asyril Experts in Flexible Feeding Systems

Smart Sight

User Guide

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Contents

1. Introduction

1.1. General information

This document is the property of Asyril SA; it may not be reproduced, modified or communicated, in whole or in part, without our prior written authorisation. Asyril SA reserves the right to modify any information contained in this document for reasons related to product improvements without prior notice. Before using the product, please read this entire document in order to ensure that the product is used correctly. However, if you encounter difficulties when using the product, do not hesitate to contact our customer service department.

In this manual, the safety information that must be respected is split into three types: "Danger", "Important" and "Note". These messages are identified as follows:

DANGER!

Failure to respect this instruction may result in serious physical injury.

DANGER!

This instruction identifies an electrical hazard. Failure to respect this instruction may result in electrocution or serious physical injury due to an electric shock.

IMPORTANT!

Failure to respect this instruction may result in serious damage to equipment.

NOTE:

The reader's attention is drawn to this point in order to ensure that the product is used correctly. However, failure to respect this instruction does not pose a danger.

Reference …

For more information on a specific topic, the reader is invited to refer to another manual or another page of the current manual.

IMPORTANT!

Asyril cannot be held responsible for damage to property or persons caused by failure to respect the instructions specified in the "Safety instructions" paragraph. It is the customer's responsibility to inform the personnel concerned.

NOTE:

All dimensions and values in this manual are expressed in millimetres (mm)

1.2. Other manuals

The table below provides a list of documents supplied with the product. Each of these manuals forms an integral part of the set of documentation associated with the product.

This manual contains all the information for the users on how to use and configure a new recipe (feeding and vision recognition).

Manual title	Reference	Description of the content
Smart Sight Operating Manual	SIGHT-XXX-02_Operating_Manual	Contains a technical description of the product, its functionalities and provides maintenance and transport information concerning the product
Smart Sight Programming manual	SIGHT-XXX-02_Programming_Guide	Contains a description of the product's operation and the information relating to communication and to using the product in terms of programming
Smart Sight User Guide	SIGHT-XXX-02_User_Guide	THIS MANUAL

Table 1-1: Other manuals

1.3. HMI functionalities

1.3.1. Control unit

The control unit (Vision PC) is supplied pre-configured and ready to use.

IMPORTANT!

This unit is configured for Asyview and HMI software programs ONLY! **Failure to respect this instruction will invalidate the warranty.**

1.3.2. Parties involved

This table defines the roles assigned to each professional permitted to work on the Asyview system during its life cycle.

	Operator	Technician	Integrator
Acquiring an image	✓	✓	✓
Login/Logout			
Select a recipe			
Start/Stop the system			
Create/Modify a recipe	⊘	✓	✓
Add/Modify an operator			
Calibrate			
Advanced access to Asyview	⊘	⊘	✓
Advanced access to the HMI			

Table 1-2: Parties involved

2. Setting up the system

The system is pre-configured by Asyril with the ordered components and corresponding architecture. By defaut we will describe the simple case “1 Asycube + 1 camera”.

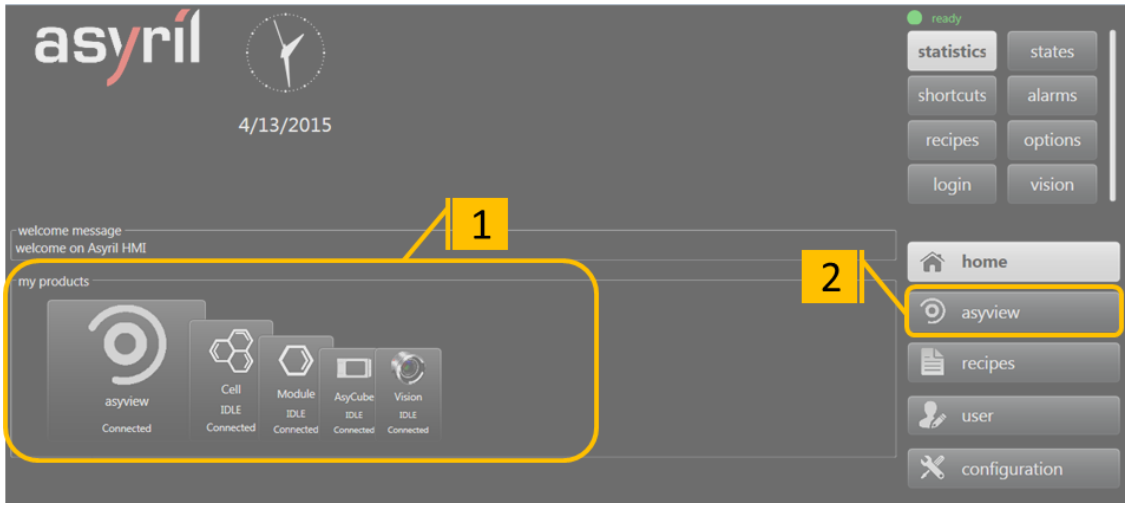


Figure 2-1: Home page of the HMI: (1) show the architecture of the connected and pre-configured devices; (2) access to the configuration steps and monitoring.

IMPORTANT NOTE

If you have several cameras (Asycube camera, control camera, etc.), the "asyview" screen will be duplicated for each camera.

Here below (Figure 2-2) is a simple description of what to settle and the main procedure after placing the Asycube and vision devices on the machine.

IMPORTANT!

Those parameters have to be set in the begginining of the setting up of the machine. Every modification of these parameters will break the calibrations and the recipes.

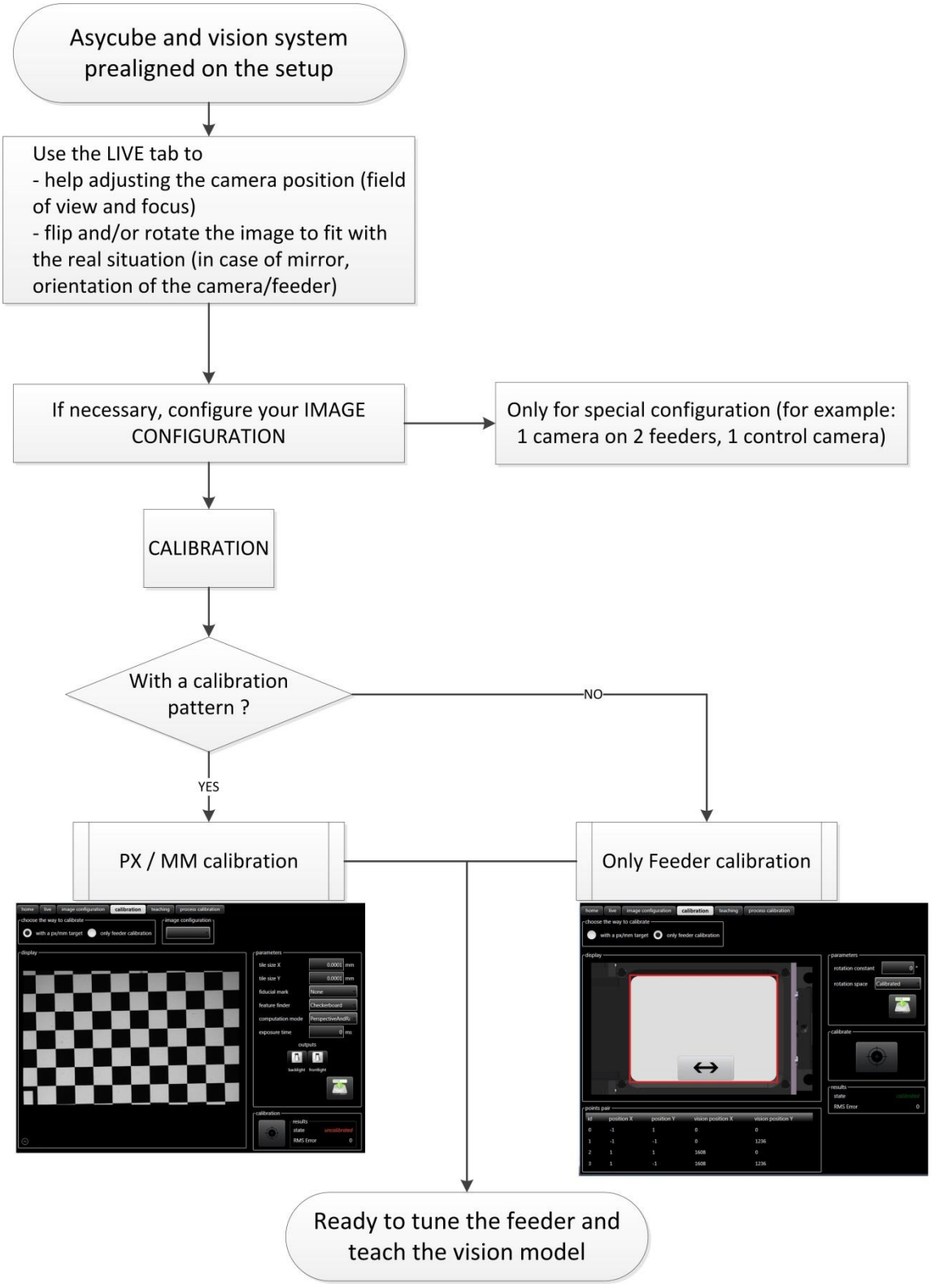


Figure 2-2: quick description of the different tasks to operate when settling a new Smart Sight configuration

See the HMI User Manual within the interface for detailed information about these functionnalies: Live, Image configuration, Calibration.

3. Creating and configuring a recipe

Different level of recipe exist and allow easy access, loading and saving of the different level of the machine as well as mixing configuration depending on the application.

A Vision recipe has a *.vrec extension and contains all of the data necessary to configure the complete vision and feeding system. The next chapters provide a tutorial describing how to configure a new recipe. However, the information contained in this chapter also applies to modifying an existing recipe.

The different steps described in this chapter are resumed in Figure 3-1.

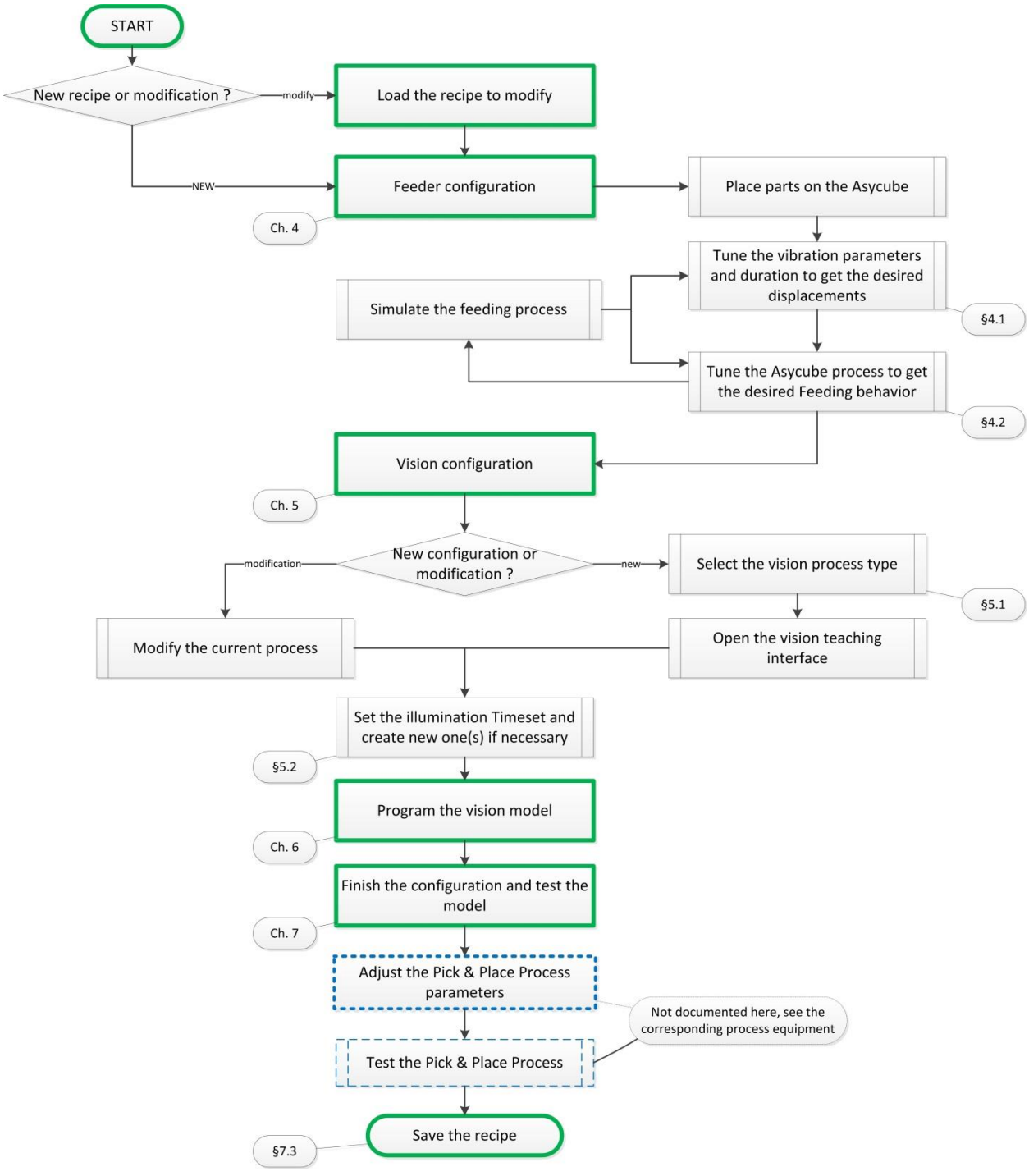


Figure 3-1: main scenario to configure or modify a vision and feeding recipe

4. Configuring the Asycube

4.1. Vibrations of the Asycube platform and reservoir

Step 1	Click on the «asycube» button
Step 2	Click on the "Platform" / “Reservoir” tab
Step 3	Modify and test (a) the vibration parameters of the standard movements to adapt them to your components: - Vibrations of the Asycube platform and reservoir (b) - Pay particular attention to configure also the vibration time (batch) (c)
Step 4	Check that the parts vibrate uniformly in the right directions, without coming out of the platform using buttons in the home tab or in the shortcut.

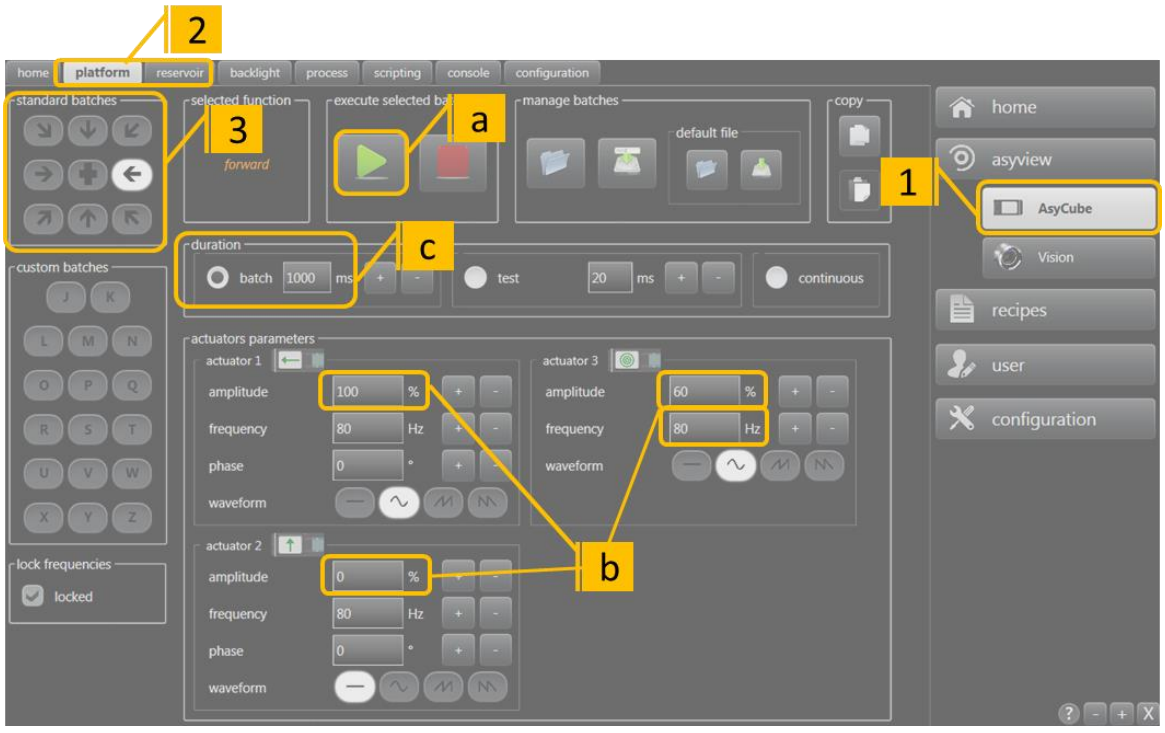


Figure 4-1: Adjusting the parts feeding parameters

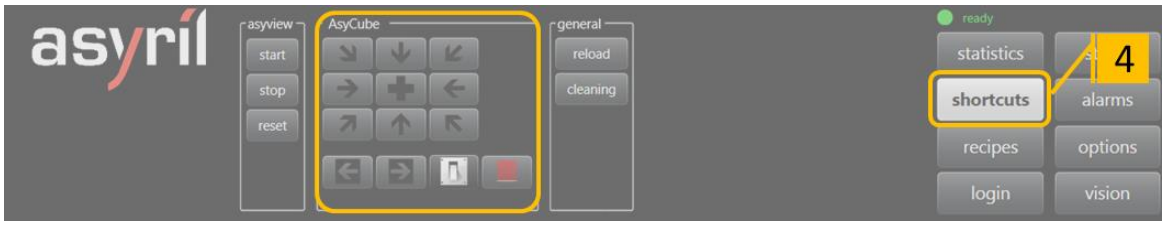


Figure 4-2: Test of the part displacements on the shortcuts button

IMPORTANT NOTE

The vibration time must always be configured as the time required to the parts to cross the platform in the corresponding direction.

