RAYLASE

# RAYGUIDE VISION SOLUTIONS

RAYGUIDE
CLICK & TEACH

RAYGUIDE
MATCH

THE POWER OF WE.

# 1

# RAYGUIDE Click & Teach

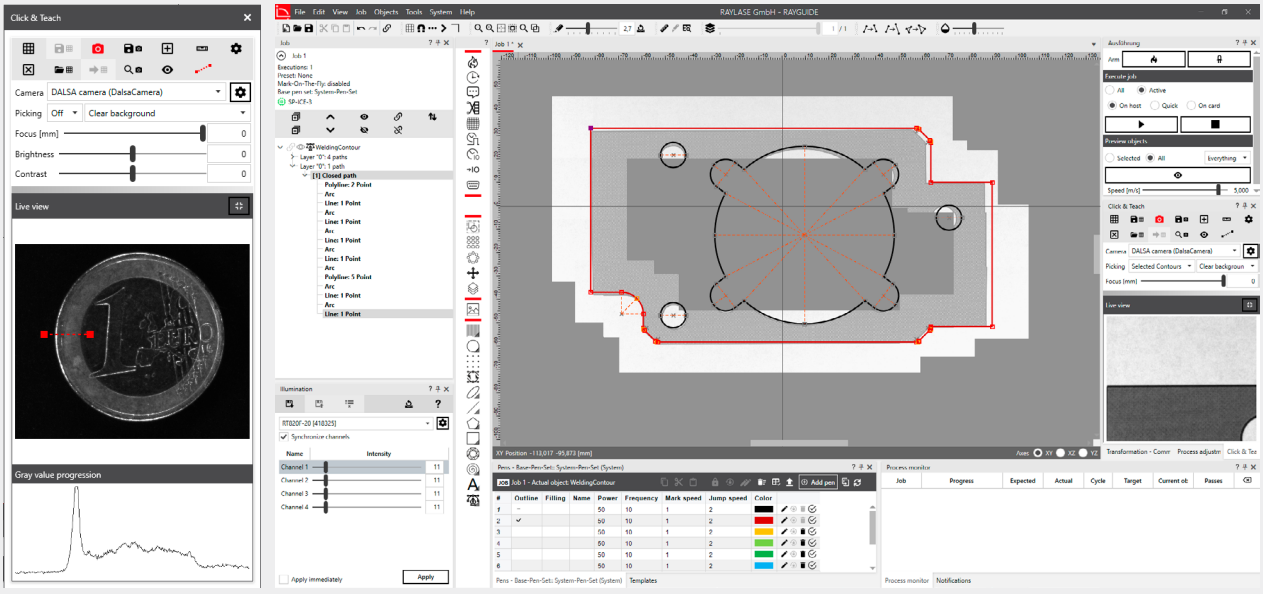
By means of a coaxially coupled camera ("on-axis"), images can be taken of the workpiece(s)/ component(s) or the entire scan field. Subsequently, the geometry to be processed can be aligned as accurately as possible to the actual position.

The associated calibration routine ensures that optical and/or geometric distortions in the camera images are compensated so that the position in the image and laser beam position will match.

- Select between 2 already fully integrated camera models.
- The function can be used for 2-axis deflection units with F-Theta and matching camera adapter as well as our pre-focusing **AS-FIBER** series with **RAYSPECTOR**.

**Benefit from the following advantages:**

- Within a single GUI application, in beside **Click&Teach** function, you can still access **RAYGUIDE's** powerful graphics editing function.
- Acquisitions are possible in different focus positions.
- Zoom directly into the desired image tile with one click.
- Simulate the final contour progression for verification in the live image.
- The following acquisition modes are available: single or 3x3 or 5x5 picked image tiles, the whole selected layout object, only along a special layout contour, a part of the working field drawn with the mouse pointer or the whole working field.



