Application Note

VeriSens® – Part location on contours
AN201406/v0.2/2023-08-21

Description

In this document we will give answers to questions that are asked very often regarding part location on contours.

### Products

VeriSens® Vision Sensors

Preparation

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21.08.2023 15:01   1/8   Baumer Optronic GmbH
Radeberg, Germany

1   Part location on contours FAQs

## 1.1   How does part location on contours work?

When the teach area is drawn for the first time or the teach button is clicked, a contour is taught. The taught contour would be laid upon the current image. While doing that, *VeriSens*® tries to find the position that fits best to the taught contour in the current image. The correlation rate is put out and can be compared to the required limits. The found position is marked with a small coordinate system. Other features can be aligned to this position now. Only the contours are relevant for the recognition of their position.
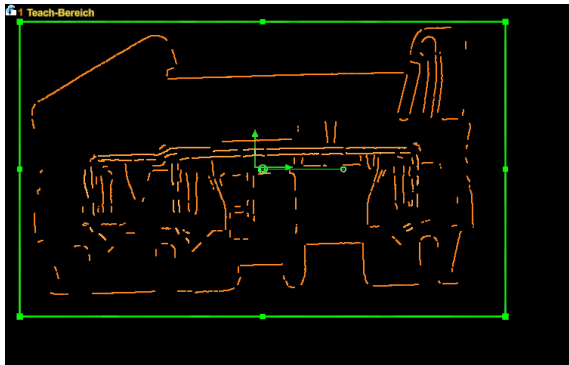
Taught contours (only contours displayed):
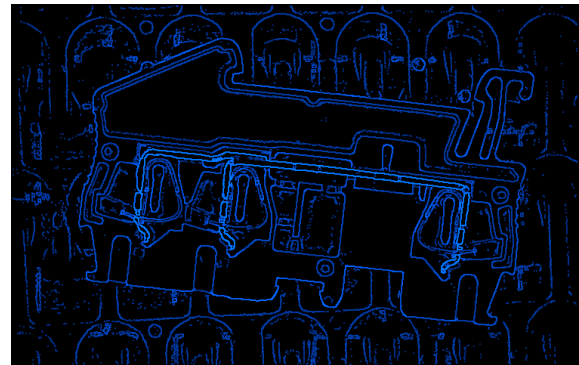
Current image (only contours displayed):
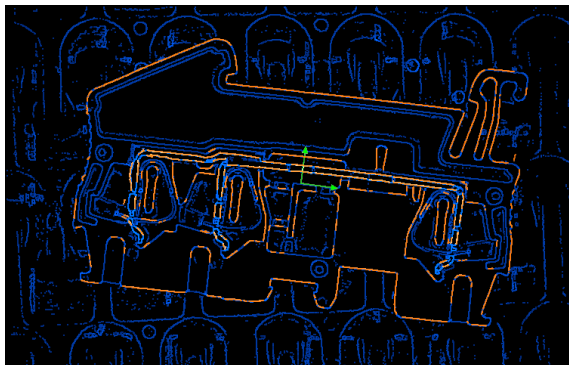
Position with best contour match of taught contour in current image (only contours displayed):

1.2   Which effect does the parameter "Mode" have?

In order to speed up the position recognition, *VeriSens*® first looks for a fitting correlation position using a very rough raster. Because the rough scale does not give a definite statement about the position, *VeriSens*® creates a list of potential matches that might be correct. These options will then be compared very detailed with the taught contour. The position with the best correlation rate is chosen.

The parameter "*Mode*" defines the length of the potential candidates list. If "*Exact*" is chosen, a lot of candidates have to be checked, at "*Fast*" mode, the list is short. That means that objects with a lot of symmetries (e.g. rotationally symmetric parts) should be set to "*Detailed*" or "*Exact*". If the taught contour is easy to tell apart, it is possible to find only one match in the image. In this case, the "*Fast*" mode also is an option.

1.3 How precisely can a contour be found in the image?

In the best possible image, theoretically the maximum precision is:

Position in X, Y:	¼ pixel
Rotation:	$1/64°$

The precision values above can seldom be reached in reality. Image noise, optical distortion or other systematic errors in measurement can lead to distorted results.

