

Quick Start Guide

Smartzoom 5



Digital Microscope



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1 WELCOME



1.1 Introduction

Welcome to the Smartzoom 5 Quick Start Guide.

This Quick Start Guide introduces you to the most important features, functions, and information you need to know to start using Smartzoom 5 quickly, including:

- Suitability of Smartzoom 5 and its main components
- Setting up and starting the microscope
- Workflows

- Creating jobs for routine examinations
- Running jobs

It also contains a quick reference for the most common image optimizations and measurement tools.

For the complete documentation refer to the User Manual (for hardware, safety, and technical information) and the Online Help (tap the  icon in the user interface).

1.2 About Your Smartzoom 5 Microscope

Smartzoom 5 is a fully motorized, easy-to-use digital microscope which provides high-quality, reliable inspections.

All the functions of the microscope are controlled via the attached computer, which is also used to process and analyze the acquired images.

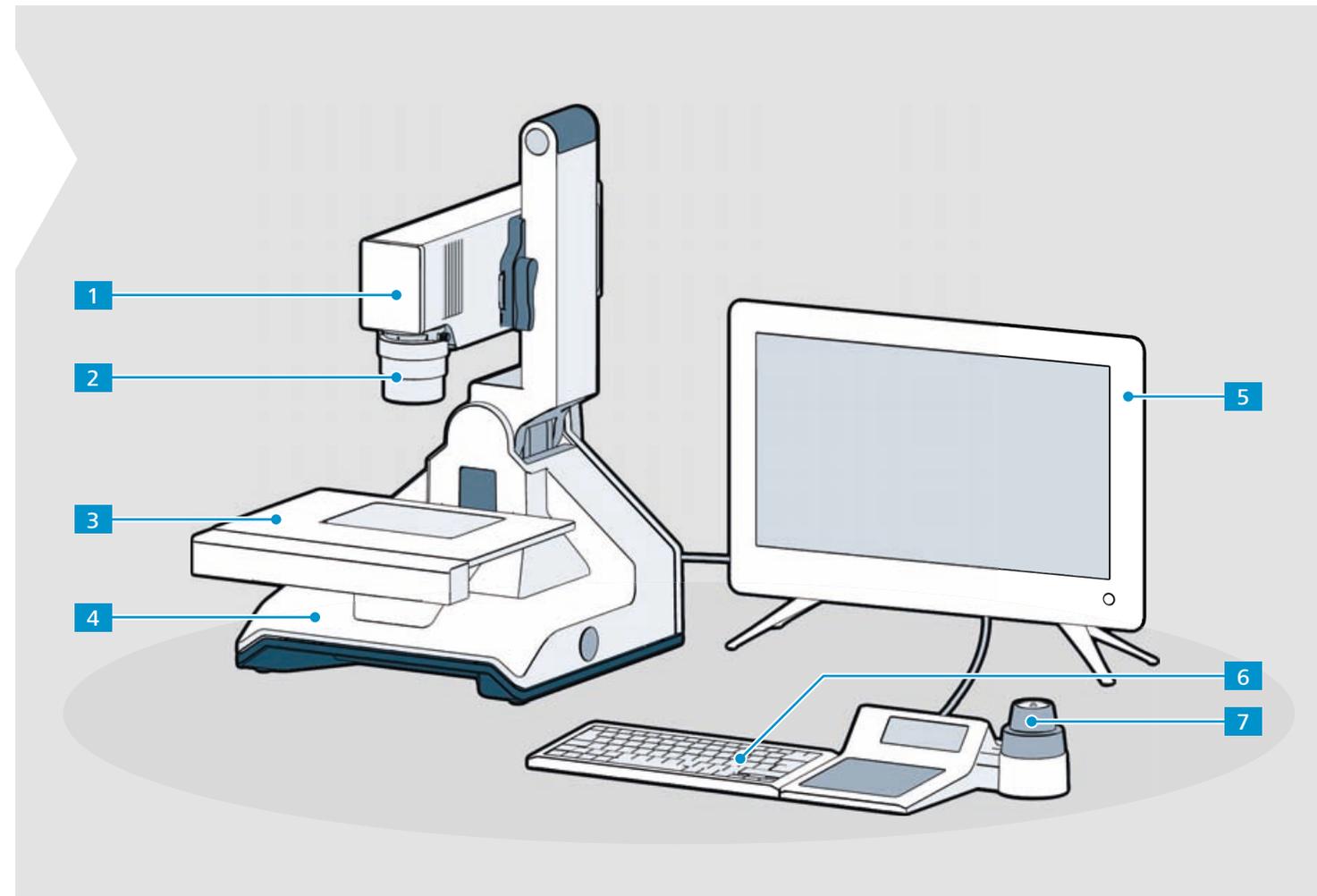
Smartzoom 5 is particularly suitable for performing quality assurance and quality control tasks. It can resolve features down to 1 μm and is suitable for samples measuring up to 13 x 10 x 12 cm (width x depth x height).

Smartzoom 5 is also designed as a portable device and can be assembled within minutes without needing any tools.

1.3 Main Components

- 1 Optical engine**
Contains the image acquisition sensor and lenses for zooming the image.
- 2 Objective**
Acquires and focuses the light from the sample. Three different objectives are available for various image acquisition tasks.
- 3 Scanning stage**
Base upon which the sample to be inspected is placed.
- 4 Microscope stand**
The main component of Smartzoom 5: it provides the support for the optical engine and the scanning stage as well as controlling the communication between the attached components and the computer.