# RAYGUIDE Match

**RAYGUIDE MATCH** serves the automatic position recognition of components.

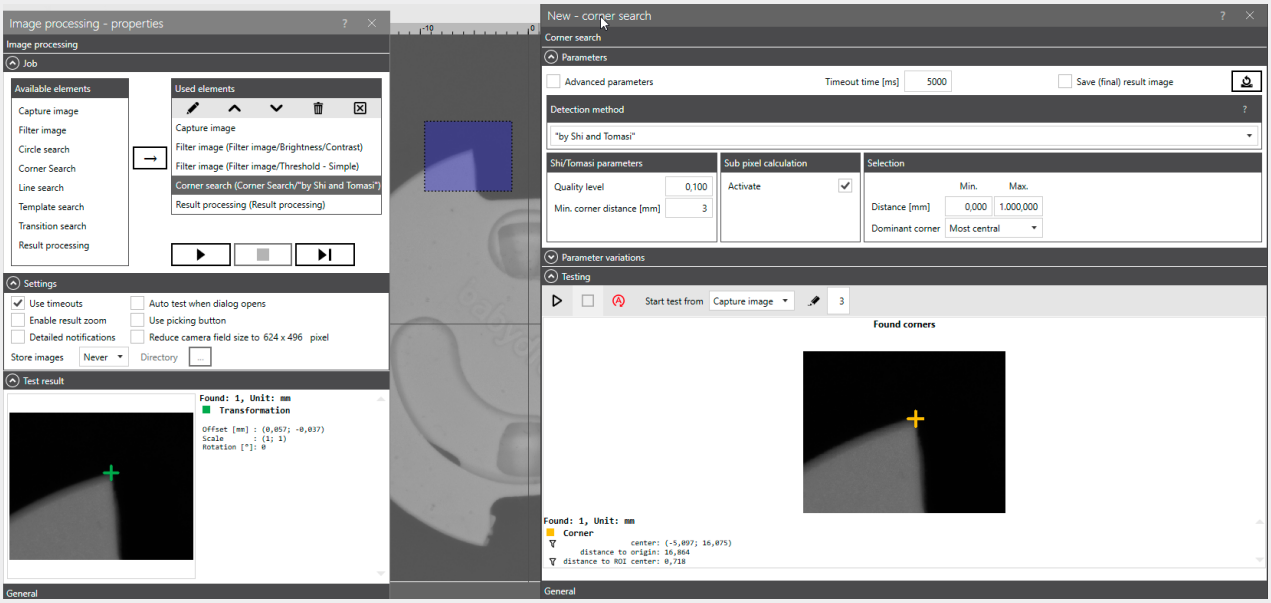
Here, images of component features are evaluated via image processing and the current component position is determined. The deviation of each component from a taught component position is then transmitted to the control card as a so-called process transformation and thus the position of the drawn laser path is adapted precisely and reliably to the respective component position.

**RAYGUIDE MATCH** also always includes **RAYGUIDE CLICK & TEACH** and the calibration routine for the camera contained therein.