1.4 How can I increase the stability of the inspection?

If the object that has to be inspected cannot be found, there can be many reasons. The following aspects give advice how the robustness of the part location can be optimized:

Please only teach **contours that always stay the same**. Contours in the background or contours that result from image noise should be removed in the model editor:
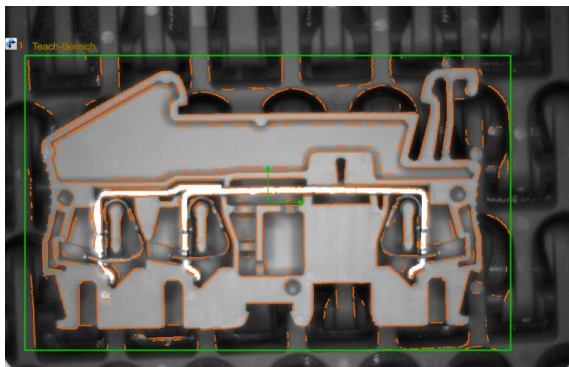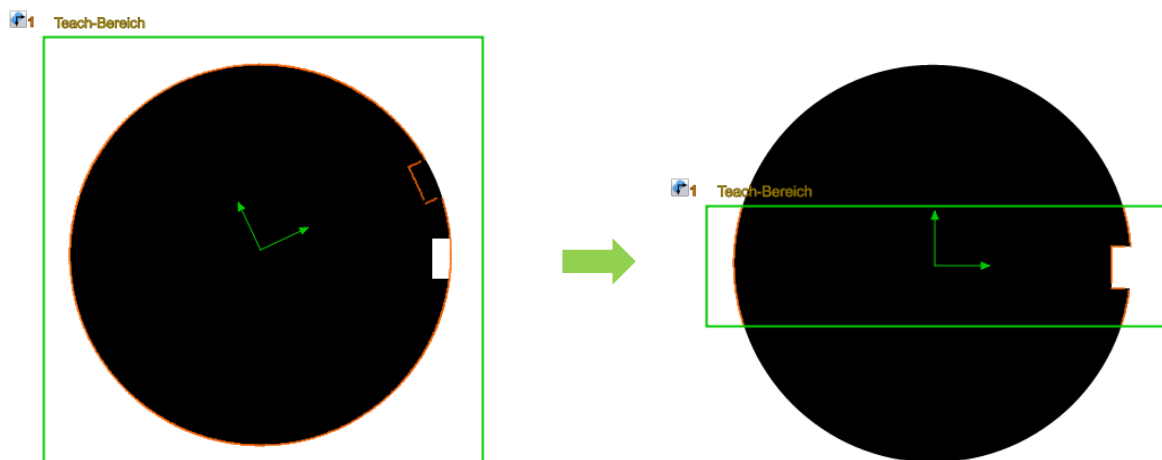

Teach with disturbing contours
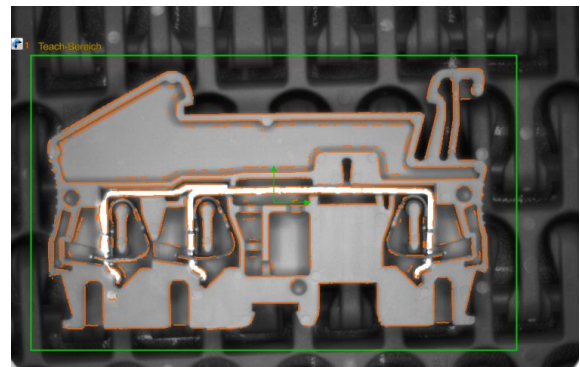
Removed disturbing contours

For the part location **relevant contours** should take respectively **a lot of space in the model**. This is especially important for turned parts with a small feature giving the rotation angle.
Have a look at the following example:

In the image above, the rotation only depends on the small flute. But this small flute only resembles 5% of the entire taught contour. The far bigger amount of other contours, which are irrelevant for the rotation, distort

the result. In order to solve this problem, the teach area should be chosen smaller, so that fewer but more important areas gain appropriate significance.

Reasonable **limitations of the search area or the rotation** lead to an increased stability as well. Wrong answers are excluded from the beginning. Example: If a part always arrives in the same position/orientation, the "*rotation*" can be set to a lower value. Falsely determined rotations (because of symmetries of the part) can be excluded. If the part is rotationally symmetric, the determination of the rotation is pointless. The rotation can even be set to 0°.

The choice of **suitable parameters** has a positive influence on the inspection. If the part mainly consists of small, curved contours, the parameter "*Form*" should be set to "*Arbitrary*", so that the important contours are resembled in the model. If the object shows strong symmetries and there is more than one possibly correct solution with a high correlation rate, the parameter "*Mode*" should be set to "*Exact*".