- 5 Computer**
Touch-sensitive monitor that supports multi-touch gestures and which contains the Smartzoom 5 software.
- 6 Keyboard**
Connects to the computer wirelessly and can snap onto the controller magnetically.
- 7 Controller**
Controls the microscope and workflow using multi-touch gestures and touch-sensitive, context-specific icons. The control knobs control the zoom, focus, and microscope image position.

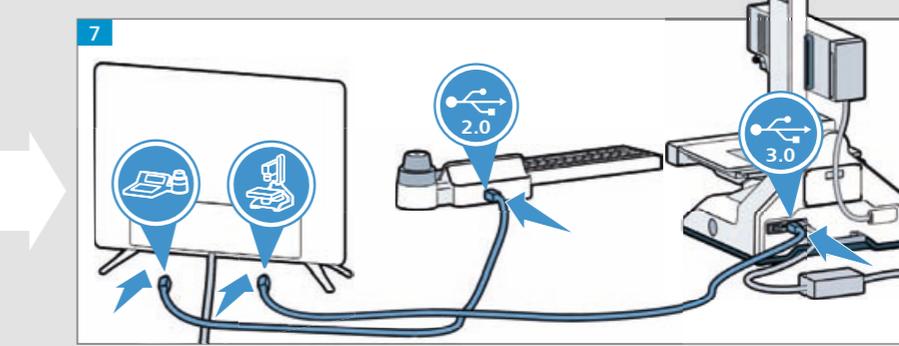
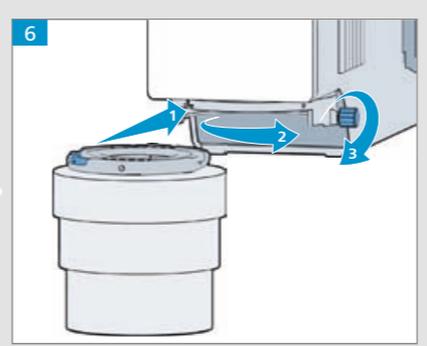
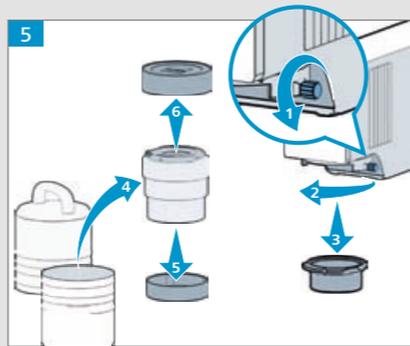
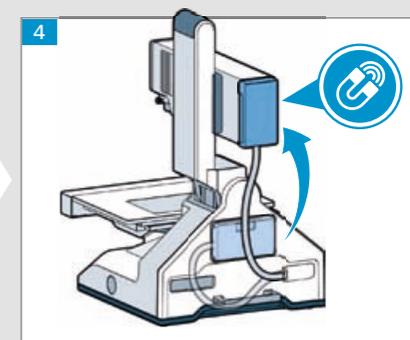
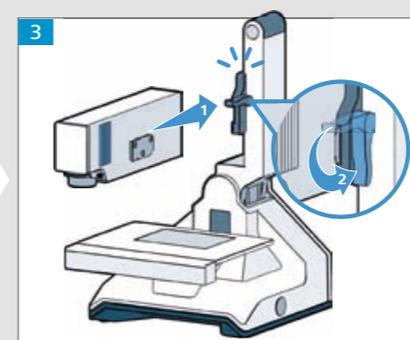
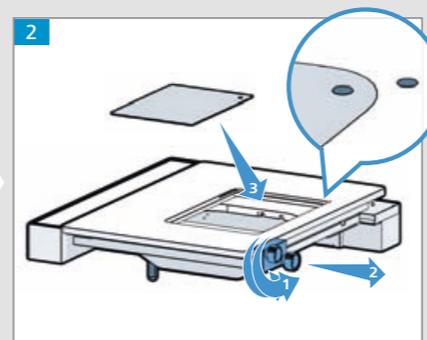
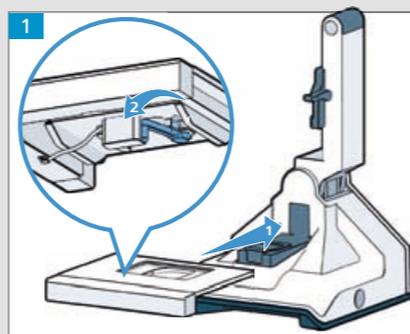


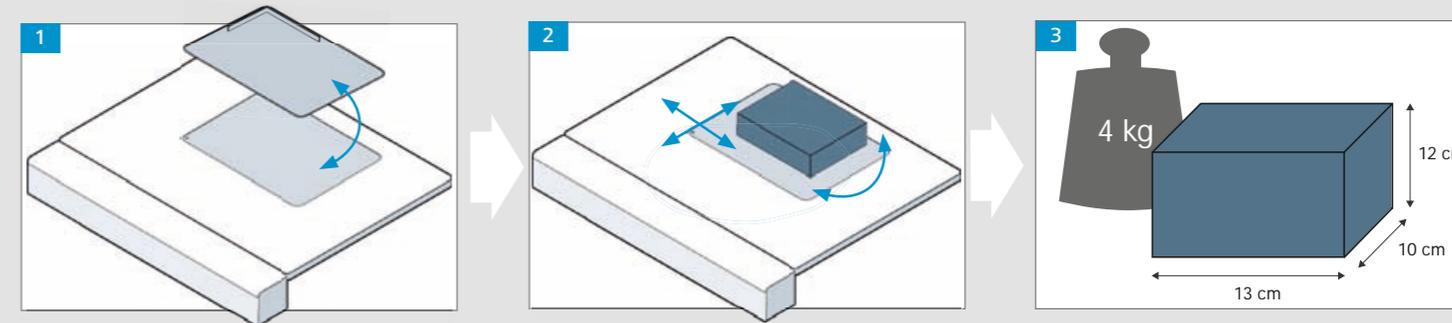
2 ASSEMBLING AND STARTING SMARTZOOM 5

2.1 Assembling Smartzoom 5

The following contains a summary of how to assemble Smartzoom 5. For a complete guide, see the Instruction Manual.