The control of the necessary lighting elements is also an integral part of **RAYGUIDE MATCH**. Here you can choose either a 2-, 4- or 8-channelillumination controller.

If **RAYGUIDE MATCH** is used with the pre-focusing deflection units from **RAYLASE** such as the **AS-FIBER** series plus **RAYSPECTOR MODULE**, then in principle one has the unique possibility of also using features for detection, which lie in a different focal position than the actual component contour to be processed.

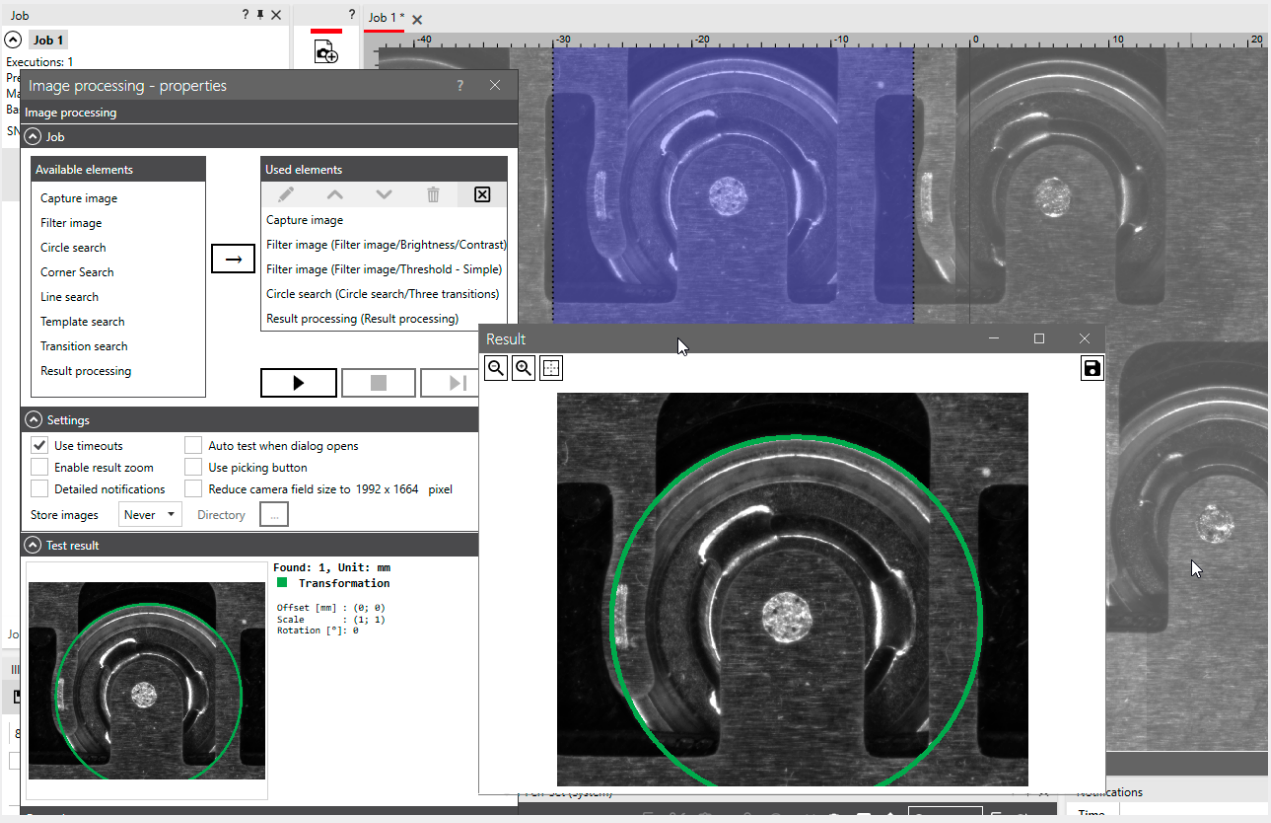
The architecture of **RAYGUIDE MATCH** allows you to build a recognition job in a very modular way and thus adapt it to the recognition task at hand.