1.5   How can I speed up the inspection?

All parameters have an influence on the calculation speed of the feature.

***Parameter and there influence on speed*:**

	slower	…	*faster*
Contrast	very low	…	very high
Mode	exact	…	fast
Form	arbitrary	…	straight
Rotation Max	±180°	…	0°
Limit search area	deactivated	…	limited search area

The general rule: The more limited the search is, the faster the inspection can be done. The parameters that eliminate the least relevant information should always be adjusted first. The elimination of wrong solutions even improves the location. At the same time, the inspection will become notably faster.

1.6   Is it possible to find several objects in the image?

The feature "*Part location on contours*" is able to find only one object per applied feature. If several similar objects are in the image, the one object with the highest correlation rate regarding the taught contour is found. For that reason, the choice is rather random for similar objects.

If each of the objects only appears in a specific, differential area, it is possible to apply several part locations on contours in the image and to "*limit search areas*". By this method, every object can be found by one part location each, as in the example below.
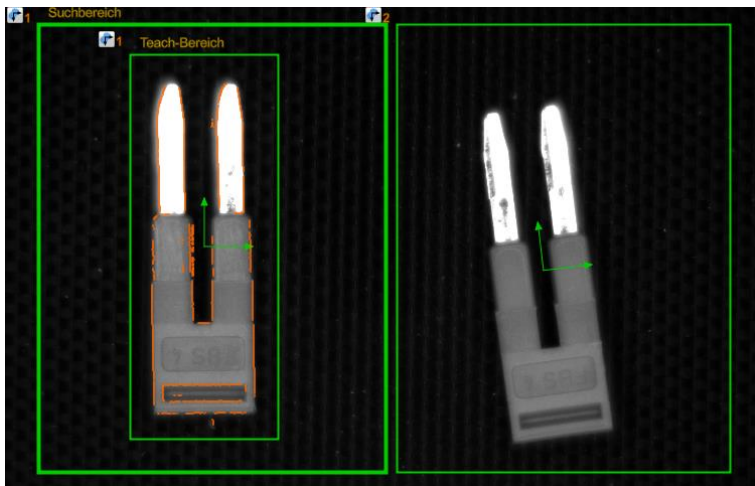
No.	Name	Result
1	Part location on contours 1	OK
2	Part location on contours 2	OK

1.7 Can I "attach" one part location to another one?

Yes. This is possible with nearly no restrictions. If you want to tie one part location to another, you simply have to enter the reference part location in "*Track position on*".
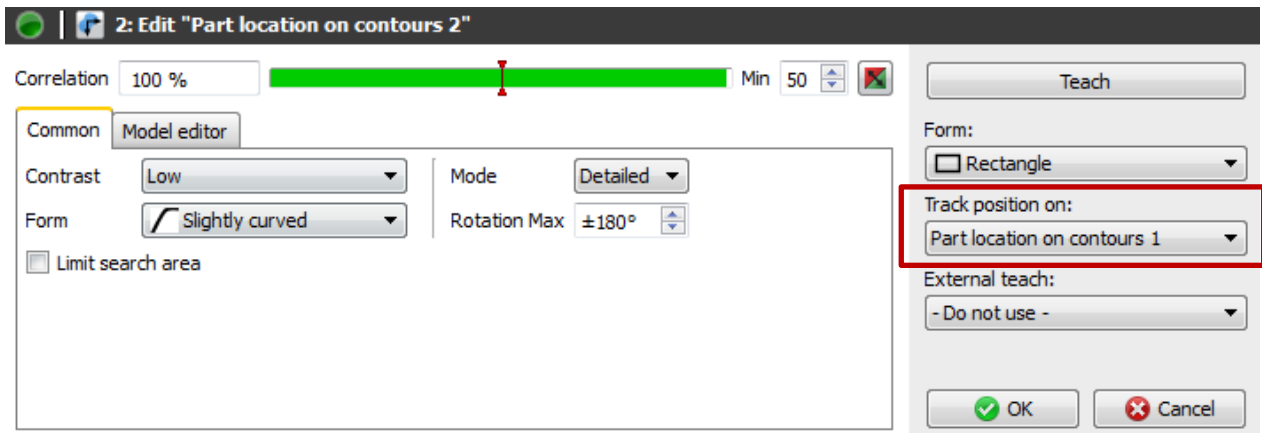
2 Support

In the case of any questions or for troubleshooting please contact our support team.

Worldwide

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