- 1 Slide the scanning stage onto the microscope stand and close the lever.
- 2 Remove the transport lock from the scanning stage and place the insert plate in the recess.
- 3 Slide the optical engine (holding the grips) onto the stand and close the lever.
- 4 Attach the plug of the stand to the optical engine.
- 5 Loosen the screw of the objective carrier, remove the cover, and unpack the objective.
- 6 Screw the objective into the objective carrier and tighten the screw.
- 7 Connect the computer to the stand (USB 3.0) and the computer to the controller (USB 2.0).





2.2 Starting Smartzoom 5

Note: Ensure that no object, including your hands, is under the optical engine.

- 1 Turn the microscope stand, computer, and keyboard on.
 - The optical engine and the scanning stage move to their initial positions.
 - The Smartzoom 5 software starts automatically and the *Login* screen is displayed.

- 2 In the list of users, tap your name.

- 3 Enter your password and tap the icon to log in.

Note: When you start the Smartzoom 5 software for the first time, the system administrator account exists by default, as well as one operator account. Enter a password and hint for the system administrator account, and then create an administrator or operator account for each user of the system.

2.3 Preparing the Sample

Smartzoom 5 can be used to inspect various types of sample, from circuit boards to tissue samples, from solar panel sections to textiles.

Before using Smartzoom 5, prepare the sample you wish to inspect according to your standard sample preparation workflow.

- 1 Ensure that the correct side of the scanning stage insert is facing up (flat side or side with guide).
- 2 Place the sample on the scanning stage.
- 3 The sample should conform to the following criteria:
 - Maximum size (width x depth x height): 13 x 10 x 12 cm
 - Maximum weight: 4 kg

2.4 User Roles and Workflows

How you work with Smartzoom 5 depends on your user role in the system:

- **Administrator**

Administrators are experienced microscopy users. Administrators can create jobs to ensure product quality as well as perform free inspections.

- **Operator**

Operators are the main category of user. Operators run jobs that have been defined by an administrator.

Since the workflows for operators and administrators are very different, they are described in separate sections in this Quick Start Guide. The graphic indicates which sections are relevant for you.



3 CREATING A JOB AND FREE MICROSCOPY

(This chapter only applies to administrators)

3.1 Workflow

As an administrator you have three possible workflows:

- **Creating a job (routine examination)**
This “template” enables an operator to reliably and reproducibly analyze a sample.
- **Free examination**
This enables you to start inspecting a sample quickly and easily without needing to define an overview image or coordinate system
- **Running, editing, or deleting a job from the archive**

The workflows for a routine examination and a free examination are identical apart from where you join the workflow (see diagram).

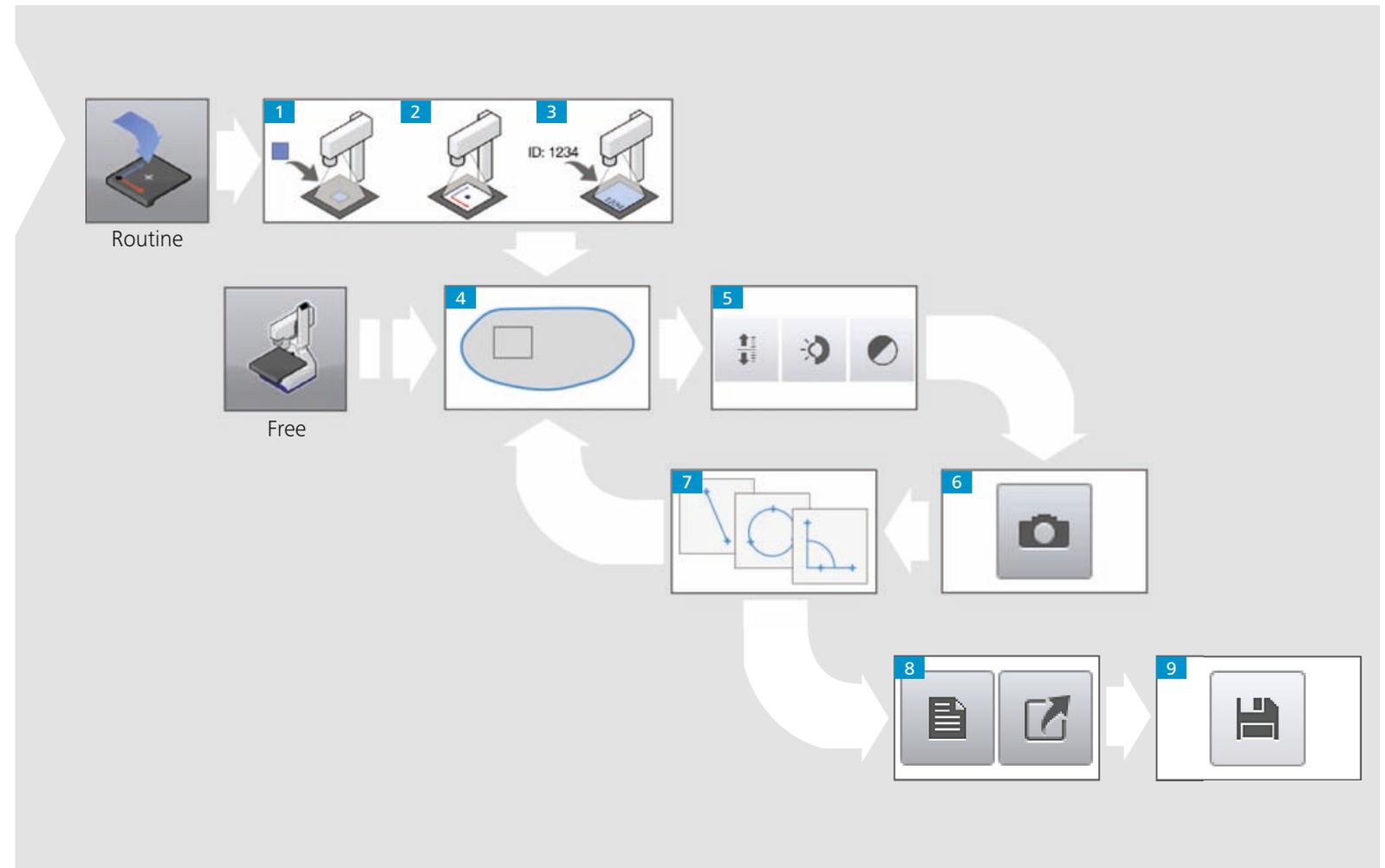
You can turn a free examination into a routine examination at any point by clicking the **Setup** workflow step.