NOTE 2

The vibration buttons (D) are only made available outside production. The Asyview must be in "configuration" mode in order for the buttons to appear. If this is not the case, click on the "stop" button under the Asyview shortcuts tab.

4.2. Configuring the vibration process

Step 1	Click on the «asycube» button
Step 2	Click on the "Process" tab
Step 3	Click on the "Planar plate" or "Structured plate" button to load the default parameters associated with your platform or load an existing configuration.
Step 4	If necessary, modify the paremeters of the process sequences **NOTE:** *You can freely modify these parameters (duration, sequence, order of vibrations) and work also in advanced mode if necessary in order to configure the sequences specific to the feeding and recirculation phases.* *In all cases, remember to finish with a stabilisation time to prevent the parts from moving when a photo is being taken.*
Step 5	Use the simulator to control the behaviour of the process

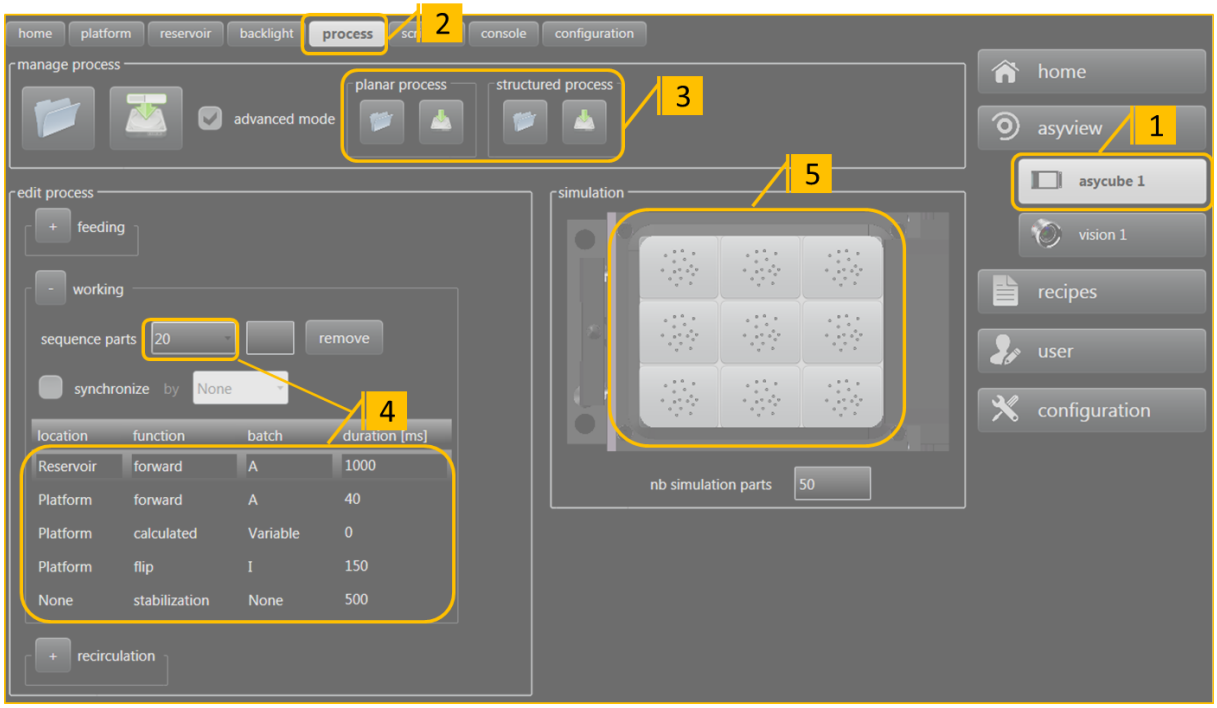


Figure 4-3: Defining the vibration sequences

Depending on the number of parts detected on the Asycube platform, it is possible to configure a specific vibration sequence. Between each configured sequence, the vibration time will be interpolated linearly.

All the configured batches can be used in the sequence. To distribute the parts uniformly on the platform and take into account the position of the parts on the platform, the “calculated” option is included in the sequence. In this case, the algorithm will automatically define the vibration time and the optimal batch to apply. A typical sequence may be:

- Calculated
- Flip
- Stabilization

In order to reduce the component stabilisation time, the Asycube platform may be machined (grooves, holes, etc.). In this case, the vibration sequence must be adapted to the type of platform (so that the parts are directly positioned in the grooves or holes for example). In the case of a grooved platform, a typical vibration sequence may be:

- Flip
- Forward
- Backward

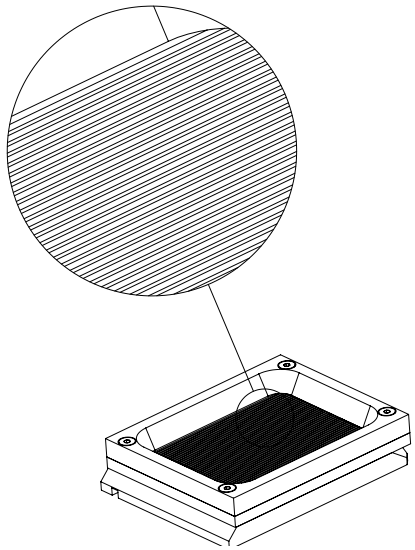


Figure 4-4: Example of a grooved platform

In "advanced" mode, it is possible to differentiate the desired vibration sequence for a feeding and recirculation phase as:

- Feeding:
  - this sequence is normally used at the initial step or at the end of a production when none or not a lot of parts are in the field of view. Its goal is to transport the parts from bulk to the field of view
- Recirculation:
  - this sequence should prevent an overflow of parts in the field of view by preventing any part to come in the field of view
- Working:
  - it corresponds to the optimal state where the aim is to compensate the taken parts and to distribute the parts on the platform. The feeder should work most of the time with this manner. If not, the different thresholds and sequences should be modified. The cycle time is also directly related to this configuration.

In the “normal” mode, only the Working sequences are configurable. The Feeding and Recirculation ones are automatically set up.

5. Configuring the vision

Step 1	Click on the «vision» button
Step 2	Click on the “teaching" tab
Step 3a	For a new configuration: choose the type of process to be used for this recipe: control or localisation (see § 5.1) and click on the “add” button. This will open the teaching window.
Step 3b	To modify the configuration, click on the “modify” button. This will open the teaching window.

NOTE

The Asyview state will change to "teaching" in the header screen. Wait until the state has changed to "teaching" before moving on to the next step. The teaching window will be opened at that time.

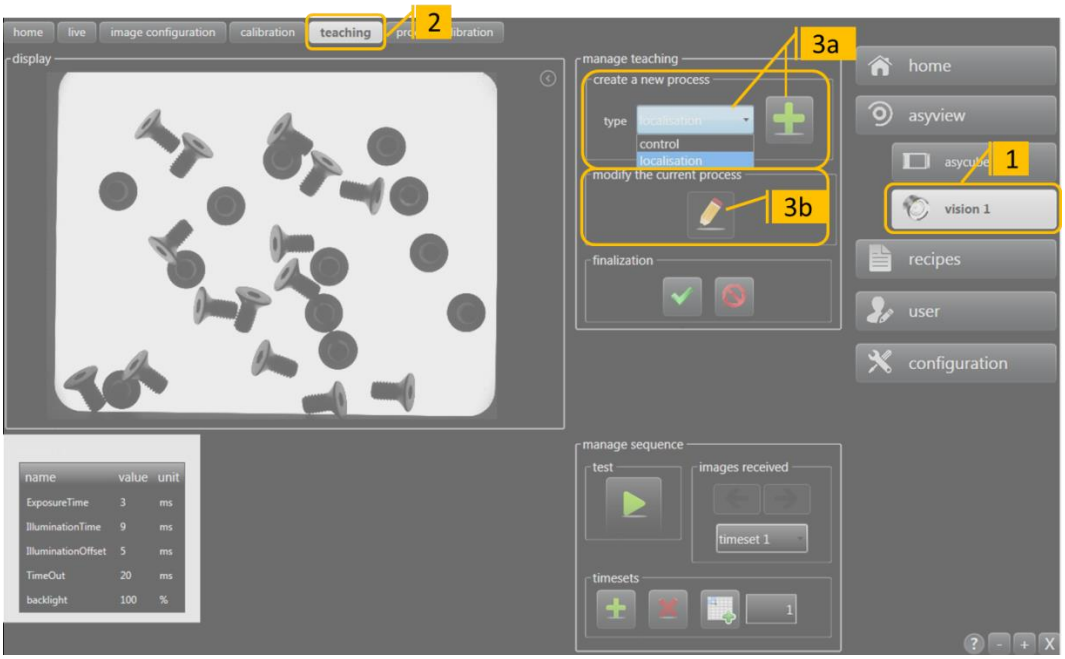


Figure 5-1: Starting the configuring of the vision model

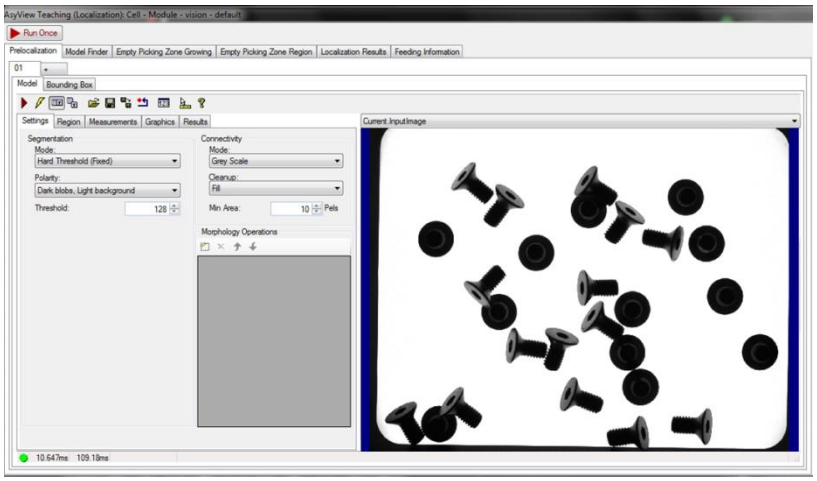


Figure 5-2: opening of the teaching window

5.1. Selecting the vision process type

Vision tools are preconfigured to allow easier, faster and reliable teaching and working processes. These tools are grouped in two main functionalities: “Control” and “Localisation”. Table 5-1 describes their use and content.

Type of vision process	Description	Included vision functionality				Number of acquired images
		Pre-localisation	Pitch & Toss and position	Exclusion zone	Feeder Info	
CONTROL	Detection of one specific feature on the image, mainly used for purpose of presence checking, orientation or position alignment error.		x		(x)	1
LOCALISATION	Optimized detection of several/all parts in the field of view for purpose of localization, orientation, pitch & toss sorting and feeder management.	x	x	x	x	1 - 15 (different lighting conditions and intensity)

Table 5-1: Description of the vision processes and their functionalities

NOTE

The feeding information is automatically available if the camera is linked to an Asycube. For a control camera, this feature is not used.

5.2. Configuring the illumination parameters

Step 4	Adjust the illumination type and exposure time as well as the number of images (see section 5.2). You can test the acquired image(s) on this tab.

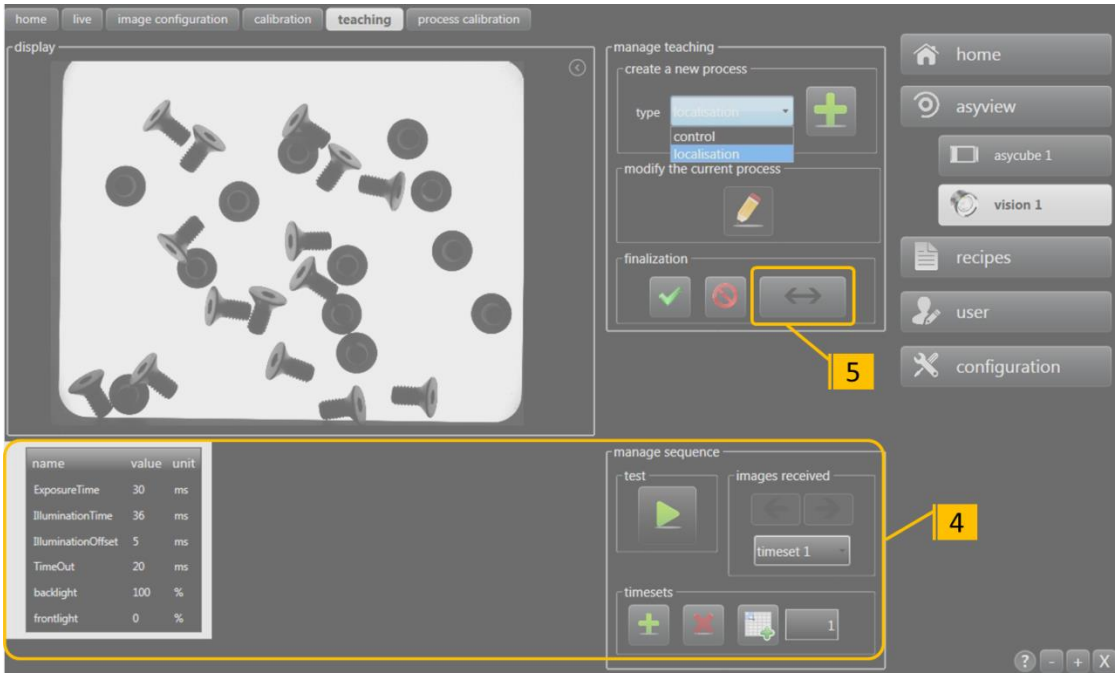


Figure 5-3: illumination parameters on the HMI

The parameters available on the timesets are used to configure the image acquisition process:

- exposure time [ms] : real acquisition time of the camera to take the picture
- illumination time [ms] : time in which the light is on
- illumination offset [ms] : time with the light on before to take the picture
- time out [ms] : minimum time between two acquisitions
- backlight intensity [from 0 to 100 %]
- frontlight intensity [from 0 to 100 %]

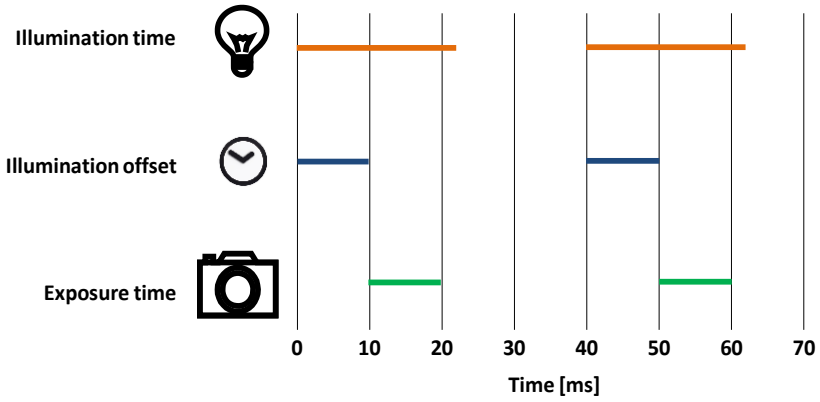


Figure 5-4: Defining exposure time and illumination time

The illumination time must be longer than the exposure time. In order to ensure that the lighting (DOAL or backlight) is at full power when the photo is taken, it is necessary to delay the image acquisition by using the illumination offset and to switch off the lighting one to two milliseconds after the image acquisition is completed. Figure 5-4 illustrates this phenomenon.

NOTE

In general, only modify the Exposure time and Backlight / Frontlight intensities. The other parameters will then automatically adjust to optimize the sequence.
For more advanced configuration it is still possible to set manually all parameters.

On the HMI you can add or remove a timeset and test the whole sequence of acquisition/illumination. The displayed image can be selected by clicking on the corresponding timeset or with the arrows and selector in the images received area.

