



Image analysis  
Laboratory exercise manual

## **Image processing: inspection of the bracket**

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### 1. The purpose of the exercise

The purpose of the exercise is to inspect the bracket based on recorded images using Vision Assistant.

### 2. Preliminary information.

The subject of the analysis is the bracket shown in Fig. 1. The dimensions presented in the drawing are subject to inspection.

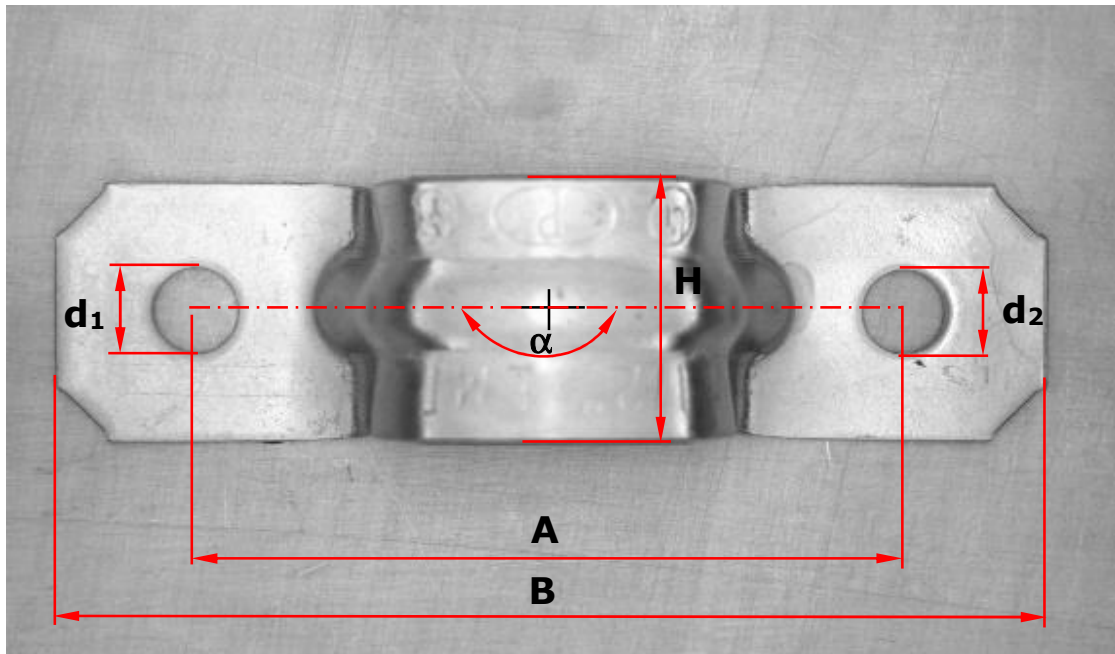


Fig. 1. Bracket

### 3. Exercise.

You should create a script that will allow you to carry out inspections for the parameters shown in Figure. The following is a list of files that are necessary for the analysis:

- Bracket1.jpg - Bracket6.jpg: images of objects,
- Bracket Template.png: image of hole centers location,
- Cal.png bracket: calibration image for real units.

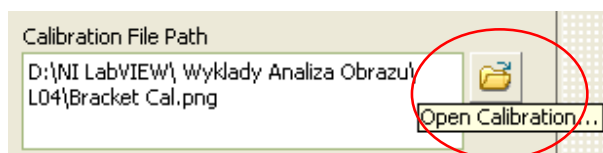
#### 3.1 Loading the image

From the *Processing Function: Image palette*, select the *Get Image* function.

In the function configuration window, locate the file with the **Bracket1.jpg** bracket. Confirm the selection.

#### 3.2 Calibration of units

From the *Processing Function: Image palette*, select the *Image Calibration* function.