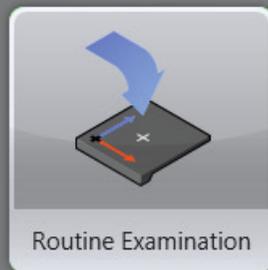
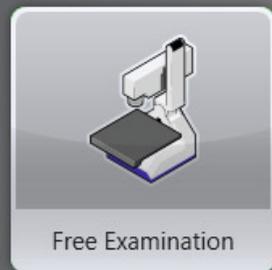
For more information on running, editing, or deleting a job from the archive, see the Online Help.

Administrators have the following typical workflow:

- 1 Acquire an overview image
- 2 Define the coordinate system
- 3 Name the sample and the job
- 4 Find the desired area on the sample
- 5 Optimize the microscope image
- 6 Acquire a microscope image
- 7 Perform measurements
If desired, repeat steps 4-7
- 8 Check and export the results
- 9 Save the job

The individual workflow steps are described in the following sections.

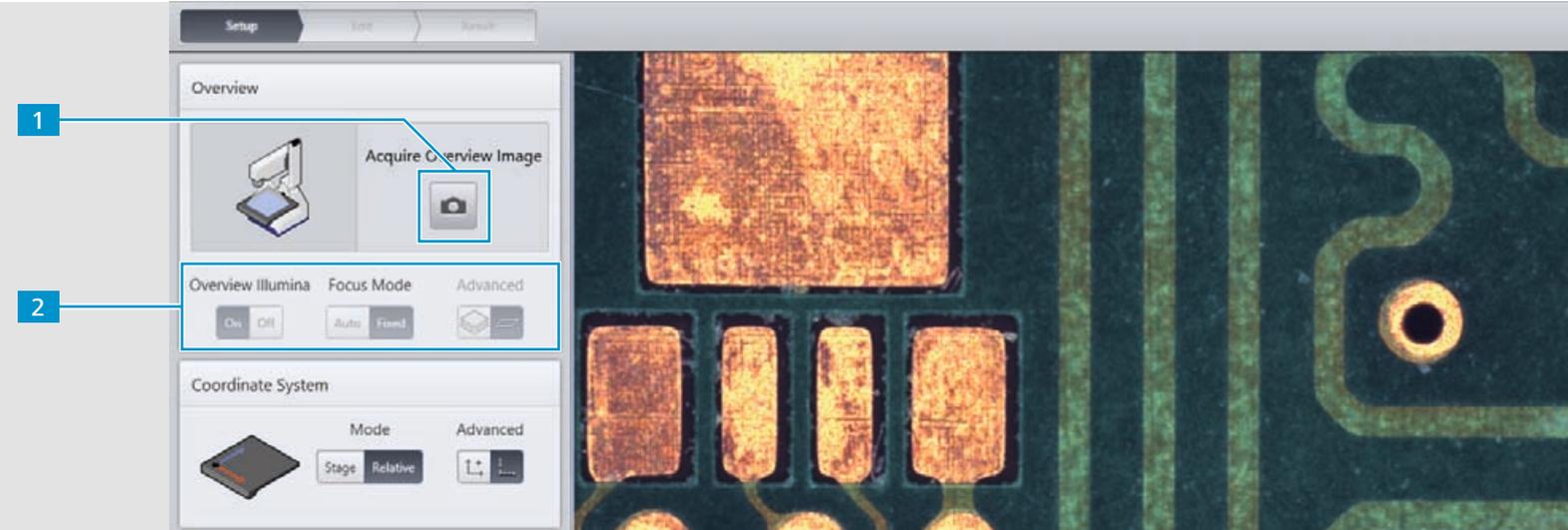




3.2 Workflow Selection

After logging in you can choose which type of workflow you wish to perform:

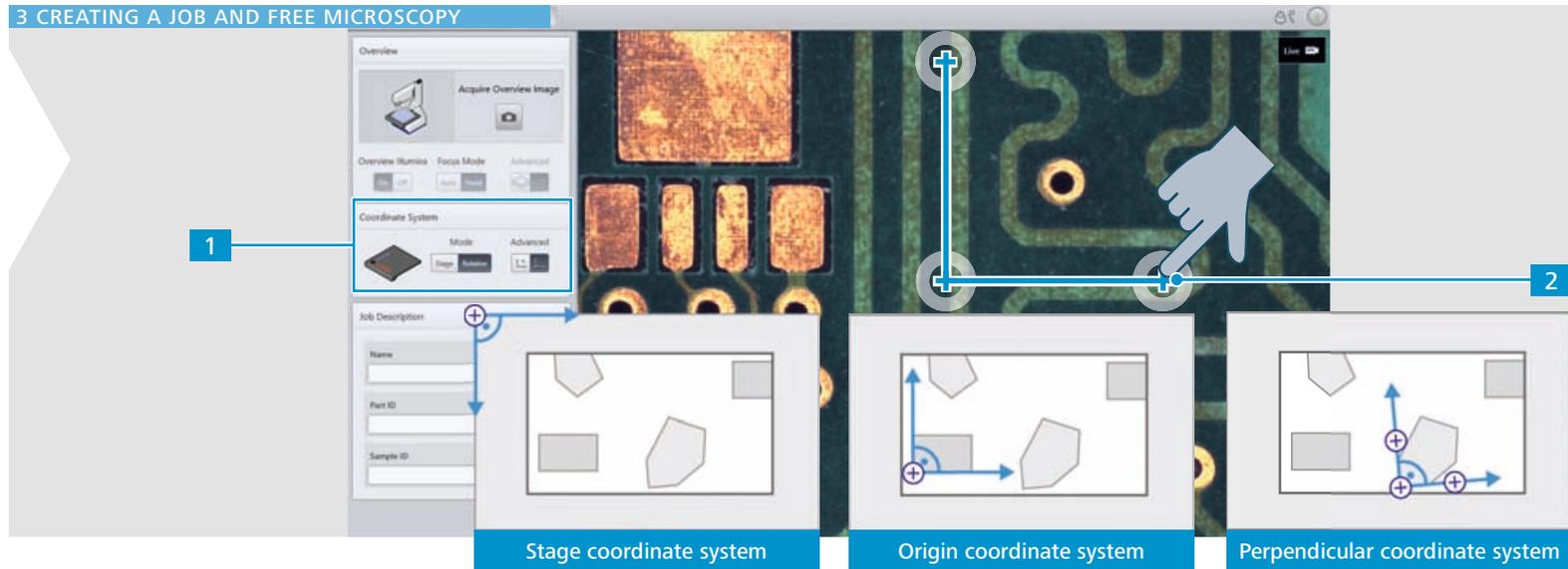
- Tap **Free Examination** to jump to a microscope image of the sample without creating an overview image or defining a coordinate system.
- Tap **Routine Examination** to create a job
- Tap **Archive** to run, edit, or delete an existing job from the archive as well as open or delete job results.
- **Maintenance** enables you to configure the software.



3.3 Acquiring an Overview Image

The first step when creating a job is to acquire an overview image. This shows the entire stage and enables you to orientate yourself within a sample when looking at a microscope image.

- 1 Tap the  icon.
- 2 If desired, adjust the **Overview Illumination** and **Focus Mode** and then tap the  icon to acquire a new overview image.



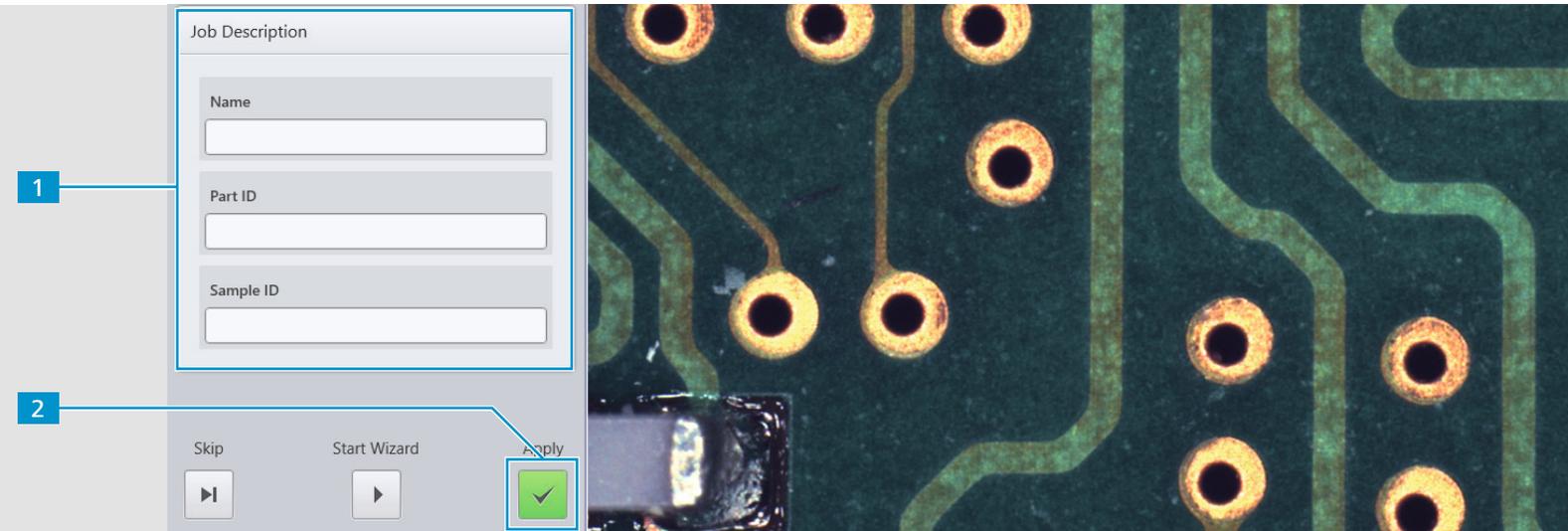
3.4 Defining the Coordinate System

Smartzoom 5 allows you to specify a reference point and coordinate system that is the basis for all measurements, e.g. distances and locations. You can choose between the following coordinate systems:

- **Stage** (default)
Reference point: back left corner of the scanning stage
Axes: parallel to scanning stage

- **Relative – Origin**
Reference point: user-defined
Axes: parallel to scanning stage
- **Relative – Perpendicular**
Reference point: user-defined
Axes: rotatable +/- 5°

- 1 Tap the type of coordinate system
- 2 For **Relative**, drag the handles to the desired locations

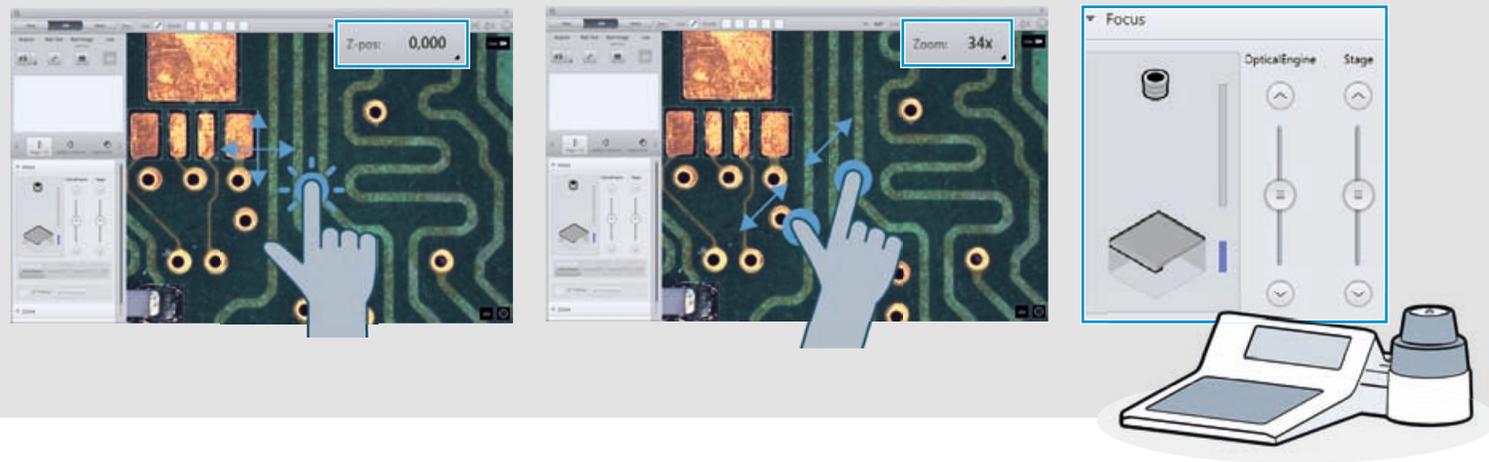


3.5 Naming the Sample and Job

Adding a sample ID and job description helps users identify the correct job to run. The user can filter the list of jobs according to any of the following criteria:

- A textual description of the job.
Example: *Circuit board ABC general dimensions*
- The ID of the part to be examined (e.g. SAP number or replacement part number)
Example: *000ABC*

- The unique serial number of the current sample.
Example: *000ABC123*
- 1 Fill out the fields according to your company or institution policies. Use values that will help users to quickly and uniquely identify the correct job to run.
 - 2 Tap **Apply** to complete the job setup.