IMPORTANT NOTE 1:

With the localization process:

- *The timeset 1 will always be used for the prelocalization operation. For this reason, it must correspond to the backlight illumination.*
- *The timeset 2 can correspond to DOAL or backlight illumination*

IMPORTANT NOTE 2:

Visually check that the image displayed on the screen is correct, as the entire Vision model will be based on this photo!

5.3. Programming the Vision model

Step 5	Proceed to the vision model programmation on the teaching window (the button "↔" on the HMI allows to easily switch from the HMI window to the Vision teaching window)

For information about the different parameters and available option in the teaching window, refer to chapter 6 "Programming the Vision model".

IMPORTANT NOTE:

To take in consideration the adjustment of the timeset, click on the "Run" button.
This action must be done at least one time when programming a new recipe to allow the correct allocation of the pictures.

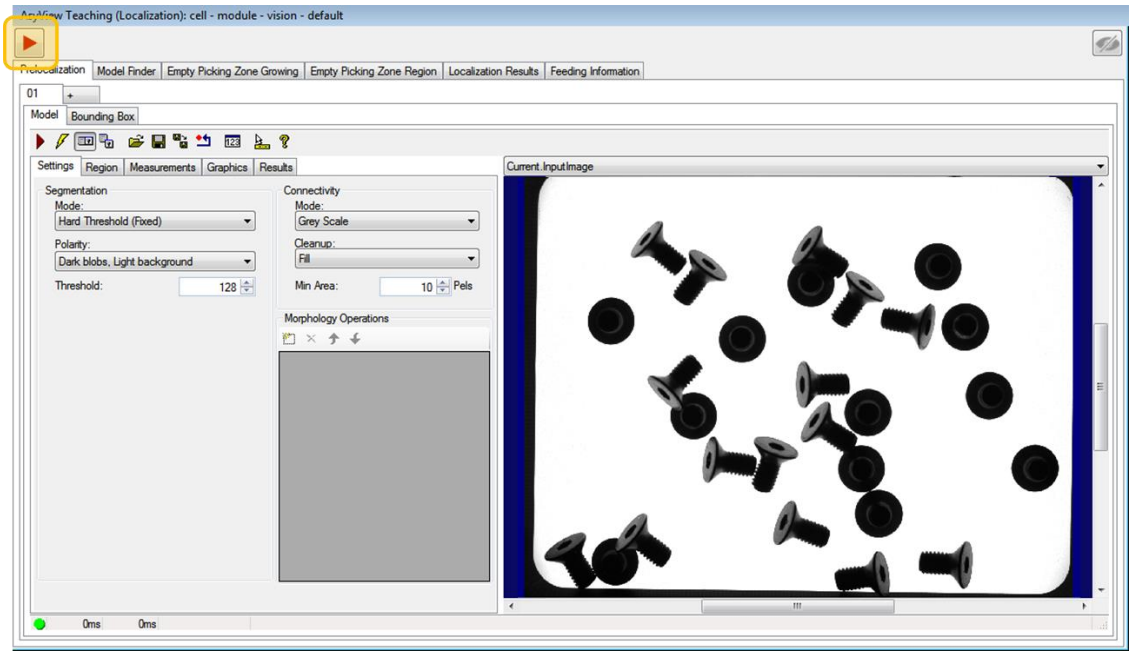


Figure 5-5: Vision teaching window

6. Programming the Vision model

6.1. Overview

By clicking on *add* or *modify* on the HMI teaching tab, the following window will then appear:

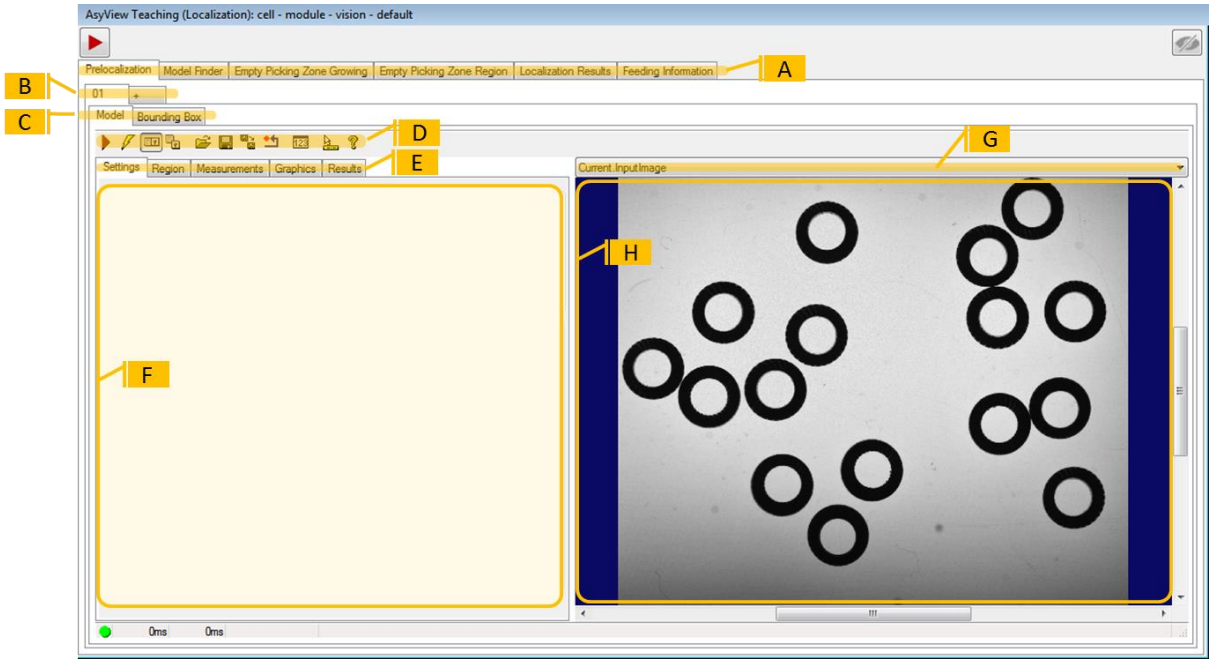


Figure 6-1: General overview of the Asyview Teaching window

Ref.	Designation	Description
(A)	*1st level of tabs*	Each tab corresponds to a specific tool: - Prelocalization - Model Finder - Empty Picking Zone Growing (EPZG) - Empty Picking Zone Region (EPZR) - Localization Results - Feeding information
(B)	*2nd level of tabs*	This set of tabs notably contains the "+" tab which enables to activate one model and also to apply several models to detect the good parts (for example when different parts have to be detected as the good ones). In this case, the system will add the results of each detection and ensure to not detect twice the same position.
(C)	*3rd level of tabs*	The content of these tabs will be described in the following sections
(D)	*Buttons associated with the 3rd level of tabs.*	The main buttons used include: - "Run" button - "Run continuously" button
(E)	*4th level of tabs*	Clicking on the tabs will display the specific content in zone **(F)**.
(F)	*Zone specific to each tab*	The content of this zone will be described in detail in the following sections
(G)	*Image selector*	Select the image you want to display in this selector (original image, train impage, with markers of the results, etc.)
(H)	*Image*	This screen displays the image chosen in the selector **(G)**

6.1.1. Tricks and shortcuts

By right clicking on the 2nd tabs level (B) it is possible to access to functionnalities as:

- Activation & de-activation of a model:
  - This last one is kept in memory but can be de-activated for test purpose for instance
  - Note that it must have at least 1 active prelocalization model, 1 model finder and 1 feeding information model to allow a correct behavior of the system.
- Removing a model:
  - This is definitive, no way to reload it (only if you had previously saved a recipe by reloading it)
  - Note that it must have at least 1 active prelocalisation model, 1 model finder and 1 feeding information model to allow a correct behavior of the system.
- Copy From/To:
  - Allow to import the model parameters from a previously configured one or to export them to a specified target
  - Note that this function is available only inside the current recipe.
- Image selection
  - Allow to define which image has to be used at each step of the vision process
  - Note that the prelocalisation is applied always on the first picture, usually with backlight illumination

The Run button  on top left allows running all analysis in the right order to reactualize the results if the acquisition timesets or a previous model have changed or to take new pictures.

NOTE:

The button “Run” has to be run at least one time when modifiying or creating a vision recipe to load the timeset configuration.

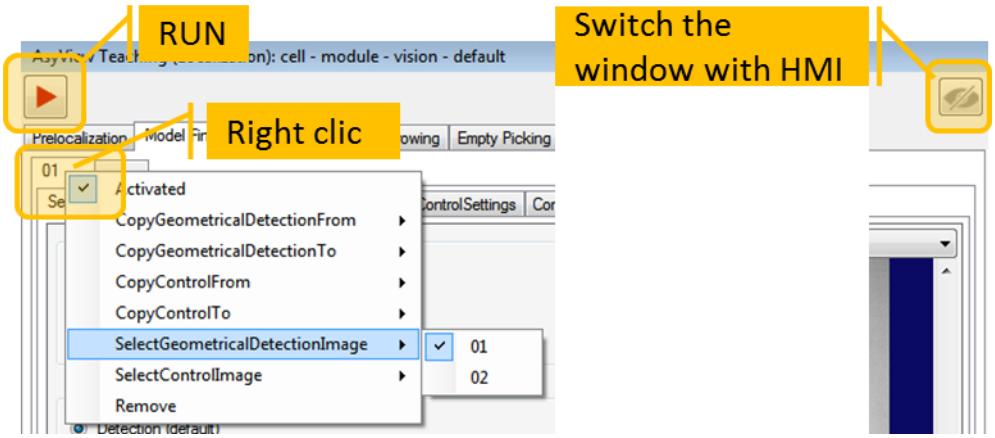


Figure 6-2: Run Once button; right click on 2nd tabs level to select image and copy/paste features

6.2. Prelocalization

6.2.1. Overview

The prelocalization tool thresholds the picture and then inspects it for discrete blobs of connected pixels. Results may be filtered depending on their geometrical characteristics but mainly on their area. This first step allows locating fastly all candidates of good parts to be picked on the surface of the Asycube. To configure this tool, you must select the surface of your parts (in pixels or in mm depending on the calibration used) as well as a threshold value (greyscale value) used to transform each portion of the image into black & white.

6.2.2. Configuring the tool: "MODEL" tab

Step 0	Click on the "Prelocalization" tab then on "Model" and finally on the "Settings" tab

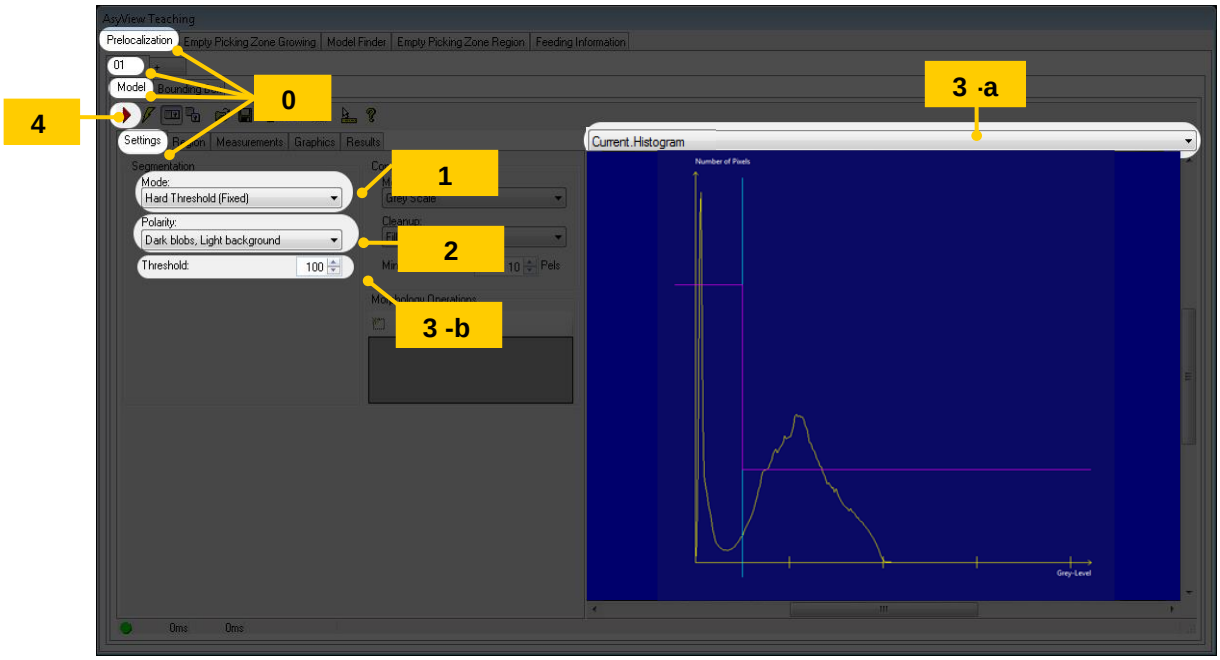


Figure 6-3: "Prelocalization" tool, 01\Model\Settings

Step 1	Choose a "Hard Threshold (fixed)" type threshold
Step 2	Choose the polarity of your parts (black on white background or vice versa)
Step 3	a- In the image selector, choose **Current.Histogram** b- Depending on the histogram, change the threshold value of the number of pixels according to the level of grey as shown in the Figure 6-3.
Step 4	Click on the button to run the tool and observe the resulting detected area by selecting *"LastRun.InputImage"* from the image selector. Modify the threshold value if necessary and run again if necessary.

IMPORTANT NOTE

The threshold represents the limit between a part and the background in the greyscale range (1 to 255). Depending on the chosen illumination for the 1st image, the polarity might be inverted if the parts are light on a dark background.

6.2.2.1. Picking area

Optionnaly it is possible to reduce the zone in which you want to find components.

Step 5	Click on the *Region* tab to display the screen below:
Step 6	You can draw a rectangle by choosing "cog rectangle", otherwise search the entire image by selecting < None – Use Entire Image >

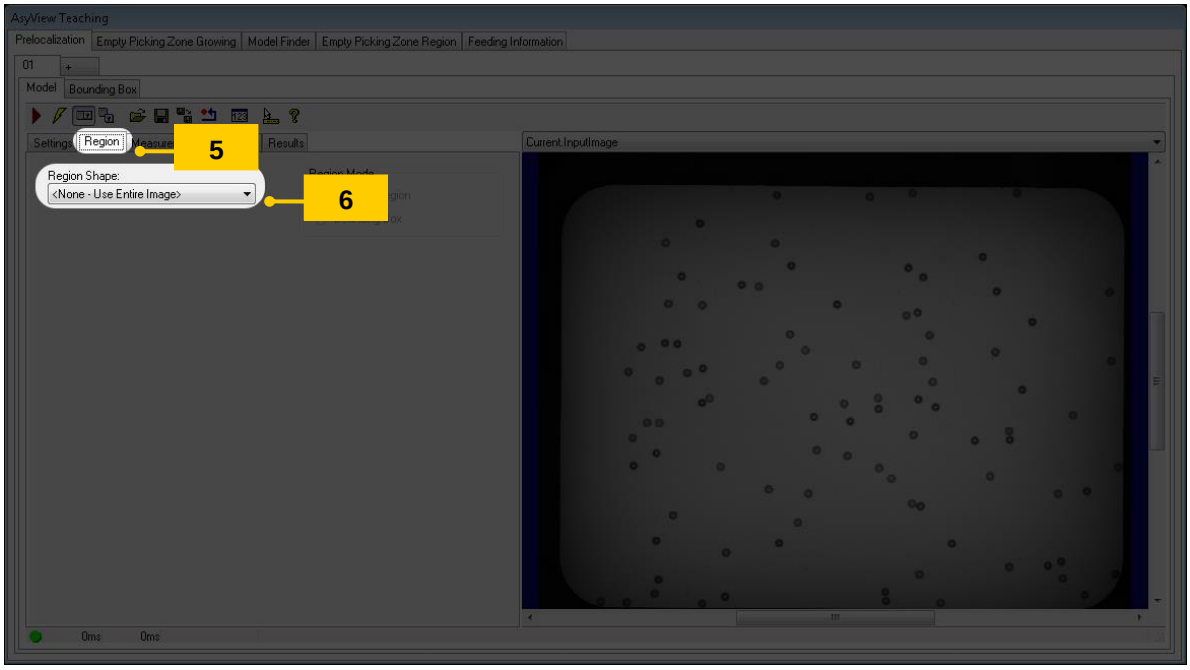


Figure 6-4: "Prelocalization" tool, 01\Model\Region

6.2.2.2. Filtering the results

Step 7	Click on the *Measurements* tab to display the screen below:

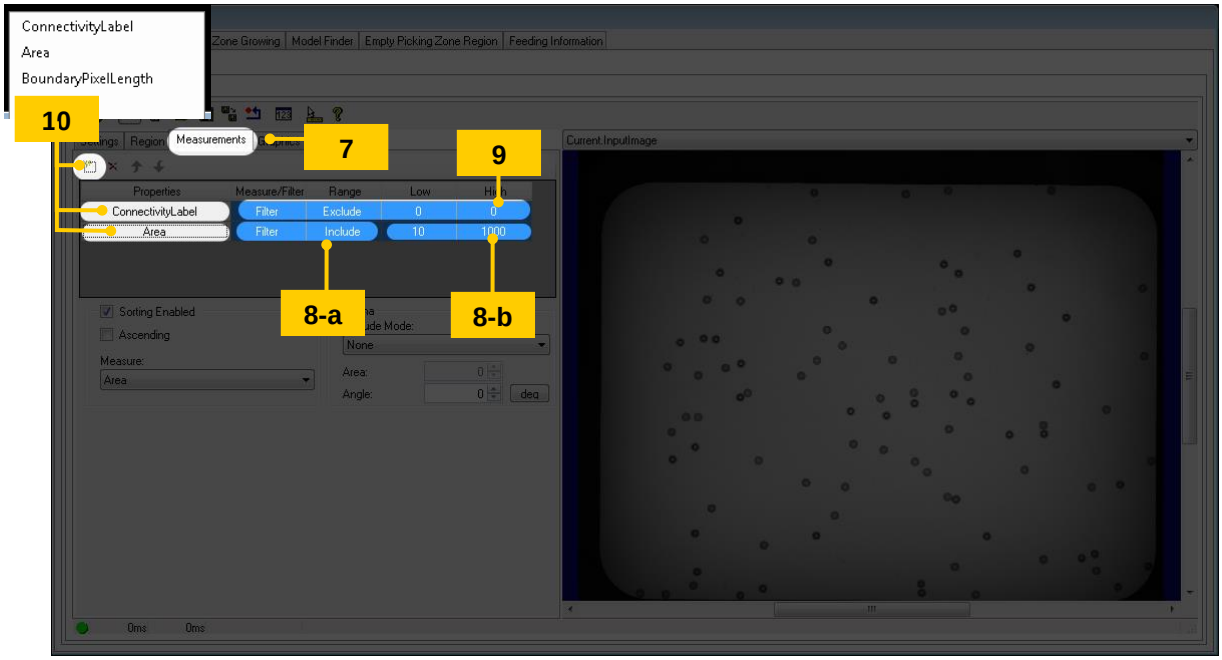


Figure 6-5: "Prelocalization" tool, 01\Model\Measurements

Step 8	Configure the "*Area*" property: a- Choose a type of "filter" measurement and an "include" value range b- At this stage of the configuration process, we do not know the pixel surface of the parts, therefore choose quite a wide variation range (for example from 10 to 10,000). We will narrow this variation range later.
Step 9	Configure the "*Connectivity*" property: Choose a type of "filter" measurement and an "exclude" value range

IMPORTANT NOTE:

The value range must be set to "include 0-0" if you want to detect the hole in a part

The value range must be set to "include 1-1" if you want to detect the external outline of a part

Step 10	If necessary, add a new property by clicking on the "Add new" button and configure it as well.
Step 11	Click on the button to run the tool

6.2.2.3. Analysing the results

Step 12	Click on the *Results* tab to display the screen below:

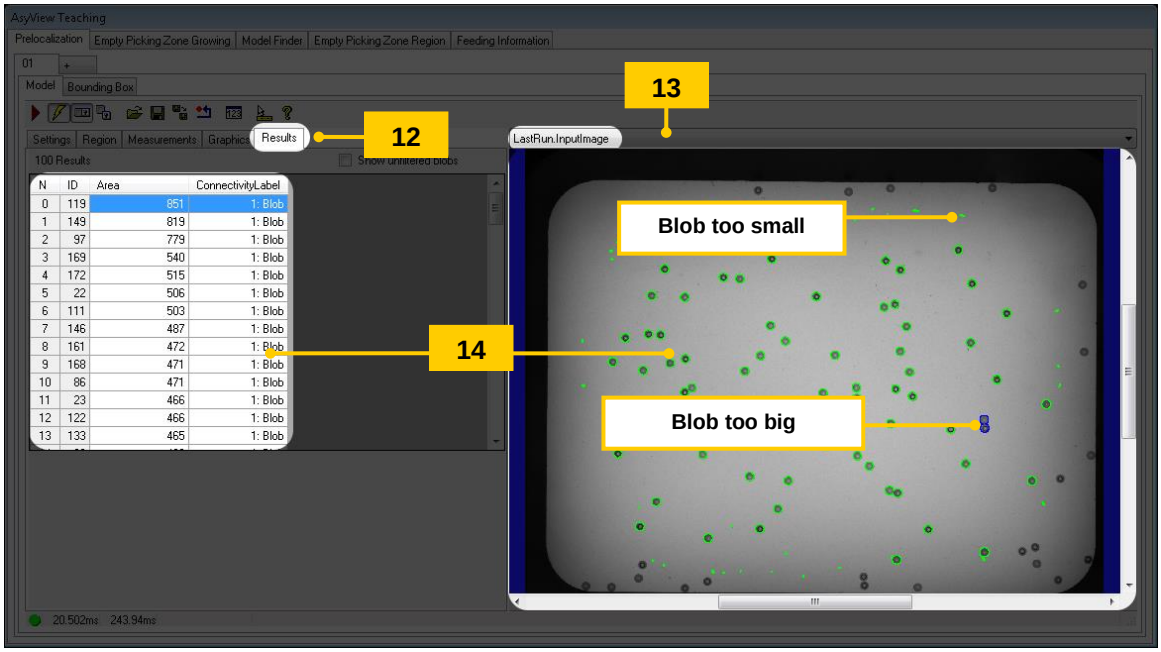


Figure 6-6: "Prelocalization" tool, 01\Model\Results

Step 13	Select *"LastRun.InputImage"* from the image selector
Step 14	The table displayed on this tab lists the parts found, the associated area and the connectivity. Examine the area of each component found and determine the smallest and the largest area for which a single component is found, as illustrated in the figure below:

NOTE:

When you select a line in the table, the corresponding blob is displayed in blue in the LastRun image and vice versa.

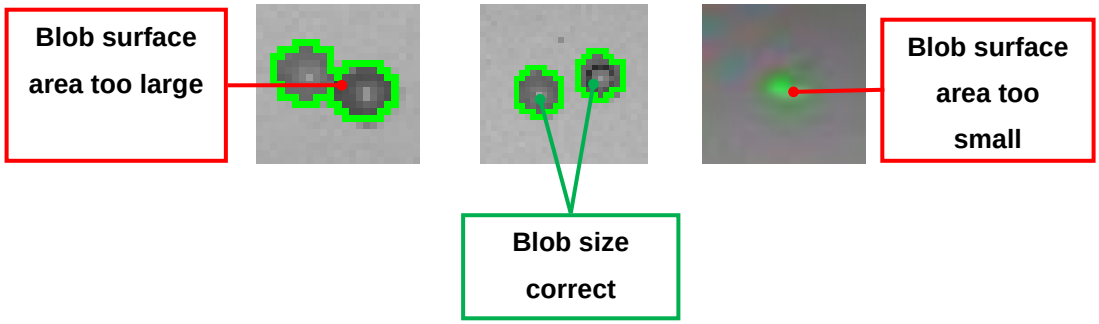


Figure 6-7: Defining the area acceptance range

Step 15	Return to the *Measurement* tab
Step 16	Modify the area range accepted as a result of the observations made in step 14, then run the tool again. Check that all blobs surround just one part only. Otherwise, adjust the area again.

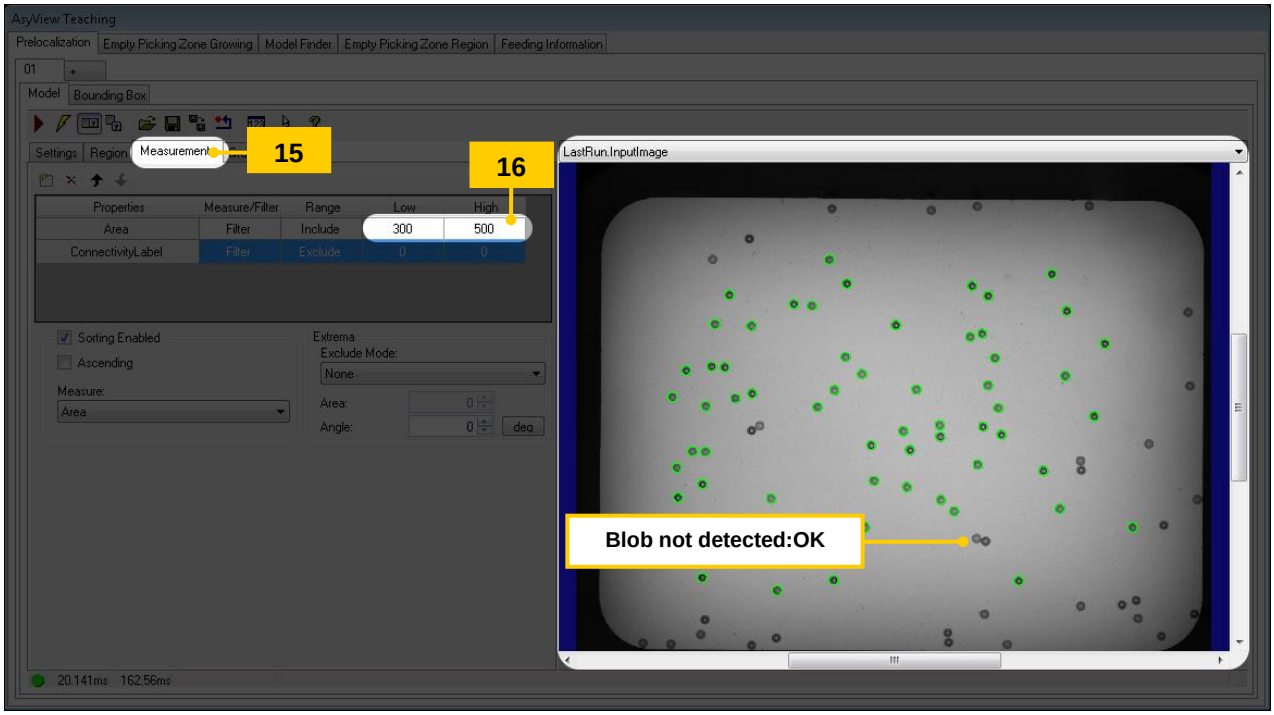


Figure 6-8: "Prelocalization" tool, 01\Model\Measurements

NOTE:

The threshold value may also need to be adjusted; to do this, vary the value chosen in step 3.

6.2.3. Configuring the tool: "BOUNDING BOX" tab

Step 17	Click on the *Bounding Box* tab to display the screen below:

NOTE

Pay particular attention to the configuration of this tab if you have chosen to detect a hole in a part. In fact, the surrounding rectangle (subsequently called the "bounding box") must contain the ENTIRE part!

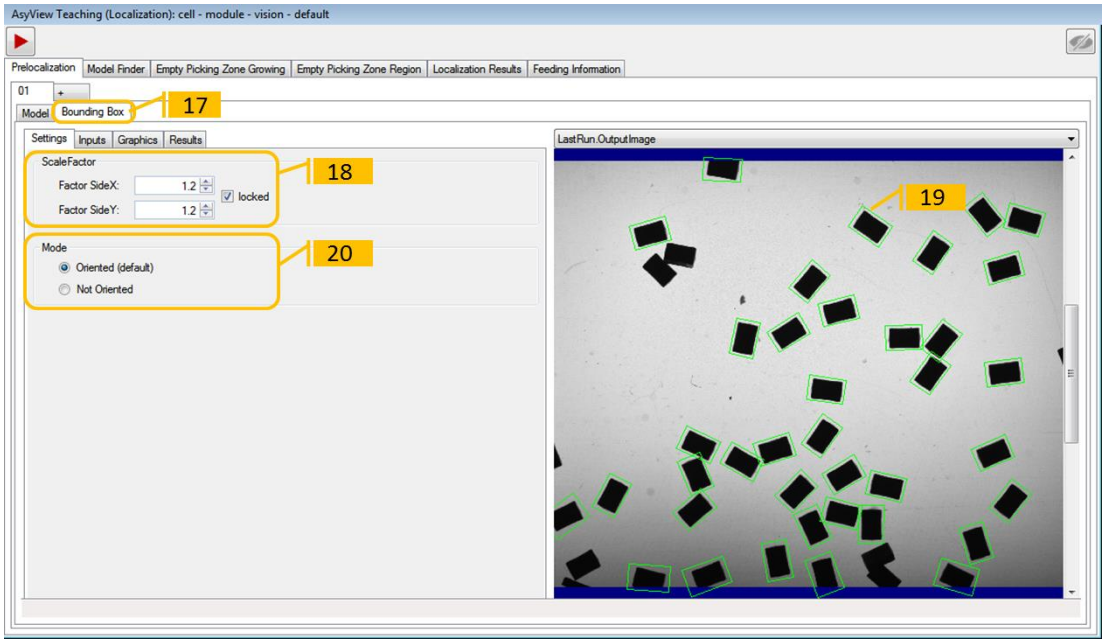


Figure 6-9: "Prelocalization" tool, 01\Bounding Box\Settings

Step 18	In the "scale factor" input field, choose a multiplication factor that makes it possible to extend the initial bounding box. For non symmetrical part it is possible to unlock the fields and choose different value for each direction.

NOTE

The initial bounding box is defined as the smallest rectangle able to contain the entire blob:

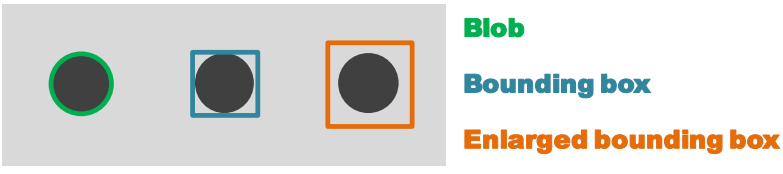


Figure 6-10: Defining the "Blob" and "Bounding Box"

Step 19	Check that your "extended bounding box" contains the entire surface area of the part:
Step 20	In the “Mode”, “Oriented” means that the bounding box will be oriented along the main inertial axis of the part. For complex geometry it might be better to not orient this bounding box. The main effect occurs when computing the Empty Picking Zone Region (see §6.4.2) for which it is optimal when contour and box are the closest possible.

6.3. Model finder

6.3.1. Overview

The "*Model Finder*" tool enables to train the model of a correct part (pattern) with which the application will be able to differentiate correct parts from incorrect parts (notably for the detection of pitch and toss). The search is applied on all candidates located with the prelocalizsation tool. It is able to match rotated and varying in size objects.

6.3.2. « Settings » tab

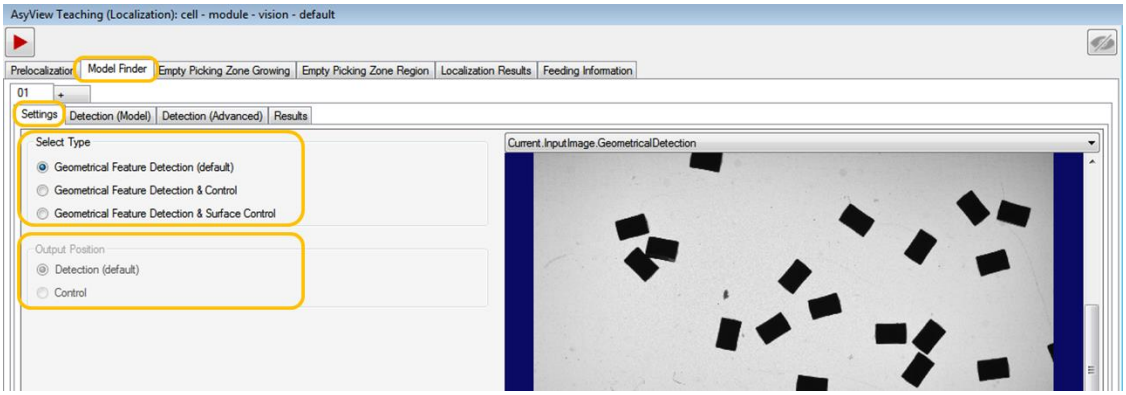


Figure 6-11: "Model Finder" tool - settings

The Model Finder tool is composed by a Geometrical Feature Detection that can optionnaly be followed by a second control. This last one can be again based on a geometrical model or on the characteristic of the surface. Table 6-1 describes their uses.

Type	Use case
Geometrical Feature Detection (default)	Standard case : pitch & toss differentiation & precise localization on the 1st or a 2nd image
Geometrical Feature Detection & Control	Two geometrical successive searches, possibly on different images: one for localization purpose, the other for pitch & toss differentiation. - Parts where the pitch & toss detail is not compatible with precise localization purpose - Parts where the pitch & toss detail has not the same position on all parts
Geometrical Feature Detection & Surface Control	Geometrical detection followed by a control of the surface characteristics, possibly on different images. - Contour detection for localization - Different surface characteristics between pitch & toss Note that the surfaces to detect must be repeatable also considering their imperfections.