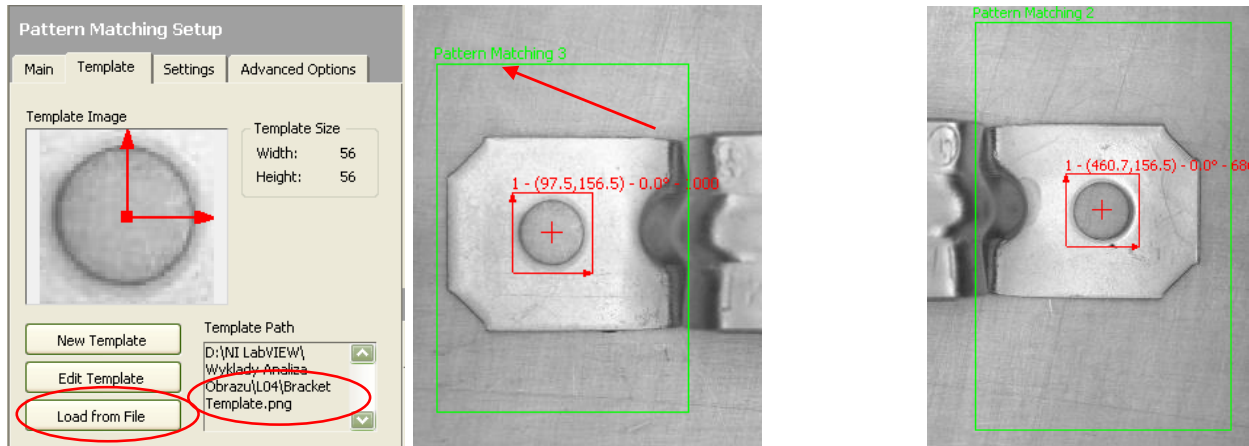


In the configuration window, use the *Open Calibration* key to locate the calibration file **Bracket Cal.jpg**. Confirm the calibration with the OK key.

#### 3.3 Identification of the location of hole centers

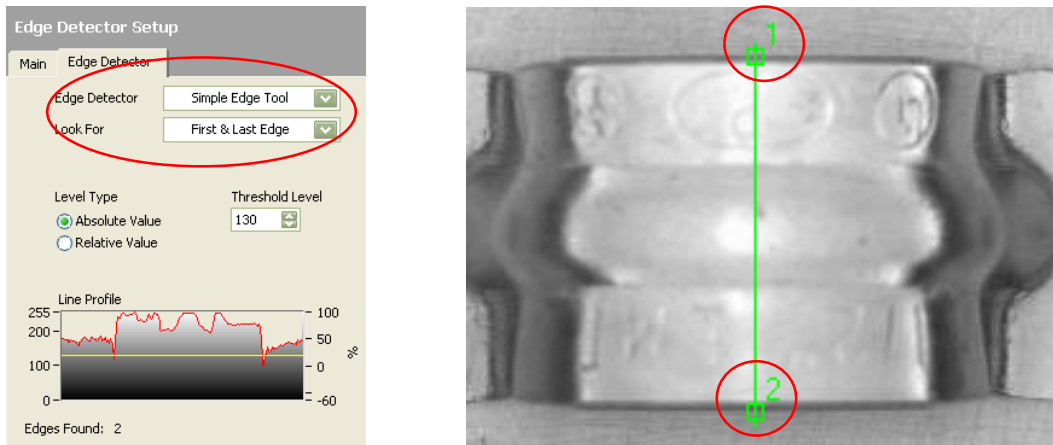
From the *Processing Function: Machine Vision palette*, select the *Pattern Matching* function. In the *Template tab*, use the *Load from File* key to load a file with the **Bracket Template.png** template. Next, in the analyzed image, mark the **ROI** containing the hole on the left side of the bracket. Confirm the identification of the OK keys.