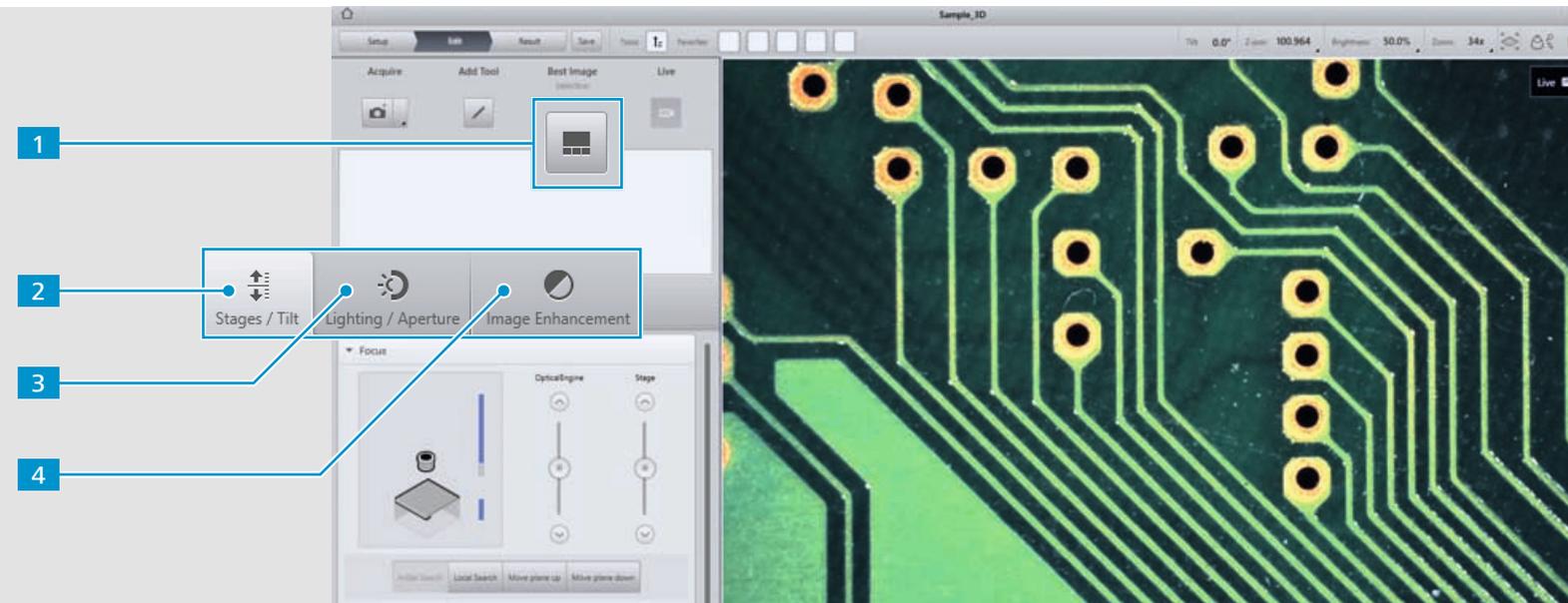


3.6 Finding Areas on the Sample

Navigate to the desired area of the sample:

- Pan and scroll the sample
- Zoom in and out
- Adjust the focus until the sample is sharp

You can also perform all these actions using the controller (see Reference section).



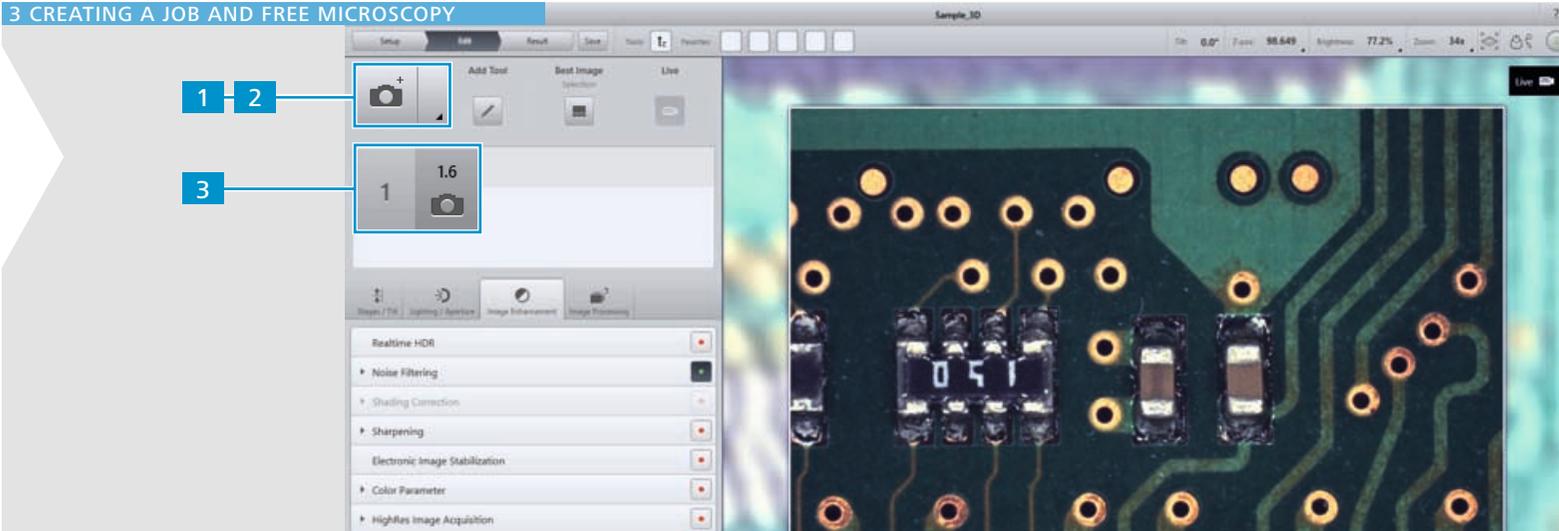
3.7 Optimizing Microscope Images

Smartzoom 5 contains various possibilities to enhance the appearance of a sample, from adjusting the brightness and aperture to reducing noise or altering the color temperature.

- 1 Try using one of the **Best Images**.
- 2 For advanced hardware options, adjust the settings in the **Stages / Tilt** tab.

- 3 If the sample is too light or dark, adjust the settings in the **Lighting / Aperture** tab.
- 4 If the sample appears pixely, incorrectly exposed, or unsharp, adjust the settings in the **Image Enhancements** tab.

For a complete list of image optimizations, see the Online Help.