**The following detection functions are available:**

- **Grey value transitions:** This allows to determine very precise ordinates of features with sharp grey value transitions.
- **Lines** (straight edges): Detect two straight edges and you have already determined offset and rotation. Various algorithms are available here to achieve a reliable recognition result depending on the situation.
- **Corners:** Detect corners (with angles between 45° and 120°) and thus receive one coordinate per corner. Slightly rounded or chamfered corners can also be recognised.
- **Circles:** This can be used to detect holes, circular openings or even cylindrical structures on a battery, for example.
- **Templates:** Recognition of features as in the template image. This search can detect arbitrary shapes and is therefore very versatile in its application.

In addition, various digital image filters are available to optimise the captured image for evaluation.




A **result handler** combines the results of the individual searches to calculate offset and rotation for the transformation.

The use of the process transformation offered by the SP-ICE-3 control card allows position adjustment without the need to Upload the whole contour data to the control card each time again, thus avoiding unnecessary upload times.

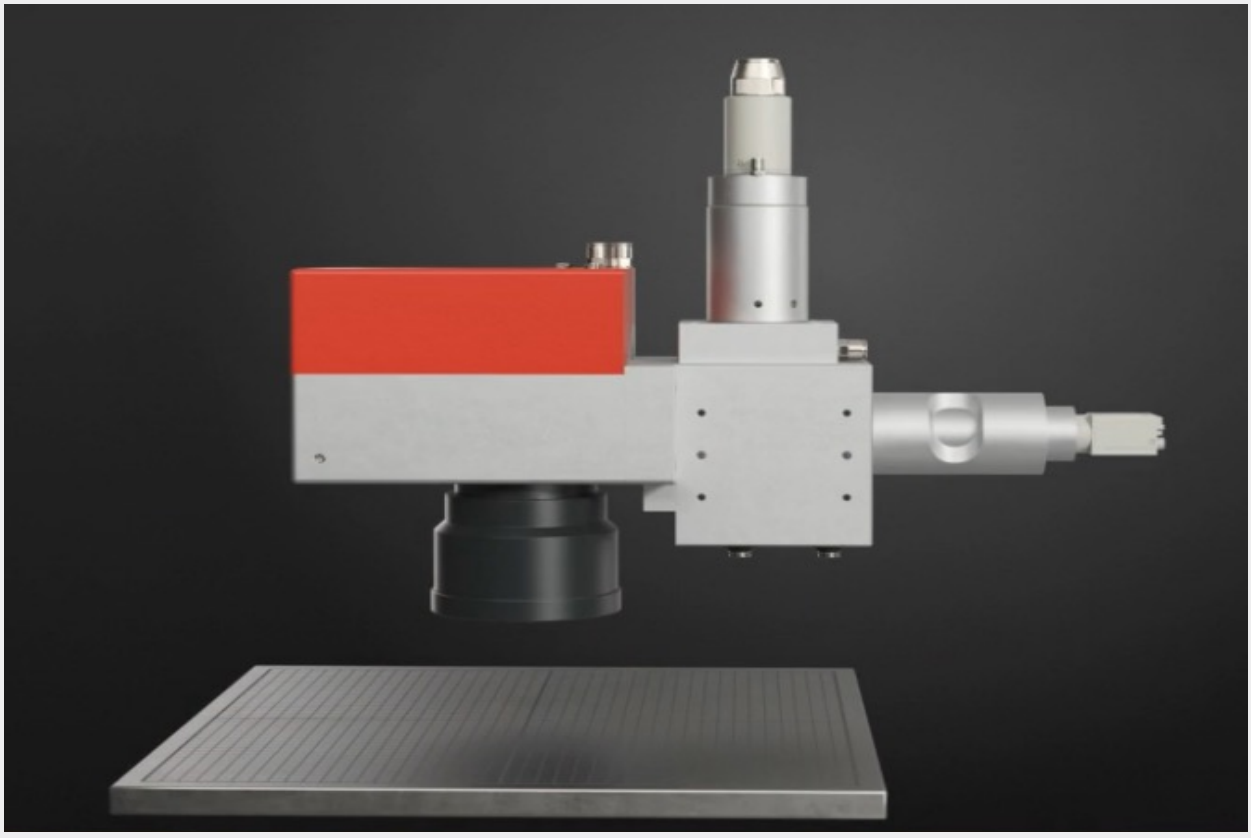
## IMAGE FIELD DATA FOR COAXIAL CAMERA OBSERVATION FOR 5 MP CAMERAS

The data below refer to deflection units for YAG-Wavelength.
Note about resolution: These values are only valid for a resolution scale factor of 100% and if no pixel combining is active. The cameras specatral range ususally is from 400–1.000 nm with the peak intensity at around 550–600 nm

### COAXIAL CAMERA LENS IN COMBINATION WITH 2-AXIS DEFLECTION UNIT + F-THETA-LENS THE VALUES APPLY EQUALLY TO ALL APERTURES OF 10MM / 15MM / 20MM / 30MM

| e.g. Teledyn Dalsa Genie Nano M2420 | Camera Lens 002 | Camera Lens 003 |
|---|---|---|
| Camera Chip size | 2/3" – 5MP | 2/3" – 5MP |
| active number of pixels – width | 2.464,00 | 2.464,00 |
| active number of pixels – height | 2.056,00 | 2.056,00 |
| active chip size – width [mm] | 8,50 | 8,50 |
| active chip size – height [mm] | 7,09 | 7,09 |
| Pixel size [µm] | 3,45 | 3,45 |

| Focal length f-theta [mm] | FOV [mm x mm] | Resolution [µm] | FOV [mm x mm] | Resolution [µm] |
|---|---|---|---|---|
| 100 | 2,2 x1,9 | 3,5 | 8,3 x 7,0 | 3,5 |
| 163 | 3,6 x 3,0 | 3,5 | 13,5 x 11,4 | 5,5 |
| 254 | 5,6 x 4,7 | 3,5 | 21,1 x 17,8 | 8,6 |
| 255 | 5,6 x 4,7 | 3,5 | 21,1 x 17,8 | 8,7 |
| 300 | 6,6 x 5,6 | 3,5 | 24,9 x 21,0 | 10,2 |
| 330 | 7,3 x 6,1 | 3,5 | 27,4 x 23,1 | 11,2 |
| 340 | 7,5 x 6,3 | 3,5 | 28,2 x 23,8 | 11,5 |
| 420 | 9,2 x 7,8 | 3,8 | 34,9 x 29,4 | 14,3 |
| 500 | 11,0 x 9,3 | 4,5 | 41,5 x 35,0 | 17,0 |