**Note: repeat the identification for the hole on the right side of the bracket !!!**



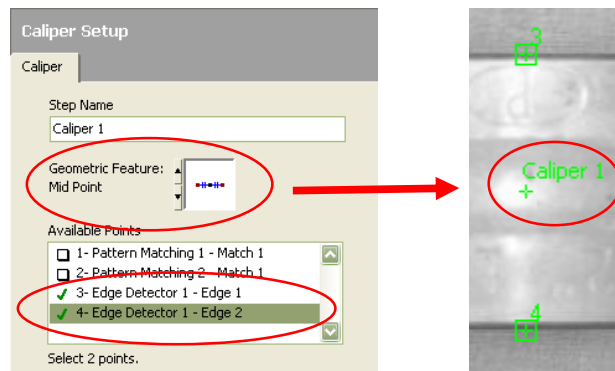
### 3.4 Edge detection

From the *Processing Function: Machine Vision* palette, select the *Edge Detector* function. In the *Edge Detector* tab set the *Simple Edge Tool* and *Look For: First & Last Edge* tools. Then draw a vertical line in the middle part of the bracket. **Holding the SHIFT key makes drawing a vertical line easier.** The result of the function should be the detection of points 1 and 2 as in the drawing below.



### 3.5 Detection of the central point

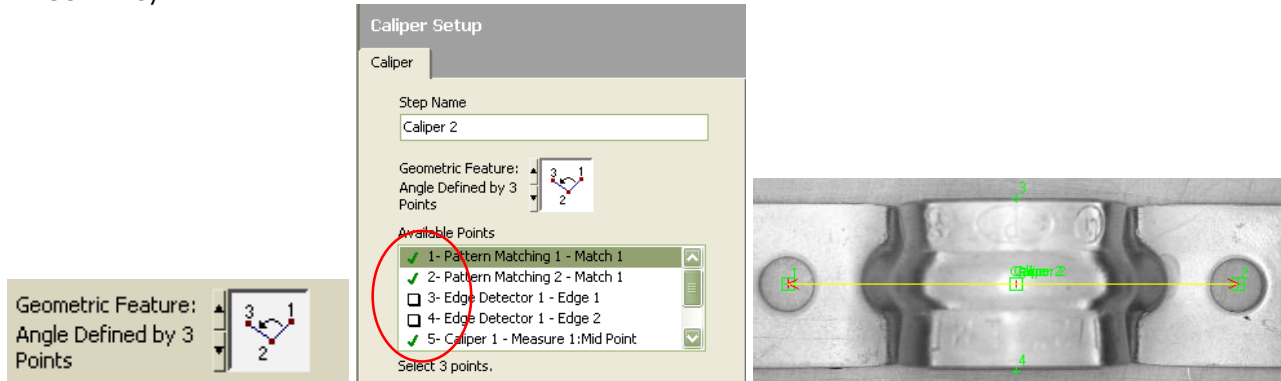
From the *Processing Function: Machine Vision* palette, select the *Caliper* function. In the configuration window, set the *Geometric Feature: Mid Point* option and select points 1 and 2 from the list of points previously created in the *Edge Detector* step.



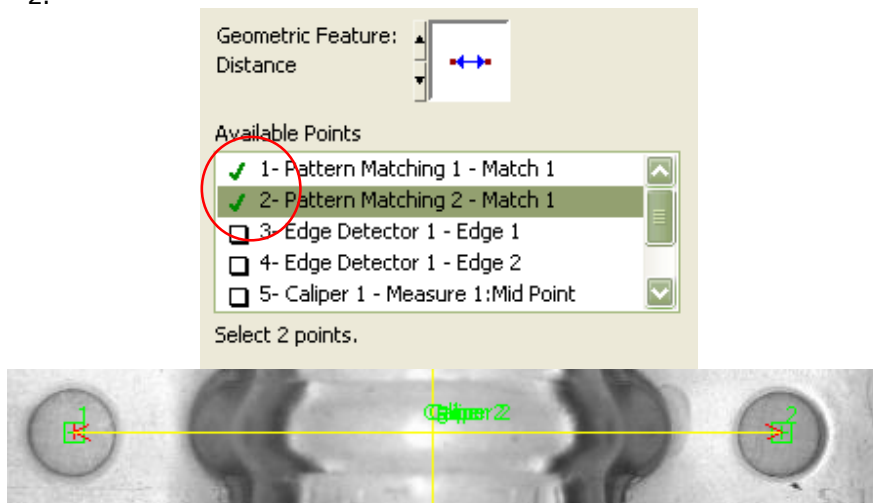
Then, using the *MEASURE* key, **the point in the middle of section 1-2 is located.**