Table 6-1: Model Finder tool type

The position of pick will be defined within this tool. By default it corresponds to the detection result and it is specified directly in the geometrical model. But precise localization and differentiation of the pitch & toss of parts can be done on different images. Therefore the output position result (pick position) can also be defined according to the specific need as explained in Table 6-2.

Pick position output	Output	Remark
Detection	Pick position = Result of the geometrical detection	By default
Control	Pick position = Result of the geometrical or surface control	Not available with « Geometrical Feature Detection»

Table 6-2: output position result configuration

6.3.3. Configuring the tool: "Detection" tab

Step 0	Click on the *Model Finder* tab then on the *Model* tab and finally on the *Train parameters* tab to display the screen below:

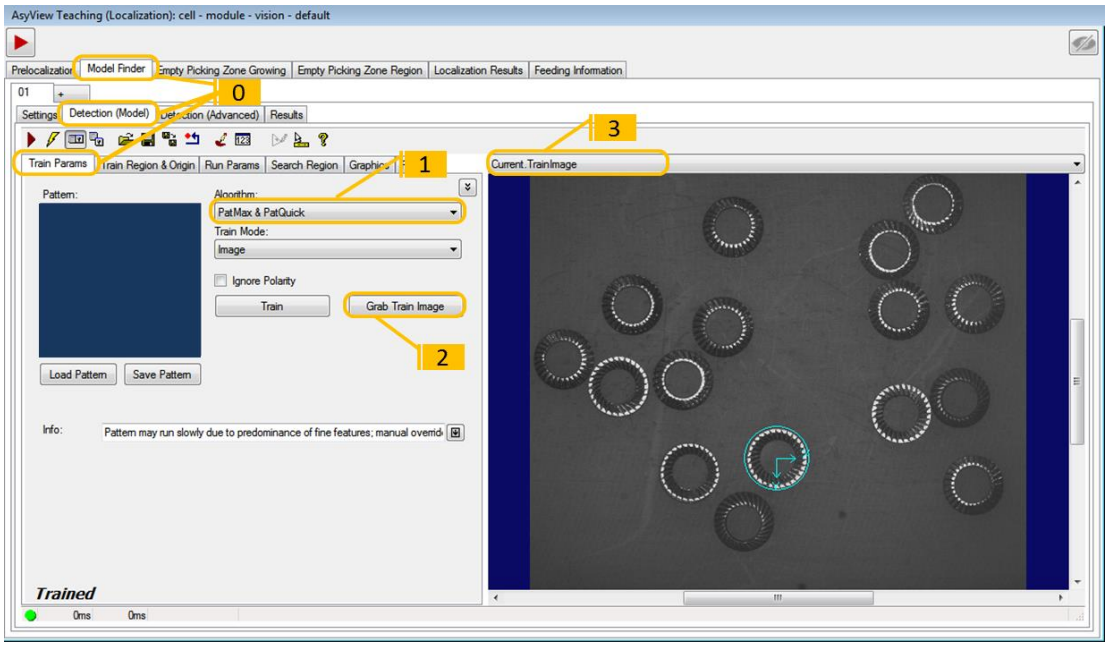


Figure 6-12: "Model Finder" tool, 01\Detection (Model) \Train Params

Step 1	Choose the "patMax & PatQuick" algorithm
Step 2	Click on the "*Grab Train Image"* button
Step 3	Choose *"Current.TrainImage"* from the image selector

Step 4	Click on the *Train Region and Origins* tab to display the screen below:

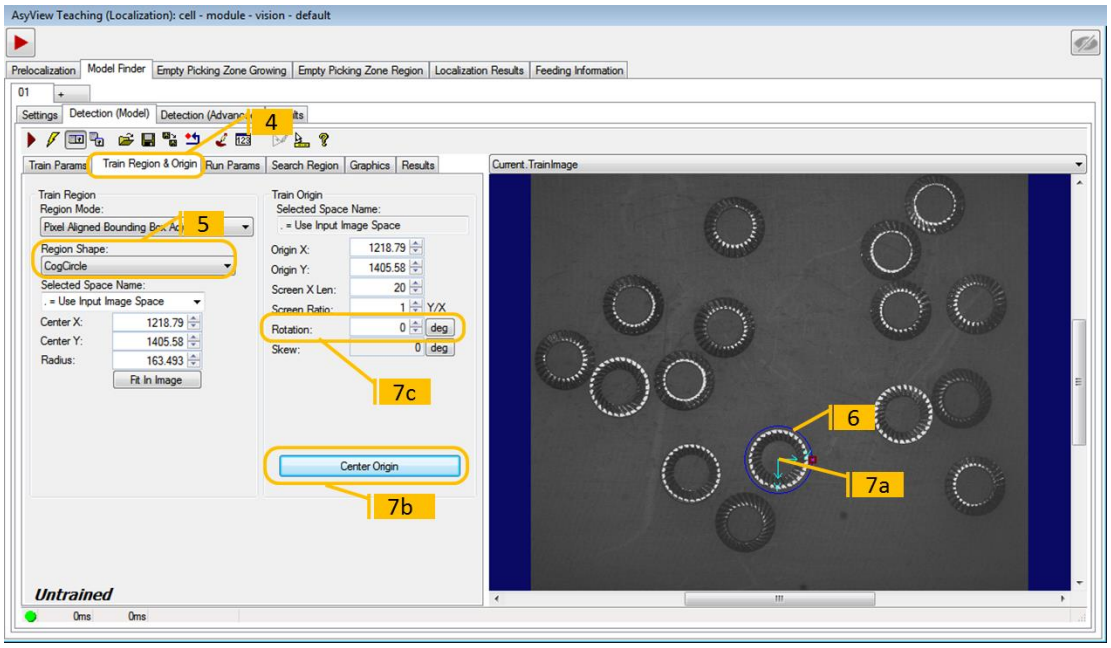


Figure 6-13: "Model Finder" tool, 01\Detection (Model) \Train Region & Origins

Step 5	Choose the shape most appropriate to your part (circle, rectangle, ellipse, etc.)
Step 6	Adjust the shape to a typical part that you want to recognise as a correct part.
Step 7	Define the centre and orientation of the part *Tip: you can move the system of coordinates manually, but it is more accurate to use the "center origin" button*

NOTE:

Pay particular attention to defining the centre of the reference as it is the coordinates of this point that will be sent to the robot as the "PickPosition"

Step 8	When the pattern has been programmed, click on the "Train" button in the "Train Params" tab. The image of the model programmed is displayed in the window that was initially blue

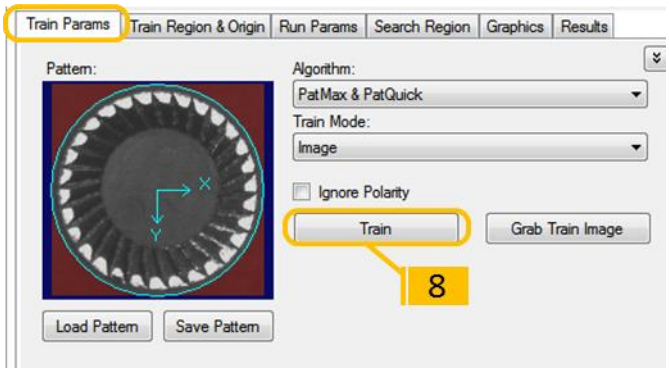


Figure 6-14: Trained geometrical feature

Step 9	Click on the *Run Params* tab to display the screen below:
Step 10	Modify the parameters as follows: a- Algorithm: **Best trained** b- Mode: **Search image** c- Approx number to find: **depends on the number of components to test on this picture** d- Accept threshold: relatively high (between **0.7** and **0.9**) e- If necessary, modify the rotation angle value accepted for the components (in relation to the model programmed) and the scale if your correct parts are not all exactly the same size.

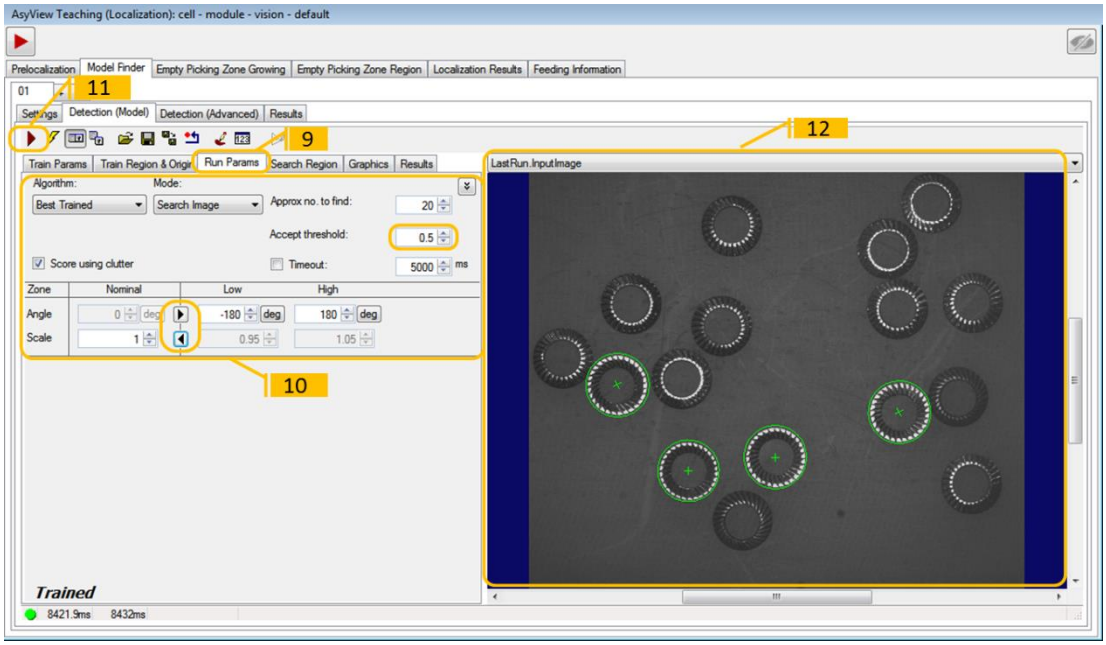


Figure 6-15: "Model Finder" tool, 01\Detection (Model) \Run Params

Step 11	Click on the ▶ button to run the tool
Step 12	Select *"LastRun.OutputImage"* from the image selector And check that the parts that you have defined as "correct" are accepted and that the others are rejected. Otherwise, modify the threshold value according to the score of incorrect parts (displayed in the results table)

6.3.4. Configuring the tool: “Detection (Advanced)” tab

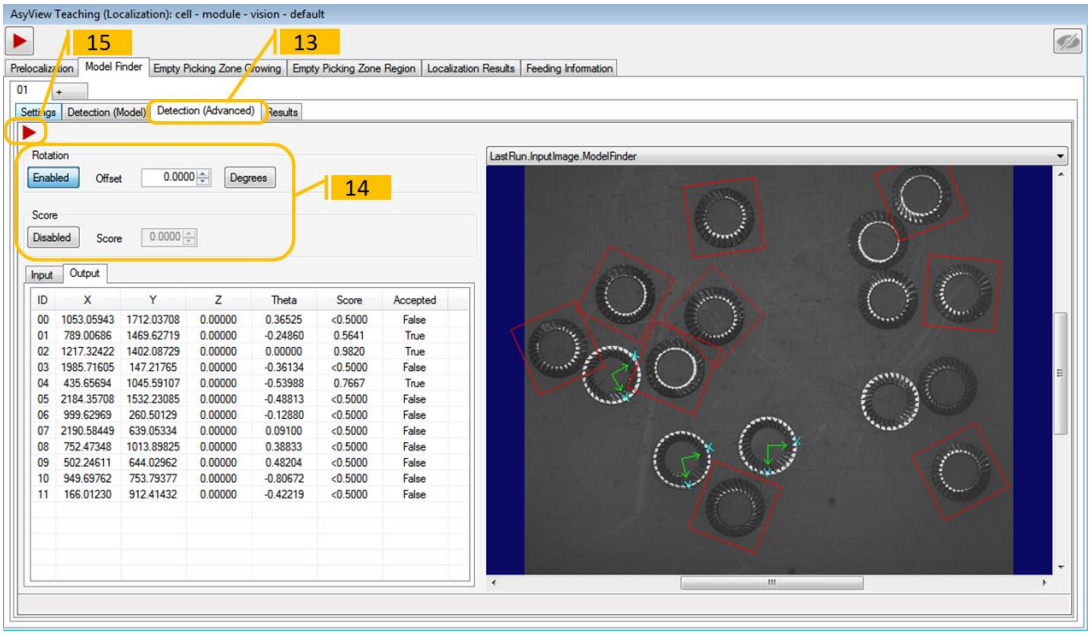


Figure 6-16 : "Model Finder" tool, 01\Detection (Advanced)

Step 13	Click on the *Detection (Advanced)* tab to display the screen below:
Step 14	Rotation: allows adjusting the rotation angle given in the result (pick position/orientation) - Enabled: the orientation will follow the detected part (only available if the search angle is not fixed to 0 in the Run parameters of the model). An optional offset can be added. - Disabled: constant orientation, eventually with adding an offset value Score: - Enabled: filter the results to to this score (only if this value is bigger than the accept threshold defined in the “Detection (Model)/Run Params” parameters) - Disabled: sort the result with the accept threshold defined in the “Detection (Model)/Run Params” parameters (step 10).
Step 15	Click on the button to run the tool

NOTE :

The use of the score may be helpful to work with a not too high acceptance threshold in the Model Finder but to sort then only the best results.

NOTE :

Going on the picture gives the information about the ID of the corresponding part in the result informations.

6.3.5. Configuring the tool: « ControlSettings » tab

NOTE

This tab is not available when chosing the option "Geometrical Feature Detection"

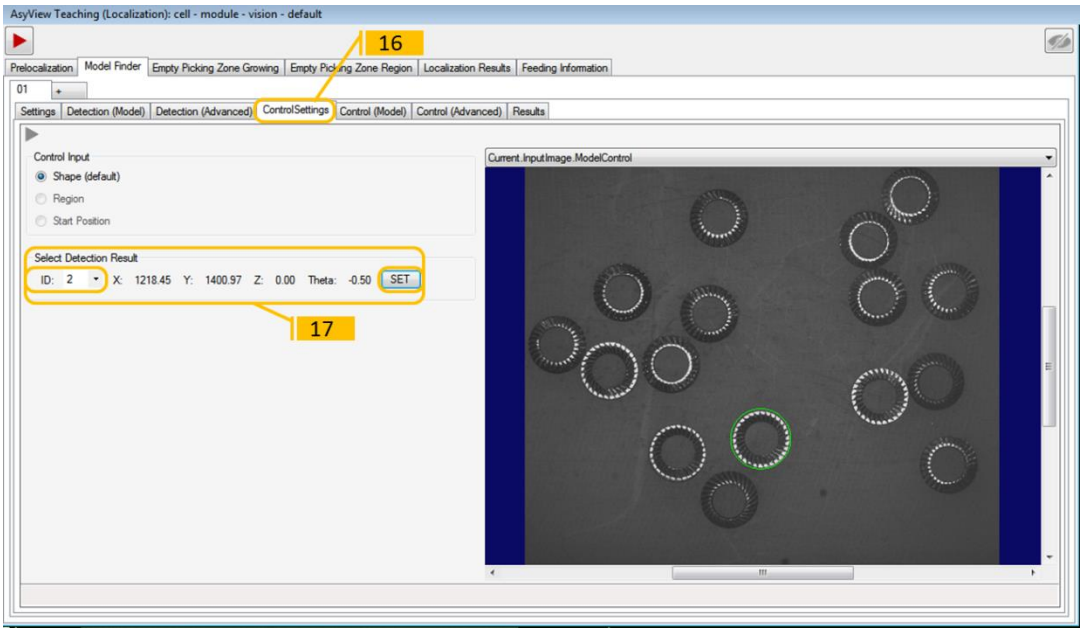


Figure 6-17 : "Model Finder" tool, 01\ControlSettings

Step 16	Click on the *ControlSettings* tab to display the screen below:
Step 17	Select the detection result you want to define as the reference : - Choose the part you want as model (ID) - Click on SET => the system will load the train image, copy the corresponding region, and center in the model so you then only need to press the Train button.

NOTE

With the option « Geometrical Feature Detection & Surface Control », it is obligatory to choose the component to be used as a reference before going to the next step.

6.3.6. Configuring the tool: « Control (Model) » tab

NOTE

This tab is not available when chosing the option "Geometrical Feature Detection"

6.3.6.1. "Geometrical Feature Detection & Control"

The method is similiar to the Detection Model (§ 6.3.3). The goal is to detect the detail that distinguishes a good from a bad part (for pitch & toss for example) and not the entire part. The "train region" should so be adapted to the detail to detect.

