

Information about “Particle tester tool”

1 INTRODUCTION

Particle tester tool is a part of the *Particle system generator software*. The main objectives of the tool are: (i) description of the particle as a set of radius-vectors and (ii) determination of the particle parameters. Particle parameters are the same as Morphologi G3 software calculates.

2 PARTICLE TESTER TOOL INTERFACE

Main window of the particle tester tool with the description of its elements is shown in Figure 1. The interface was developed in python language with the use of PyQt 5.6 library. In the figure, the numbers indicate the following elements:

1. Field with set of sliders, which are represent the radius vectors. By moving the sliders along the axes, the irregular shape of the particle can be described. The closest to the center position of the particular slider indicates the value of radius vector equal to 0.0, while the most distant position from the center equal to 1.0. Blue dashed circle on the field represents the current CE Diameter of the particle. Inside the circle there are two perpendicular lines. A little bold dashed line represents the direction of the major axis and thin line represents the minor axis.
2. This block in represent the current scale of the particle shown in the block 1. Image dimension parameter is kept constant and equal to 360 pixels. Two other parameters – image scale (in $\mu\text{m}/\text{pix}$) and real particle dimension (in μm) – are functionally dependent on each other.
3. Block with calculated particle shape parameters. The parameters are updated immediately when any of the sliders from the left moves.
4. Block 4 has a spin box with number, which is equal to the current number of radius vectors. The amount of them can be easily changed or returned to the default number by clicking the button with blue arrow.

