

Mode	Description	Icon
Select with left Mouse click	This mode limits the functionality to selecting single elements with the left mouse button. Movement is not possible.	
Select with rubberband	This mode limits the functionality to selecting multiple elements by creating a 'rectangle' which selects every element that is crossed or already contained. Movement is not possible.	
Draw View with left mouse button	This mode provides the movement within the current view by using the left mouse button. Single selection of elements is still possible.	
Zoom in/out with left mouse button	This mode provides precise zoom in and zoom out functionality by using the left mouse button and dragging up/down.	
Zoom to fit all elements in graphics view	This mode resets all zoom settings and adapts the image size to the available view size.	

## 5.2 Drawing Toolbar functionalities

The drawing menu provides a variety of additional functions to manipulate the appearance of the contour during the image processing. The following table provides an overview of the additional functions available within the drawing menu.

Mode	Description	Icon
<p>Add point</p>	<p>Adds a point on the selected element (line) in the contour.</p> <p>Single selection: The new point will be set on the mouse position, where the element was selected before.</p> <p>Multiple selection: Selects multiple elements within the same contour or in several contours add the points centered on the line elements each.</p>	
<p>Delete point</p>	<p>Adds a point on the selected element (line) in the contour.</p> <p>Single selection: The new point will be set on the mouse position, where the element was selected before.</p> <p>Multiple selection: Selects multiple elements within the same contour or in several contours add the points centered on the line elements each.</p>	
<p>Select all Contours</p>	<p>Adds a point on the selected element (line) in the contour.</p> <p>Single selection: The new point will be set on the mouse position, where the element was selected before.</p> <p>Multiple selection: Selects multiple elements within the same contour or in several contours add the points centered on the line elements each.</p>	
<p>Select Contour</p>	<p>Adds a point on the selected element (line) in the contour.</p> <p>Single selection: The new point will be set on the mouse position, where the element was selected before.</p> <p>Multiple selection: Selects multiple elements within the same contour or in several contours add the points centered on the line elements each.</p>	





## CAMERA CALIBRATION

With the help of camera calibration, radial and tangential distortion of the images can be corrected or greatly reduced.

### 6.1 Radial distortion

The radial distortion in images can be recognized when straight lines are curved (convex or concave) in the image. An extreme example is fisheye lenses (fisheye lenses are not recommended for contour tracing). Although these allow a wide field of view, straight lines that do not pass through the center of the image are displayed in a curved shape and the image is strongly barrel-shaped.

### 6.2 Tangential distortion

The tangential distortion occurs because the camera lens is not aligned perfectly parallel to the image plane. Therefore some areas in the image may look closer than expected.

### 6.3 When is a camera calibration useful?

- When image distortion affects the result of contour detection.
- When many objects are photographed consecutively with one camera and lens setting.
- When lenses that produce significant distortion are used, such as fisheye lenses.

### 6.4 When is a camera calibration not useful?

- If the image distortion is not visible or does not affect the contour detection result.
- If the camera settings have to be changed constantly, e.g. to be able to photograph objects with very different sizes.
- When a lens with very low distortion is used, for example, a telecentric lens.
- When using a mobile phone or smartphone to take the photos, the camera calibration will not work properly in most cases! This is because the smartphones apply their own distortion correction and other algorithms to the generated image. Thus the image will be significantly improved. A further camera calibration on an already changed image does not lead to the desired result.

## 6.5 Instructions for camera calibration in ContourTrace

1. Download and print the [Chessboard Pattern](#) on DIN A4 paper or cardboard. Make shure that **no** scaling is applied to the image during printing.
2. Fix or glue the chessboard pattern on a solid and flat surface, e.g. on a plastic or wooden board. Make sure that the chessboard pattern has no unevenness, waves or kinks.
3. Adjust your camera and lens settings so that you can fully and optimally capture the objects to be imaged and the chessboard pattern. The settings cannot be changed during or after calibration. The settings should be saved e.g. in the name of the calibration file. This allows the settings in the camera and lens to be restored manually later when the calibration file is called up.
4. If available, use a camera tripod. The camera can be mounted in the tripod e.g. overhead.
5. Create at least 10 different photos of the chessboard pattern. You can move, rotate, tilt the chessboard pattern or change the distance to the lens. The generated images of the chessboard pattern should cover the entire field of view of the camera. However, make sure that the chessboard pattern is always fully visible.
6. Open **ContourTrace** and click on **Camera Calibration**. Add the created images to the list of **Calibration Pictures**. Click on **Create calibration file ...** to start the calibration and save the calibration file. Wait until the calibration is finished. Once the calibration file has been successfully created, close the **Camera Calibration** window.
7. To use the calibration file in ContourTrace, click on the tab **Camera** and add the created calibration file under **Calibartion File**.
8. As long as a calibration file is used in ContourTrace, only the images generated with the camera and the camera settings for this calibration file may be processed. Otherwise the distortion correction of the images is not correct!

## INDICES AND TABLES

- [genindex](#)
- [modindex](#)
- [search](#)