### 3.6 Measuring the angle and distance of the holes

From the Processing Function: Machine Vision palette, select the Caliper function. In the configuration window, set the Geometric Feature option: Angle Defined by 3 Points and from the list of points, indicate the previously created points **1 - 5 - 2**. The result of the angle measurement appears after pressing the MEASURE key.



Then press the RESET key and change the Geometric Feature: Distance option. From the list of points, select **points 1 and 2** created in the Pattern Matching step. Use the MEASURE key to measure the **distance A** between points 1 - 2.



### 3.6 Measurement of other geometric quantities

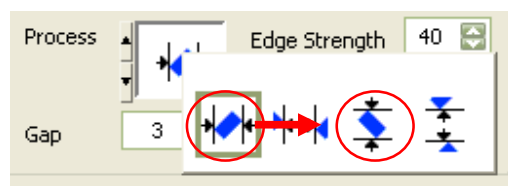
From the Processing Function: Machine Vision palette, select the Clamp function. In the image area of the bracket, draw an **ROI** including the hole on the left side of the bracket. Use the available parameters to determine the best method of measurement. The Distance parameter represents the actual value of the measured **diameter d1** of the hole.

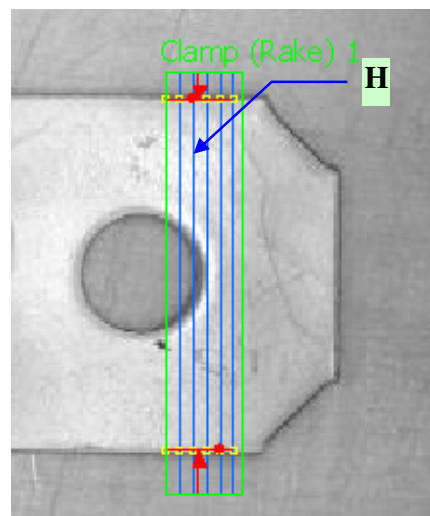
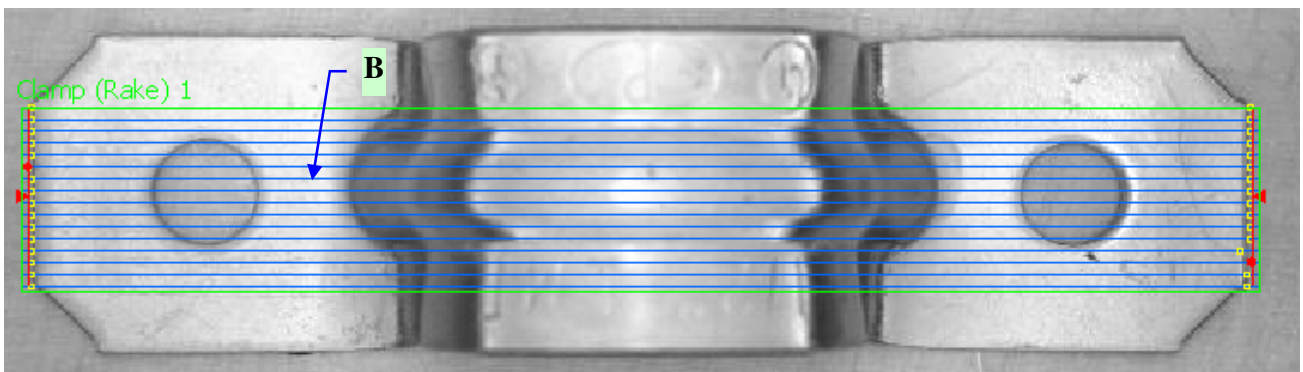
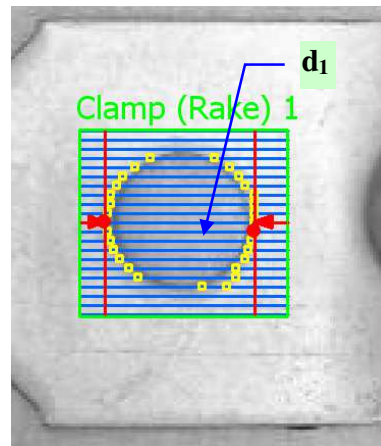
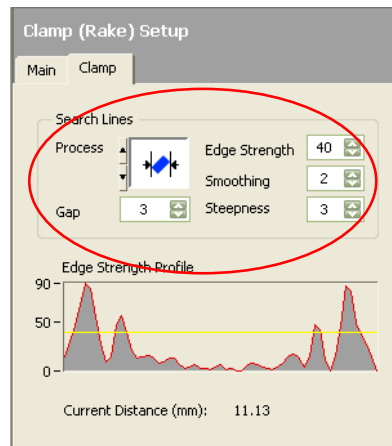
Similarly, measure the **diameter d2** of the second hole.