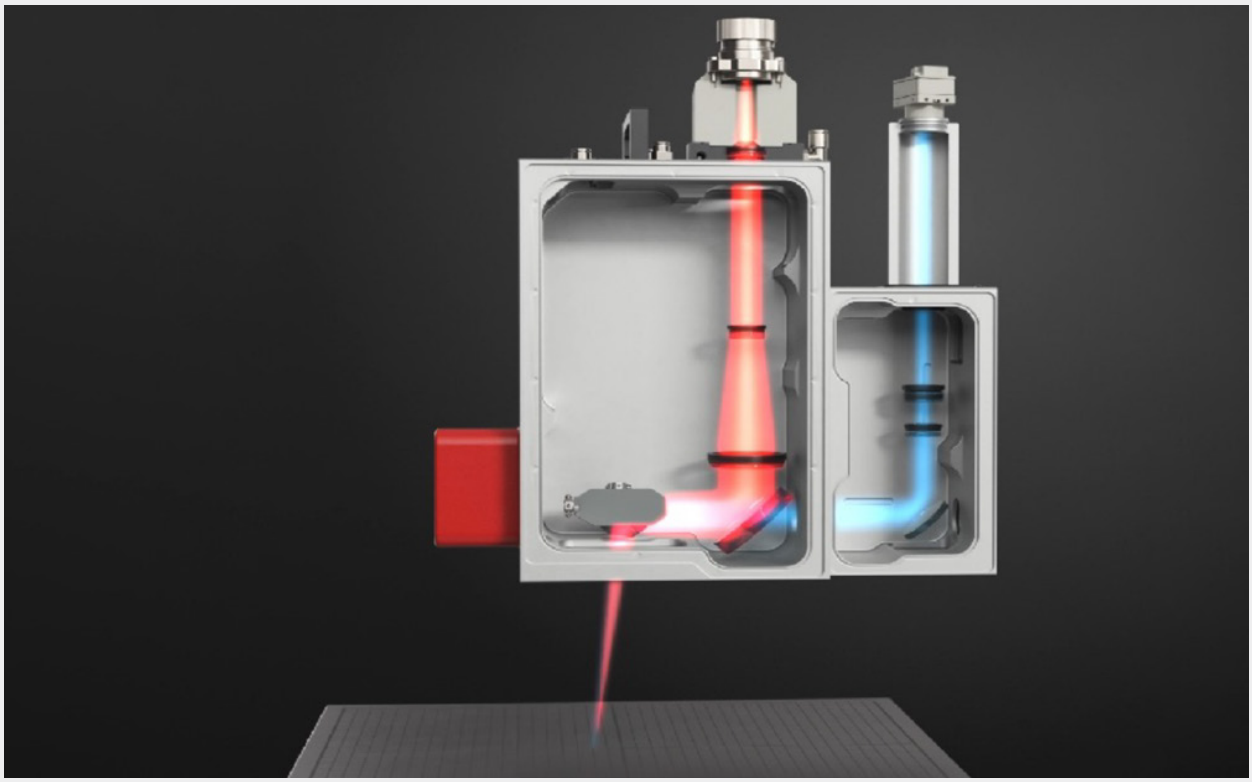
## AS-FIBER IN KOMBINATION MIT MONITORING MODUL RAYSPECTOR

| | AS FIBER-20/-30 RAYSPECTOR | AS FIBER-50 RAYSPECTOR |
|---|---|---|
| Camera Chip size | 2/3" – 5MP | 2/3" – 5MP |
| active number of pixels – width | 2.464,00 | 2.464,00 |
| active number of pixels – height | 2.056,00 | 2.056,00 |
| active chip size – width [mm] | 8,50 | 8,50 |
| active chip size – height [mm] | 7,09 | 7,09 |
| Pixel size [µm] | 3,45 | 3,45 |

| Processing field size [mm²] | FOV [mm x mm][1] | Resolution [µm][1] | FOV [mm x mm] | Resolution [µm] |
|---|---|---|---|---|
| 250 x 250 | 30 x 25 | 15 | – | – |
| 300 x 300 | 32 x 27 | 17 | 35 x 30 | 20 |
| 400 x 400 | 37 x 31 | 21 | 40 x 34 | 23 |
| 500 x 500 | 42 x 35 | 24 | 45 x 38 | 26 |
| 600 x 600 | 48 x 40 | 28 | 50 x 42 | 29 |
| 700 x 700 | 53 x 44 | 31 | 55 x 47 | 32 |

[1] The values are, comparing AS F-30 vs. AS F-20, larger by 1–2 mm (for FOV) resp. 1–2 µm (for ressolution). Therefore both use same table.

Setup requires suitable FC3 correction file with sensor axis support and RL3 heat protocol



## TYPICAL TIMES FOR CAPTURING AN ENTIRE IMAGE TILE (INCLUDING 5 MS EXPOSURE TIME)

| Camera | HW Trigger | Average Time | Average deviation |
|---|---|---|---|
| 1 GB-Ethernet | No | 105 ms | ± 15 ms |
| 1 GB-Ethernet | Yes | 68 ms | ± 2 ms |
| 5 GB-Ethernet | No | 70 ms | ± 13 ms |
| **5 GB-Ethernet** | **YES** | **40 ms** | **± 3 ms** |

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