6.3.6.2. "Geometrical Feature Detection & Surface Control"

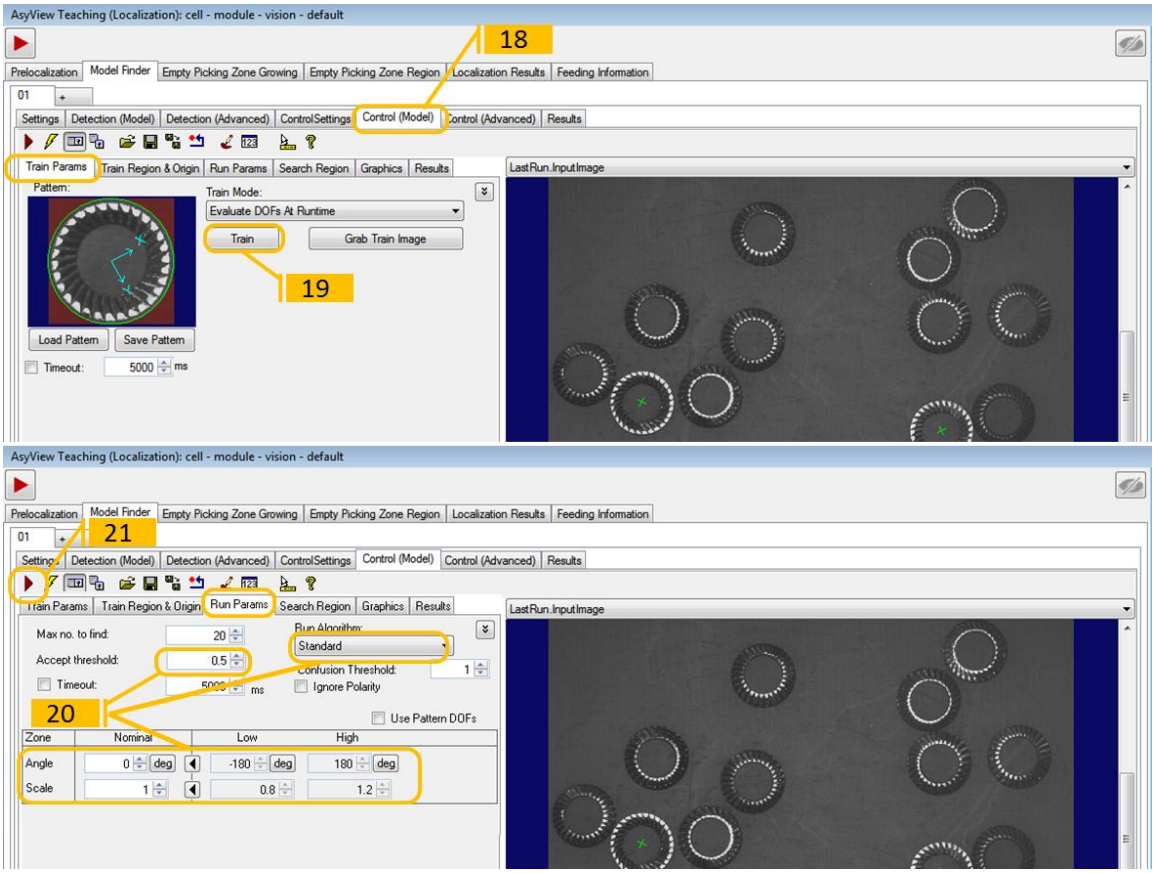


Figure 6-18 : "Model Finder" tool, 01\Control (Model) in the case of a "Surface Control"

IMPORTANTE NOTE

It is essential to have first selected the reference part and activated the « SET » button in the Control Settings before adjusting this model.

Step 18	Click on the *Control (Model)* tab to display the screen below:
Step 19	On the *Train Params* tab, click on *Train* to teach the model
Step 20	On the *Run Params* tab, adjust the parameters: - The acceptance threshold might be quite high here because tiny differences between the parts should be usually detected - Eventually the angle and scale - Eventually the type of algorithme
Step 21	Click on the  button to run the tool

6.3.7. Configuring the tool: « Control (Advanced) » tab

NOTE:
This tab is not available when chosing the option "Geometrical Feature Detection"

Step 22	This step is similar to the « Detection (Advanced) » tab (cf § 6.3.4) with the only remark that the option Rotation is only available if the pick position is the Control result and not the Detection result (cf § 6.3.2).

6.3.8. Configuring the tool: "RESULTS" tab

In the previous tab, we configured the model to enable the tool to distinguish a correct part from an incorrect part. In this tab, we are going to test this model on each of the candidates selected by the prelocalization tool.

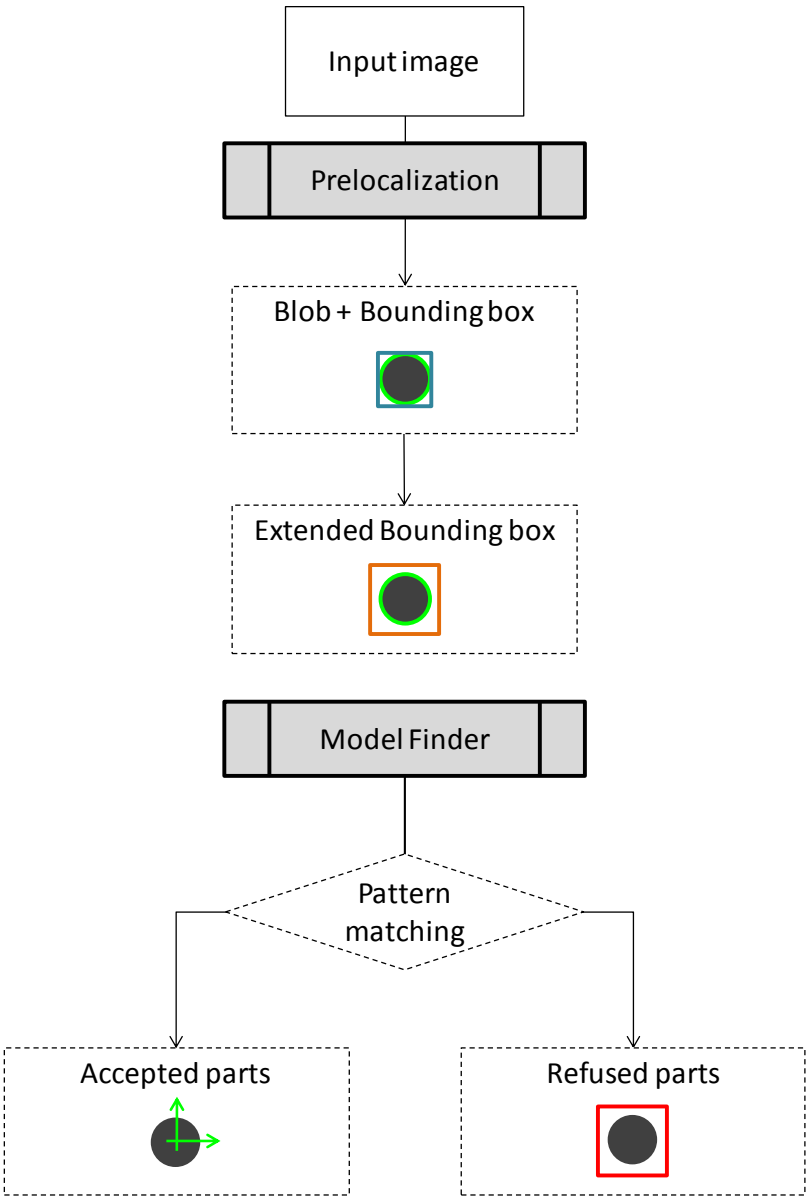


Figure 6-19 "Model Finder" tool, Schematic algorithm

The candidates found by the prelocalization tool are displayed in the "Inputs" tab of the tool in which we are currently working: "model finder". These inputs can also be consulted visually by selecting *"CurrentInput.Image"* from the image selector.

Step 23	Click on the *Results* tab to display the screen below:

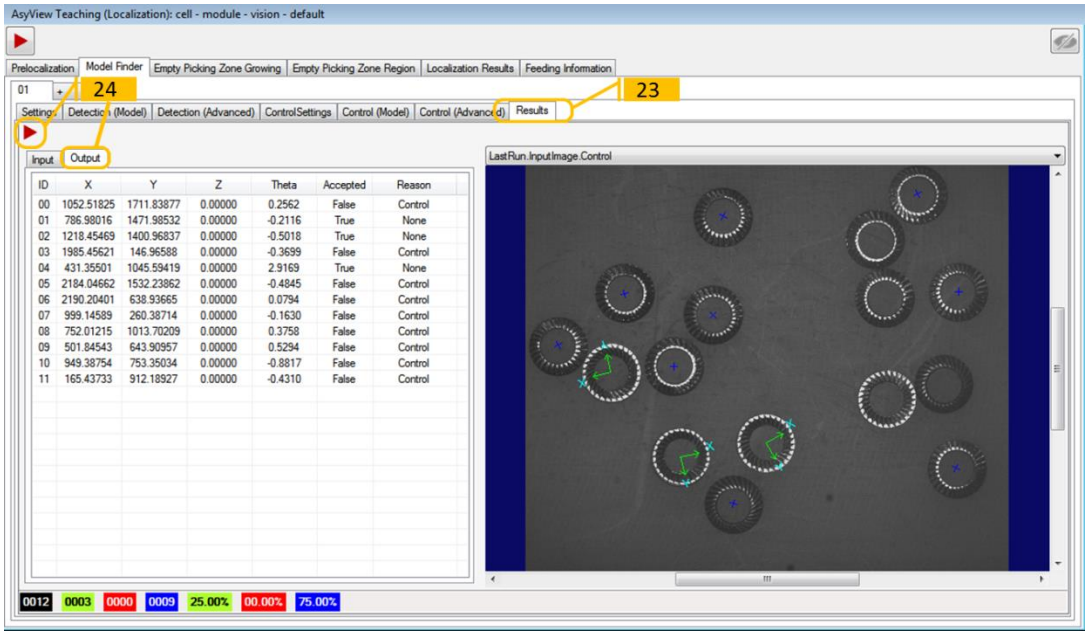


Figure 6-20: "Model Finder" tool, 01\Results\Results

Step 24	Click on the button to run the tool and obtain the results (this operation may take some time). Then click on the *Output* tab to get the list of the result.
Step 25	Select the image of interest from the image selector and check that the parts that you have defined as "correct" are accepted and that the others are rejected. Otherwise, modify the values in the different models. The color codes on the bottom of the window indicate the number of parts having successfully passed the different steps.

6.4. Exclusion zone definition

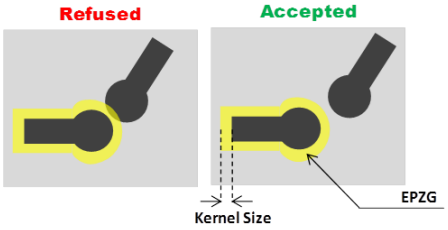
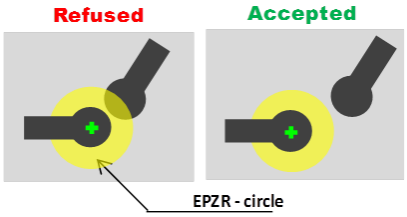
Name	Method	Characteristics
EPZG Empty Picking Zone Growing	Define a zone of a certain thickness all around the part 	- Well adapted for parts with complex geometrical shape but when just a thin border is sufficient as exclusion zone - Very interesting in case of a small gripper tip and comparatively a large part: to be sure the parts are not touching each other - Very fast for a delimitation of only a few pixels, but time consuming for larger border - Can be combined with the EPZR
EPZR Empty Picking Zone Region	Define a geometric zone centred on the part picking point 	- The outer shape of the excusion zone can be defined depending for example the geometry of the gripper tip. - Different option to fit optimally the excusion zone with the part geometry and variance. - Can be combined with the EPZG

Table 6-3: EPZG and EPZR general description

The *Empty Picking Zone* tools are used only on parts previously accepted by the model finder as explained below:

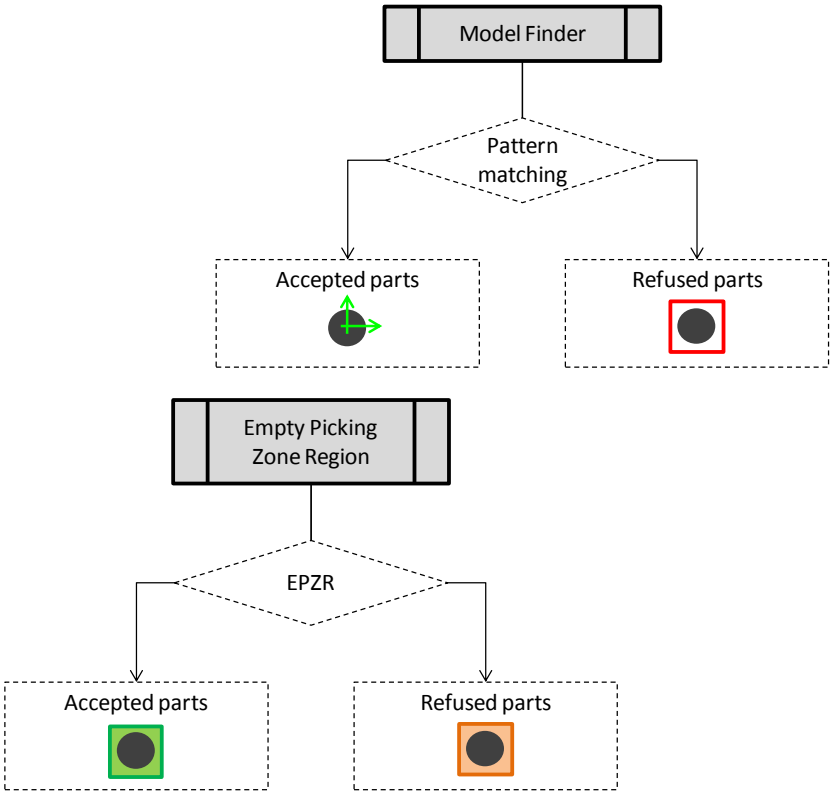


Figure 6-21: "Empty Picking Zone" tools, Schematic algorithm

6.4.1. Empty Picking Zone Growing (EPZG)

The *EPZG* tool enables to define a zone all around the part in which no other part must be found. The goal is to prevent two parts being picked at the same time. The exclusion zone corresponds then to the growing of the contour of the part and has the effect of adding a border all around the part.

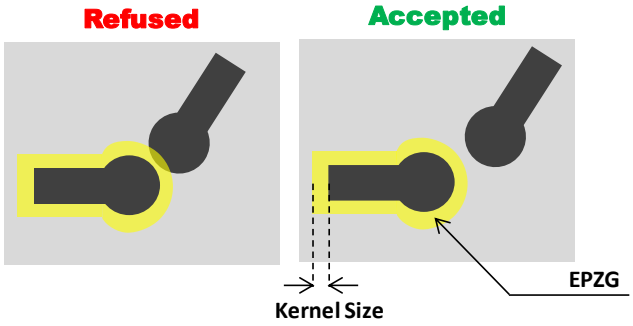


Figure 6-22: Empty Picking Zone Growing (EPZG)

NOTE :

This type of exculsion zone calculation is very time consuming. It is very well adapted to parts with a complex geometrical shape but for which only a thin border is sufficient.

Step 0	Click on the "Empty Picking Zone Growing"
Step 1	The EPZG tool is configured in a very similar way to the Prelocalization tool. Therefore, in order not to reproduce the same step twice, the 1st step consist of simply copy 1 to 1 the prelocalization tool by right clicking on the “01” tab (see Figure 6-24). Click on the button to run the tool
Step 2	Define the value of the exculsion zone (Kernel size) (always an odd value and the maximal value is 49 pixels). The Kernel size value must be selected in accordance with the size of the nozzle of your robot gripping device, in order not to take two parts at once during suction for example.