Then measure the length B of the bracket.

To measure the **width H**, change the Process option.

**Further measurement is carried out on the same principle.**





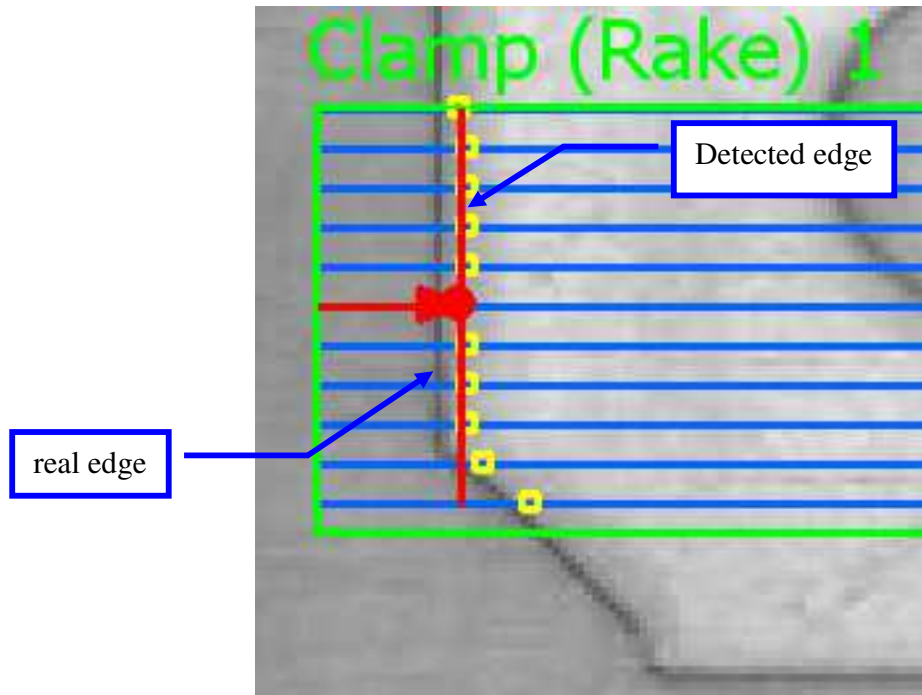
#### 4. Report.

The report should present the created script. Carry out an inspection for the entire group of brackets (Bracket1 - Bracket6). The results of the inspection should be included in the table.

**Use the report template.**

Additional question:

Suggest a solution to the problem of edge detection (especially for the CLAMP function) in case it is difficult to determine the position of the edges in the image:



REMEMBER: You can save the image to a file using the File / Save Image menu function. Next, we specify the location of the directory with files, the file name and graphic format (e.g. jpg)