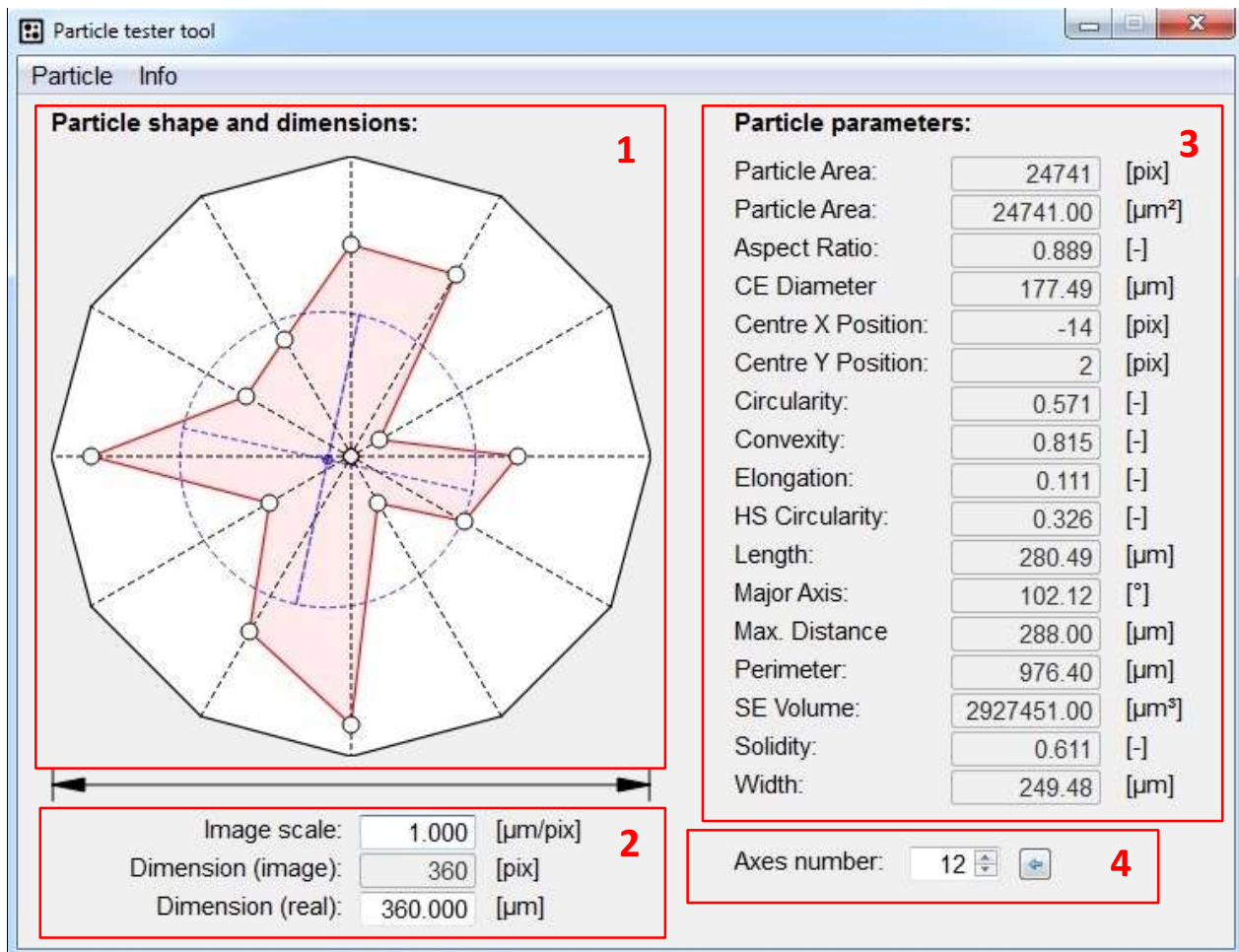






Figure 1. Main window of the particle tester tool.

Main menu of the tool and the features it provides is described in Table 1.

Table 1. Description of the particle tester tool menu.

| Menu item | Icon | Shortcut | Description |
|-----------------------|------|----------|---|
| Particle menu | | | |
| New | | Ctrl + N | Create new default particle with all radius vectors values equal to 0.5. |
| Randomize | | Ctrl + R | Create the fully random particle with random values of the radius vectors. |
| Save data... | | Ctrl + S | Open the dialog window for saving the current values of radius vectors and calculated particle parameters. |
| Load data ... | | Ctrl + L | Open the dialog window for loading the saved values of radius vectors. |
| Picture → Show | | - | Show the .png picture of the current particle. |
| Picture → Save ... | | - | Save the .png picture of the current particle on the hard drive. |
| Real Image → Load ... | | - | Open an additional window “Real particle image loader” for loading the real image of the particle and adjust the image in different ways. |

| | | | |
|--------------------|---|----------|---|
| Real Image → Clear |  | - | Clear the field with sliders from the previously loaded particle image. |
| Settings ... |  | - | Open an additional window for choosing and saving the settings of the produced .png images of the particle. |
| Info menu | | | |
| Help |  | Ctrl + H | Open a .pdf file with help information about the tool. |
| About |  | Ctrl + A | Open window with some important information about the tool version and its developer. |

Choosing the “*Real Image* → *Load ...*” menu item opens an additional window “Real particle image loader” for loading the real image of the particle. The main task of this functionality is the ability to measure parameters of the real particle in image in a fast way. The described window with its elements is shown in Figure 2. In the figure, the numbers indicate the following elements:

1. Field with loaded real image of the particles. This field shows the position of the radius vectors as well as contains elements of the image positioning and scaling – rotation, movement and changing the scale. Rotation can be done with help of circle slider located around the image, positioning can be done by moving mouse with left button pressed, scaling can be done with rotation of the mouse wheel.
2. Picture movement and rotation block, which contains backup sliders for precise rotation, positioning and scaling of the particle image. Button with the blue arrow allows to return to the default values of the parameter.
3. Block with original image scale and calculated current scale after scaling the image.
4. Block of sliders for adjusting the image in different ways: color, brightness, contrast, sharpness and transparency. Button with the blue arrow allows to return to the default values of the parameter.
5. Block which has a spin box with number which is equal to the current number of radius vectors. The amount of them can be easily changed or returned to the default number by clicking the button with blue arrow.
6. Button “Load” is designed for loading the adjusted and positioned image of the particle to the particle tester tool. Button “Cancel” just closes the current window without any changes.