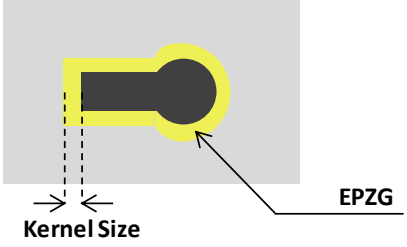


Figure 6-23: Defining the "Kernel size" parameter

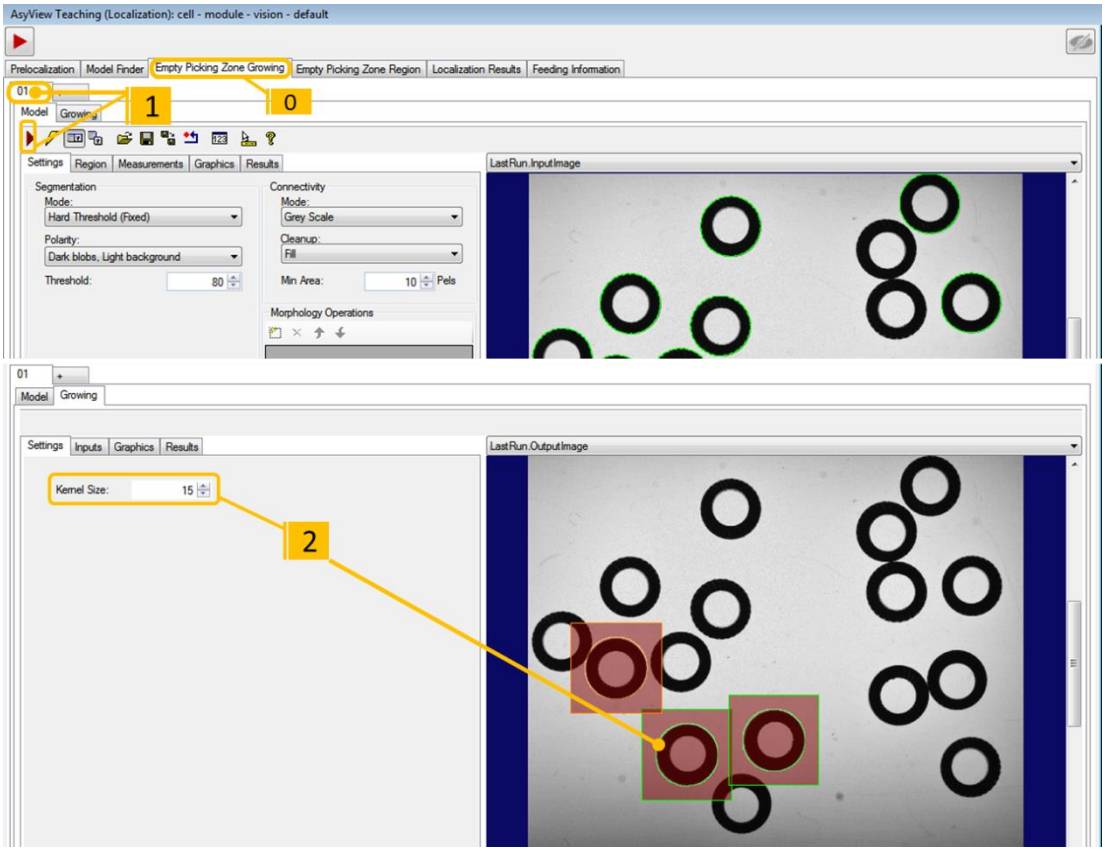


Figure 6-24 : « Empty Picking Zone Growing » tab

6.4.2. Empty Picking Zone Region (EPZR)

6.4.2.1. Overview

The *Empty Picking Zone Region (EPZR)* tool is used to define a geometrical zone centred on the part picking point in which no other part must be found. The goal is to avoid two parts being picked at the same time.

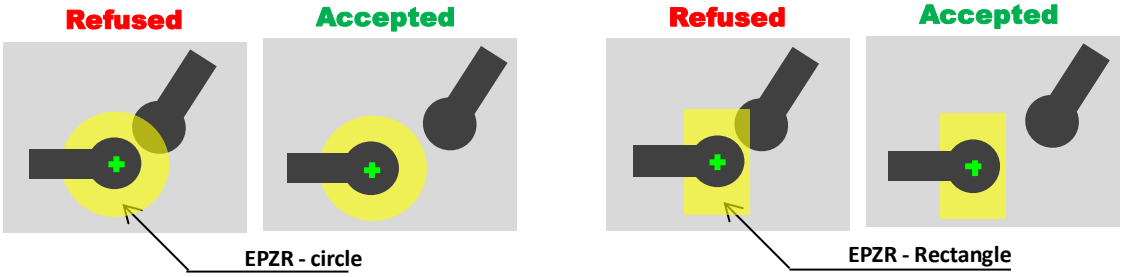


Figure 6-25: Empty Picking Zone Region (EPZR)

There are three types of EPZR optimized along the part shape as presented in Table 6-4.

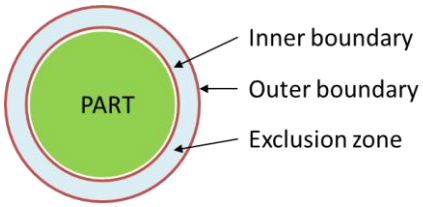
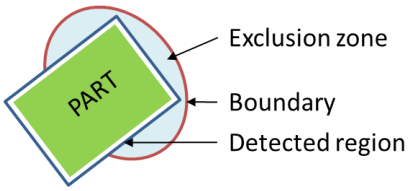
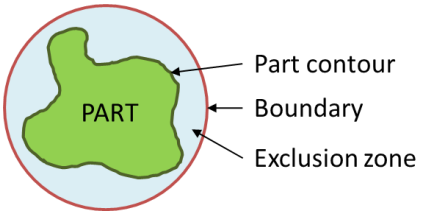
TYPE	Method	Characteristics
Annulus area	Search between 2 defined shape (inner and outer) 	• Very fast • Only available for circular or elliptical annulus
Detected region to boundary (default)	Search inside the zone between the region of the Model Detection and a defined outer shape. 	• For simple geometries • For parts with variable size Note: the Detection Region must be set as close as possible to the part contour.
Part contour to boundary	Search inside the zone between the contour of the part and a defined outer shape 	• For complex part shape • The slowest method

Table 6-4: EPZR Types description

6.4.2.2. Tool configuration

The configuration is very similar for all the three types of EPZR:

1. Select the type,
2. Define the outer boundary of the exclusion zone
3. Parameterize the exclusion model in order to detect any element that could be present in the exclusion zone.
4. The last tab consists of the results list of all candidates that passed the previous model detection.

All these steps are described here below.

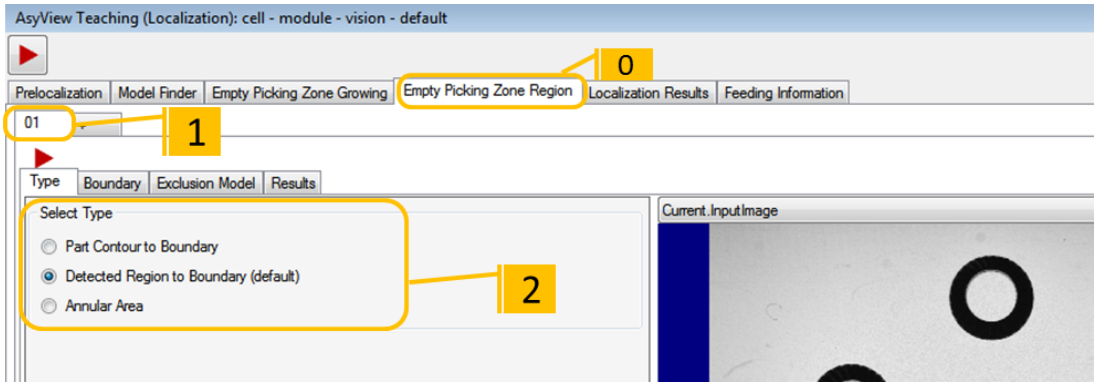


Figure 6-26: Empty Picking Zone Region tool, 01\Type

Step 0	Click on the "Empty Picking Zone Region"
Step 1	Add a model by clicking on the "+". The Exclusion Model tool is configured in a very similar way to the Prelocalization tool. Therefore, in order not to reproduce the same step twice, the 1st step consist of simply copy 1 to 1 the prelocalization tool by right clicking on the "01" tab. Click on the ▶ button to run the tool
Step 2	Select the Type of EPZR to use (see Table 6-4 for the description of the types)
Step 2B	If "Part Contour to Boundary" was selected, copy the Prelocalization parameters into the "Contour" model by right clicking on the "01" tab. The same set of parameters can usually be used. Then click on the ▶ button to run the tool.

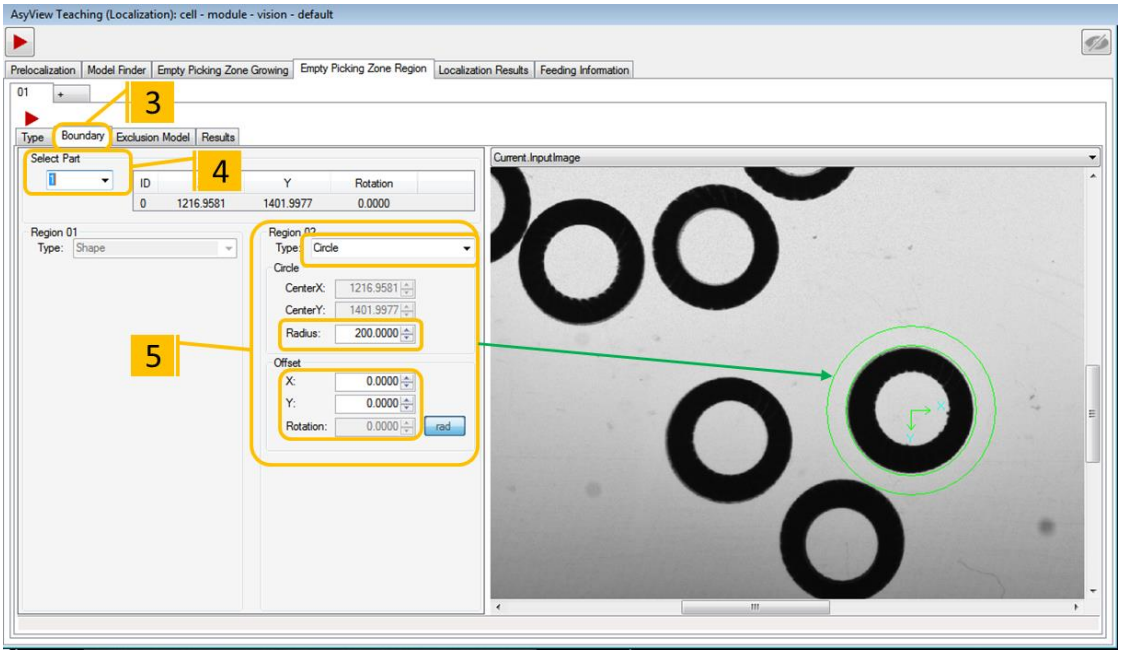


Figure 6-27: Empty Picking Zone Region tool, 01\Boundary

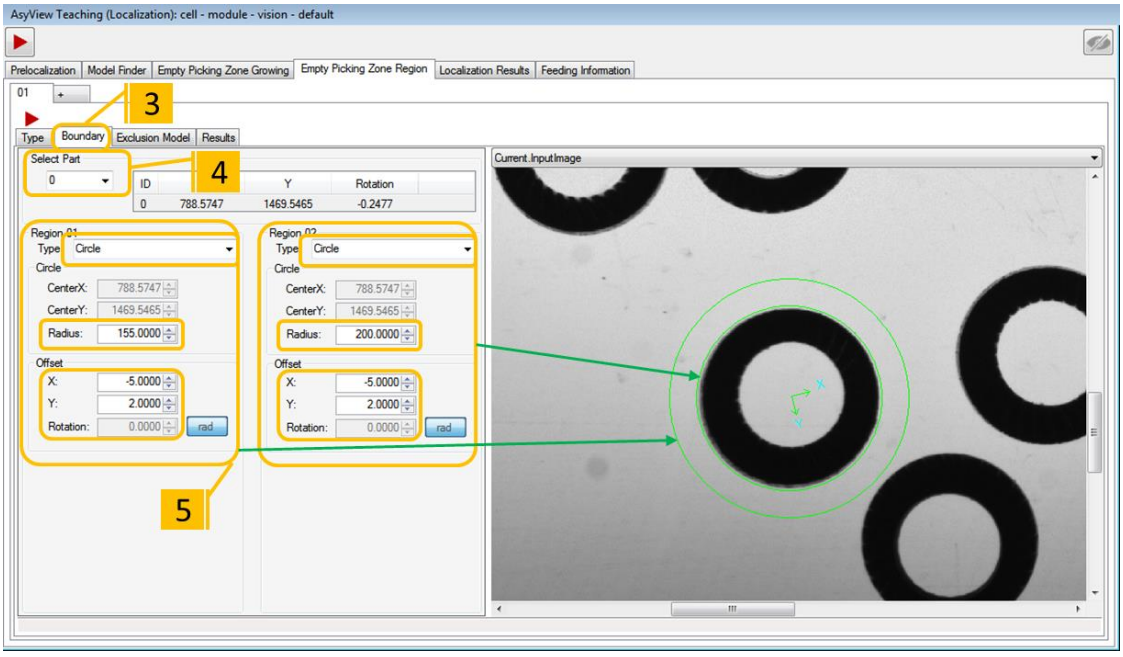


Figure 6-28: Empty Picking Zone Region tool, 01\Boundary with the Annular Area type

Step 3	Select the Boundary tab to define the shape, size and offset for the outer shape.
Step 4	Select the part ID that can be used as the reference to define the boundary.
Step 5	Select the geometry of the boundary as well as its size and offset. The shape is draw around the selected part on the picture.

NOTE:

If the type Annular Area is selected, both the inner and the outer shape are defined here (Figure 6-28).

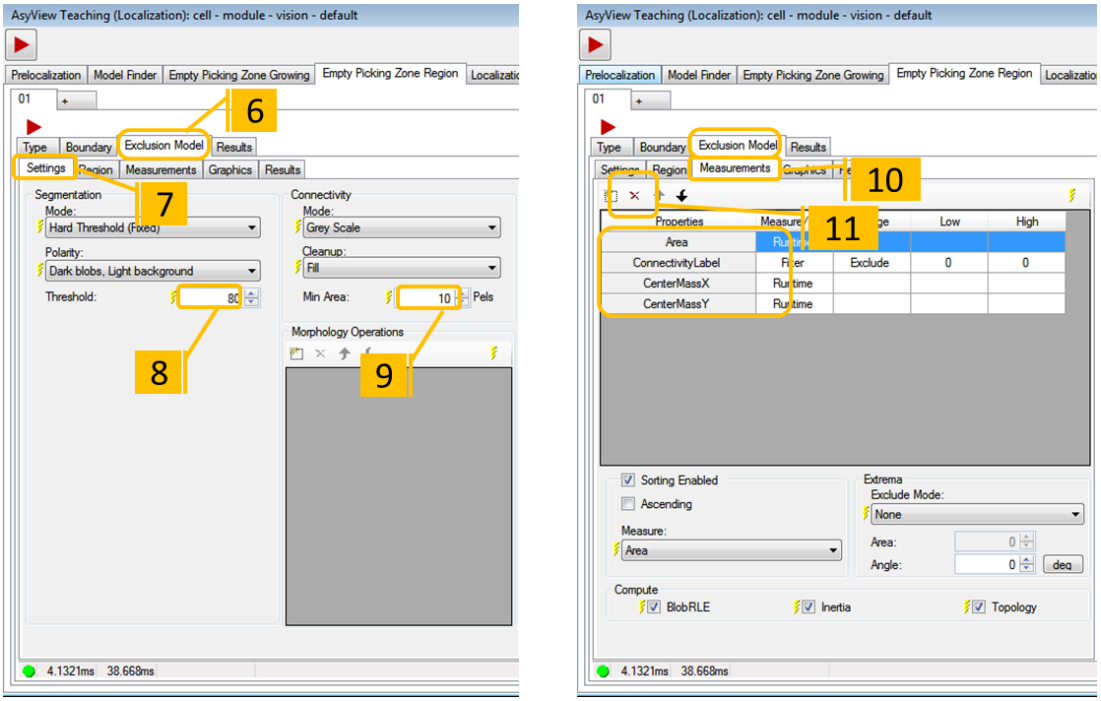


Figure 6-29: Empty Picking Zone Region tool, 01\Exclusion Model

Step 6	Select the “Exlusion Model” tab: the detection inside the exclusion zone is always based on the same tool than the Prelocalization. Simply adjust the minmal size of the element to detect and their threshold (exclusion criteria).
Step 7	Select the “Settings” tab.
Step 8	Select the threshold or copy the Prelocalization tool into the Exclusion Model by right clicking on the “01” tab.
Step 9	The Min. Area value specifies the minimal size of any detected feature to be detected. Normally it can be let at the default value (10) but can be adjusted in case for example of a non uniform background.
Step 10	Select the “Measurements” tab
Step 11	Delete all the Properties or set all Filter to “Runtime” (could be present when copying the exclusion model from the prelocalization)

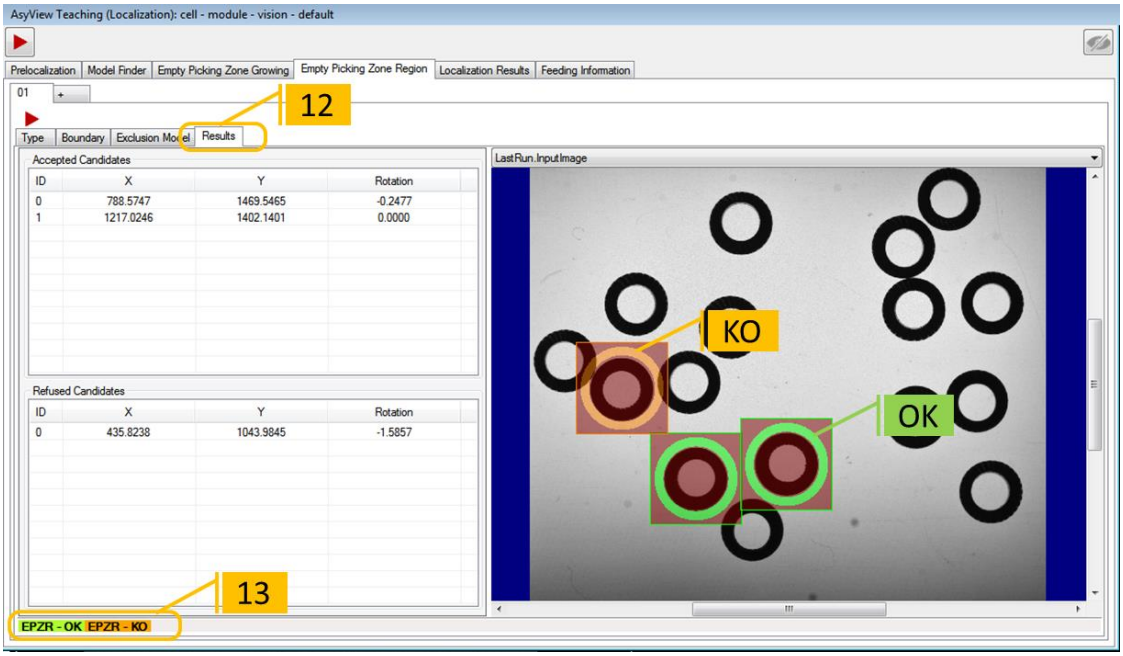


Figure 6-30: Empty Picking Zone Region tool, 01\Results

Step 12	Select the “Results” tab.
Step 13	Click on ▶ to execute the tool and get the results (this operation can take some time) Choose *LastRun.OutputImage* from the image selector. Verify that the accepted parts are: - In the right direction (accepted byModel Finder) - Sufficiently far from any other parts (because accepted by the EPZR) If not, modify the values in the previous steps.