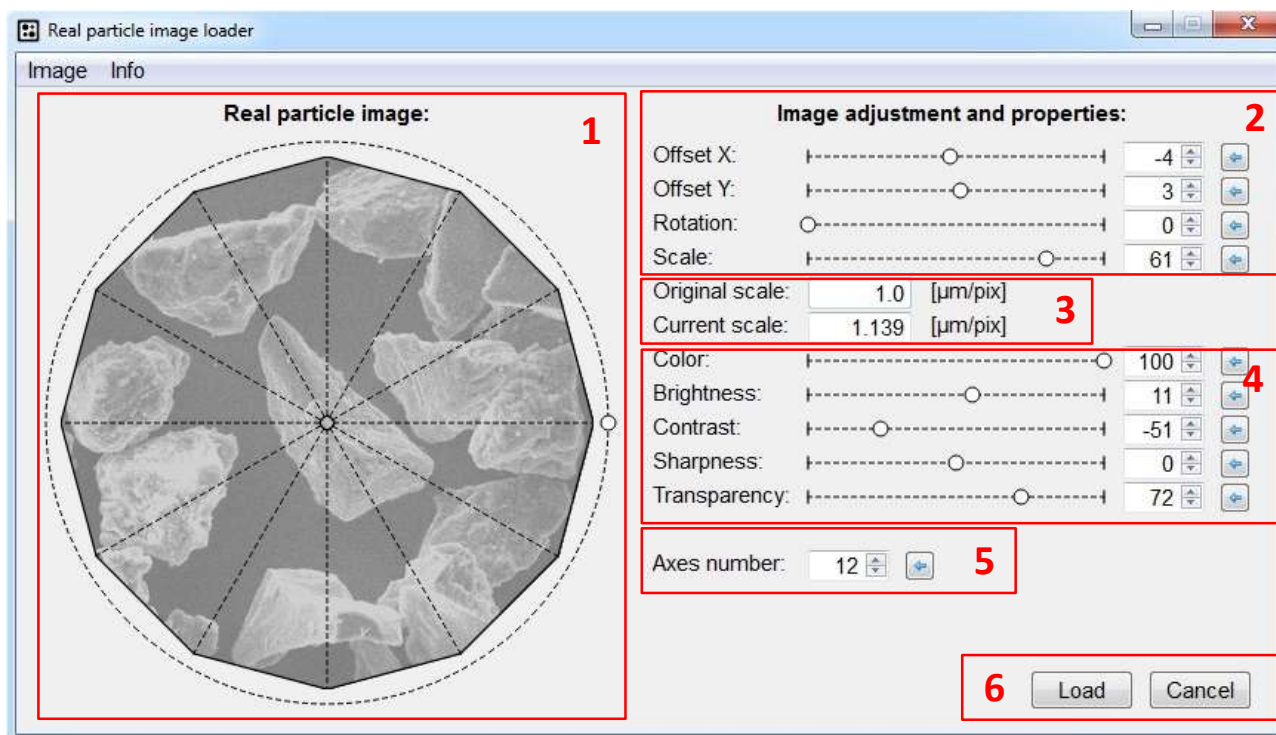








Figure 2. Window of the real particle image loader.

The real particle image loader has its own menu with the items described in Table 2.

Table 2. Description of the real particle image loader menu.

| <i>Menu item</i> | <i>Icon</i> | <i>Shortcut</i> | <i>Description</i> |
|-------------------|---|-----------------|---|
| Image menu | | | |
| Open ... |  | Ctrl + O | Open a new open file dialog to choose the image file for uploading. |
| Save ... |  | Ctrl + S | Save the adjusted image as it is shown on the block 1. |
| Reset all |  | Ctrl + R | Reset all the positioning and the adjustments of the image to its default values. |
| Clear |  | Ctrl + C | Remove the image from the block 1 and reset all the positioning and the adjustments of the image to its default values. |
| Info menu | | | |
| Help |  | Ctrl + H | Open a .pdf file with help information about the tool. |
| About |  | Ctrl + A | Open window with some important information about the tool version and its developer. |

Choosing the particle tester tool “*Settings ...*” menu item opens an additional window for adjusting the parameters of the particle picture. The described window with its elements is shown in Figure 3. In the figure, the numbers indicate the following elements:

1. Parameters of the picture like its dimension, particle color, background color and checkbox whether to show the scale on the picture or not.
2. Thumbnail of the current view of the particle image with background and scale.

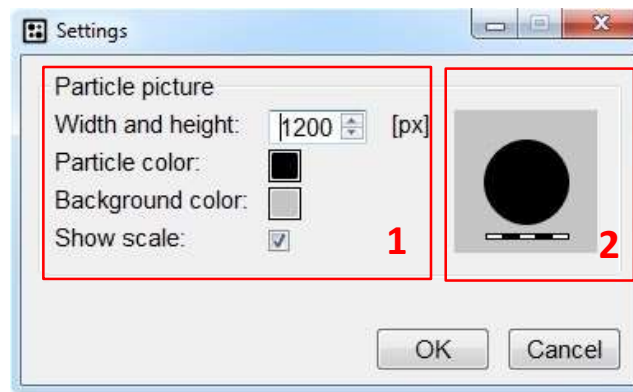


Figure 3. Settings window for adjust the parameters of the produced particle picture.