6.5. Localization Results

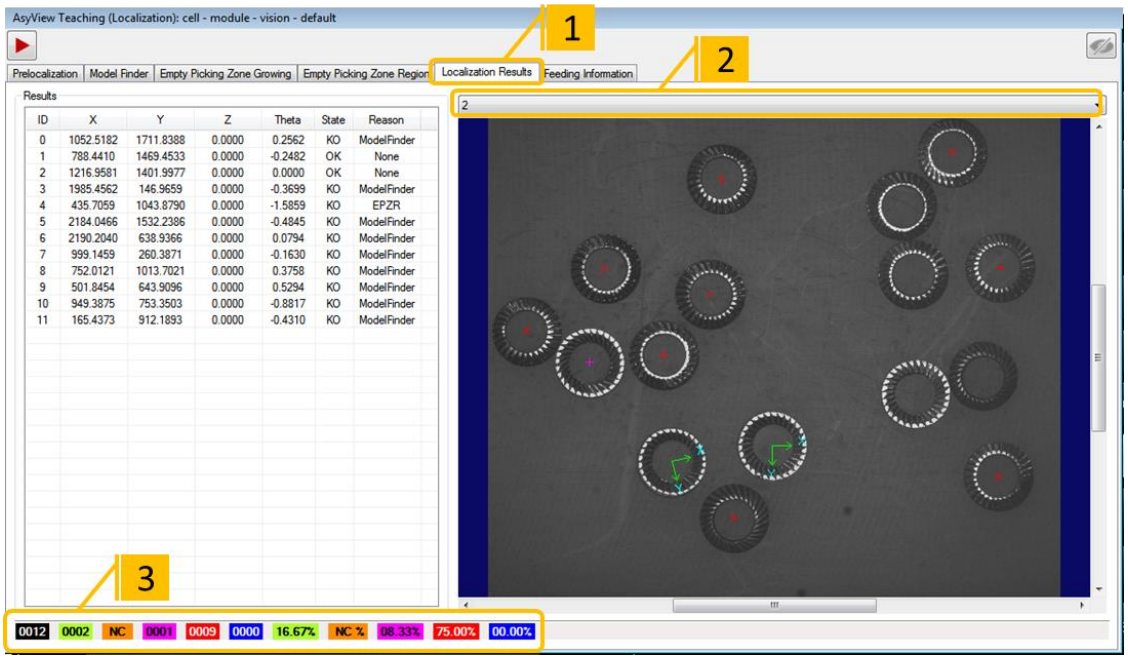


Figure 6-31: Localization Results tool

Step 1	Click on « *Localization Results* » to show the window as below :
Step 2	Click on the button « Run ». It is possible to select the image to check.
Step 3	Verify the results : - GREEN : accepted parts - ORANGE mark : EPZG rejected parts - VIOLET mark : EPZR rejected parts - RED mark : Detection Model rejected parts

6.6. Feeding information

The "*Feeding Information*" tool enables the exact number of parts on the surface of the Asycube to be obtained as well as their position, regardless of their pitch and toss orientation. This information is then used to calculate the suitable vibration sequence (re-feed components, "flip" to better dispatch the components, etc.). The configuration is identical to that of the "Model Finder" but is only performed on the image with backlighting.

Step 1	Click on the *Feeder information* tab
Step 2	Refer to section 6.3.3 “Configuring the tool: "Detection" tab”” on page 28 and follow steps 1 to 8

NOTES

- *The goal is to estimate the number of all parts that are on the plateform regardless their pitch & toss orientation. For this purpose, the backlight-illuminated image should be used to make the detection.*
- *It is also possible to apply several models to have a better estimation of the number of part if necessary, for example, when the geometry of parts is very different depending their orientation.*

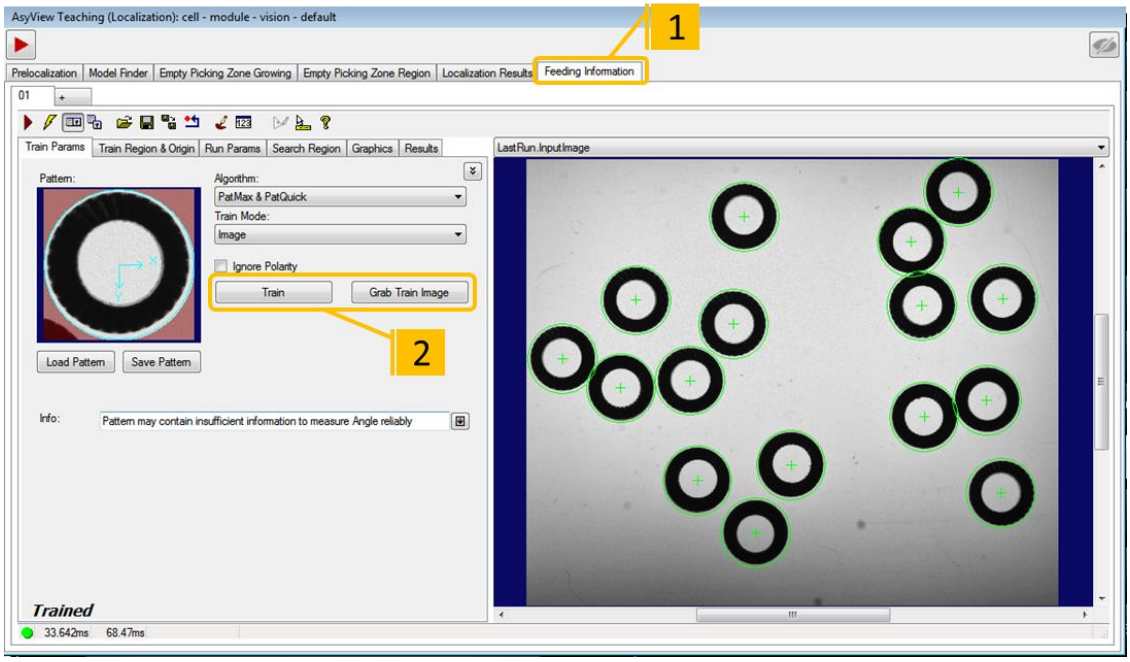


Figure 6-32: "Feeding Information" tool, 01\Train Params

Step 3	Click on the ▶ button to run the tool and obtain the results
Step 4	Select *"LastRun.OutputImage"* from the image selector And check that ALL of the parts are detected.

7. End of programming

7.1. Closing the Asyview teaching window

Step 6	Click on the «apply» or «abort» button

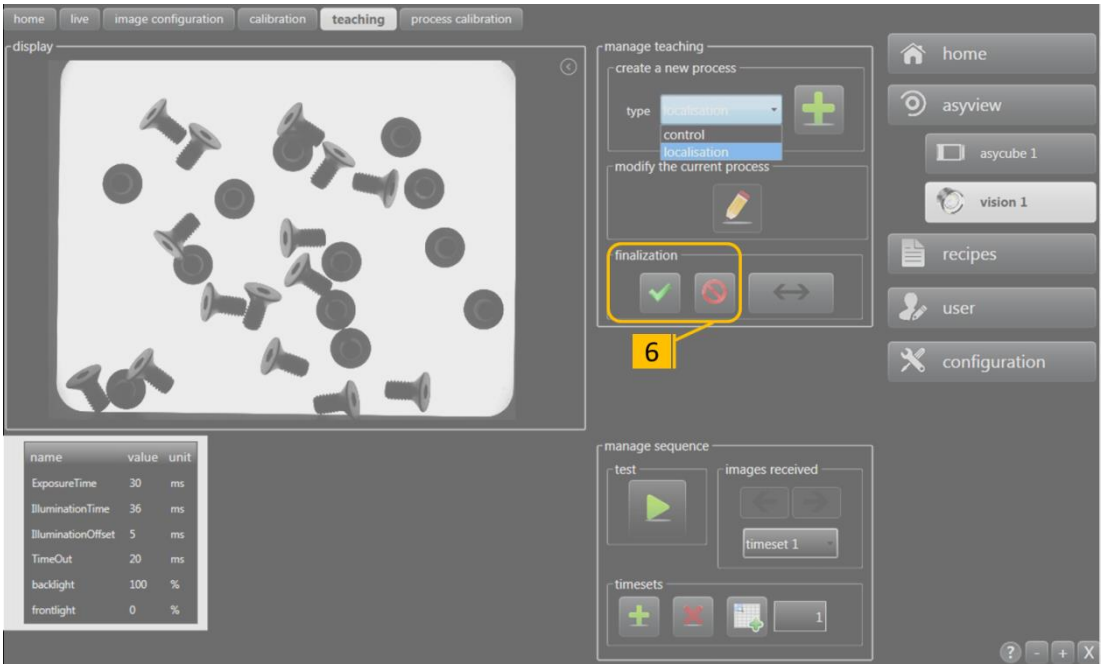


Figure 7-1: finalization of the vision model configuration

IMPORTANT NOTE:

The Asyview state will change to "Configuration - Idle" in the header screen (the LED is then yellow). Wait until the change is effective (LED to green again) before moving onto the next step.

IMPORTANT!

Your Vision model is **NOT** saved when you click on the «apply» button; you can test the modifications, but if the software is switched off, all modifications will be lost. For more information about permanently saving a recipe, refer to section 7.3.

7.2. Testing the vision model

Step 1	Click on the «vision» button
Step 2	Click on the «home» tab
Step 3	Check the dispay results box
Step 4	Choose the results to display
Step 5	Click on the “Acquire” button to start the image analysis process
Step 6	Check that the parts in the right direction are accepted and that the others are rejected.

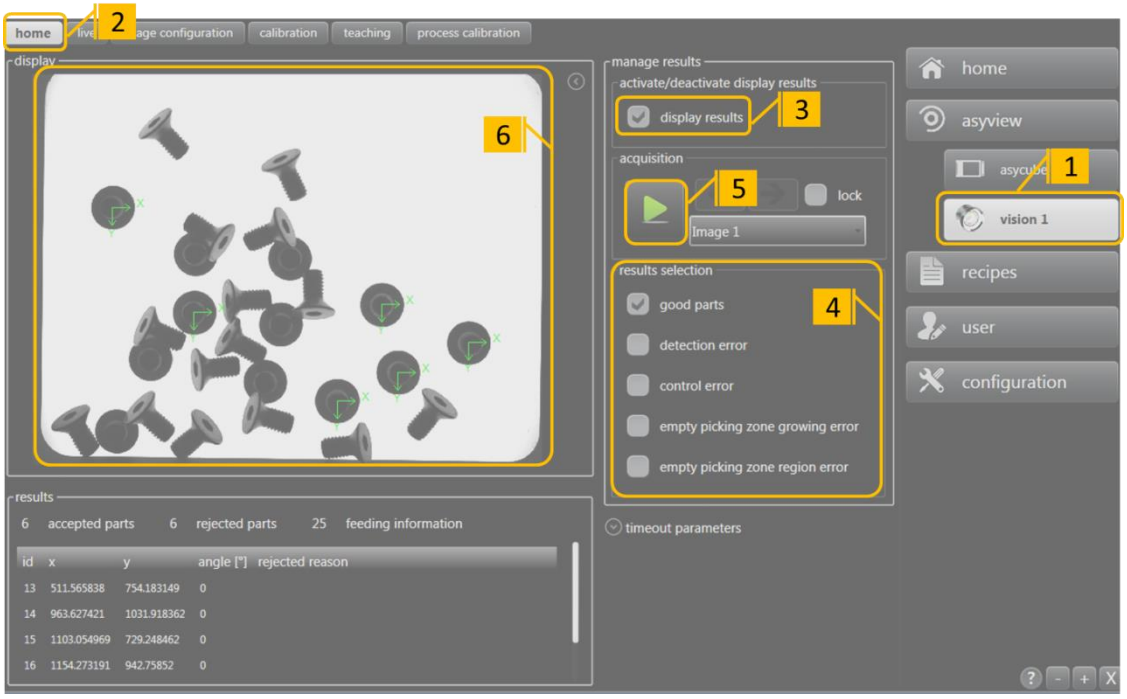


Figure 7-2: Vision-Home: Testing the Vision model

Step 7	Vibrate the Asycube using the shortcut area on the top of the HMI and repeat the steps 5 and 6. If you are satisfied with the obtained results, you can save your recipe by referring to section 7.3. Otherwise, modify your recipe by returning on the teaching tab.

7.3. Permanently saving the Vision model

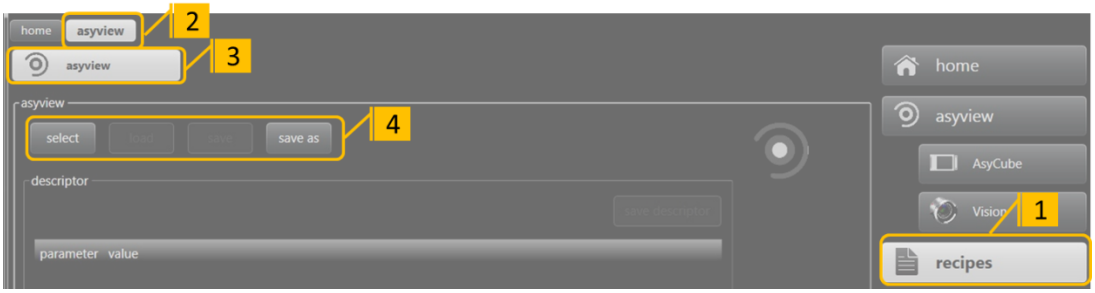


Figure 7-3: Permanently saving a recipe

Step 1	Click on the «recipes» button
Step 2	Click on the «asyview» tab
(Step 3)	It is possible to select the type of recipe to save. For example: only the feeder parameters or the whole recipe including all the cameras and feeders depending the configuration.
(Step 4a)	If the descriptor of your recipe is no longer displayed, click on the "select" button and choose your recipe, then click on "open"
Step 4	Click on the "save" button to save on the selected recipe or the “save as” button for a new recipe.

IMPORTANT NOTE:

The Asyview and HMI state will change to "loading" in the header screen (the LED becomes yellow). Wait until the state has changed to "Configuration – Idle" (green LED) before moving on to the next step (this operation may take some time).

NOTE:

Ensure that you give your recipe a detailed name in order to be able to find it easily.

IN CASE OF Asyfeed Pocket CELL or MODULE:

The complete recipe (.rec) should be saved in that case, including the ARL process and its parameters. Please refer to the Asyril_XFEED-XXX-XX_User_Guide for information about the structure and parameters of the .rec recipe.

8. Technical Support

8.1. For a better service …

Before contacting us, please note down the following information concerning your product:

- Serial number and product key for your equipment
- Software version(s) used
- Error message, alarm, or visual signals displayed by the interface.

8.2. Contact

You can find extensive information on our website: www.asyril.ch

You can also contact our Customer Service department:

support@asyril.ch

+41 26 653 7190

Revision table

Rev.	Date	Author	Comment
1.0	21.08.2012	DaM	Initial Version based on version 1.4 of the AFEED HMI doc
1.1	19.11.2012	BoB	Various modifications made since the initial version
2.0	21.04.2015	DaM	Updated version for the Asyview V3
2.1	22.06.2015	DaM	Modified structure and added references to XFEED/Process doc.

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