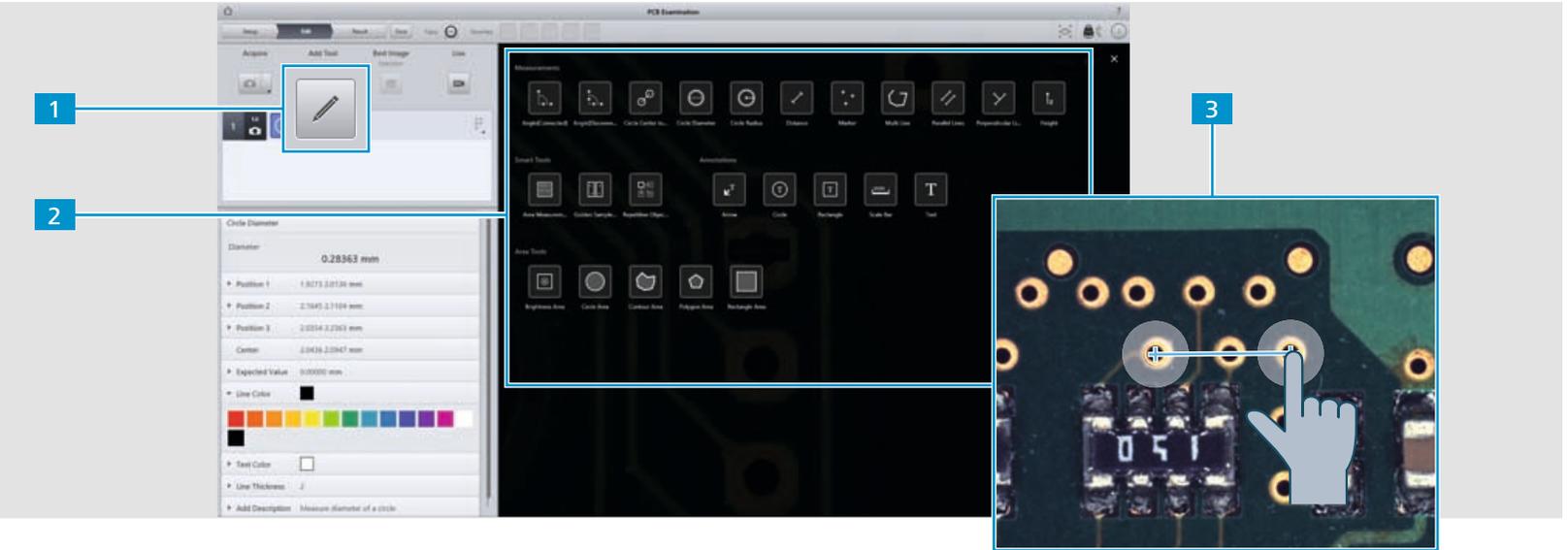
3.8 Acquiring Microscope Images

When you are satisfied with the appearance of the sample, acquire a microscope image.

- 1 Tap the  icon.
The microscope image is added to the Image management panel.
- 2 You can create additional microscope images by navigating the sample and tapping the  icon again.

- 3 Move to any existing microscope image by tapping its number.

Smartzoom 5 also supports advanced types of microscope image, for example 3D images and images with an extended depth of field (EDF). For more information, see the Online Help.



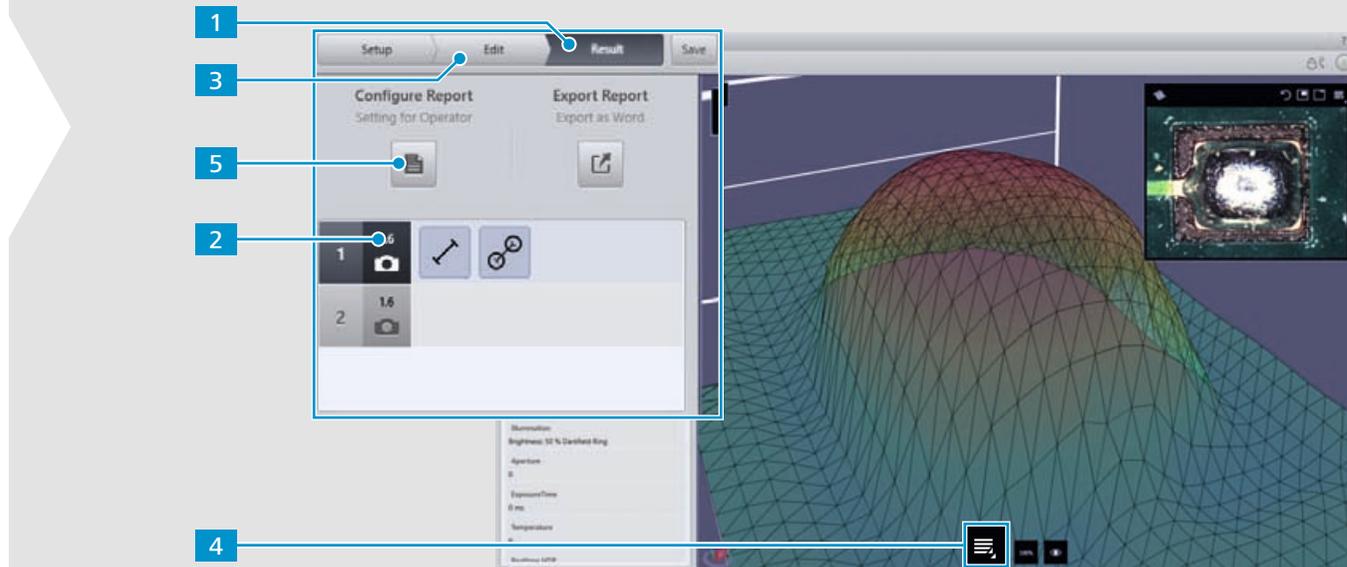
3.9 Performing Examination Tasks

Once you have acquired a microscope image, you can perform various examination tasks (measurements) to analyze the sample:

- Measure distances, angles, or perimeters
- Measure areas enclosed by shapes
- Add notes and other annotations
- Measure 3D distances, angles, and volumes

- 1 Tap the  icon.
- 2 Tap the desired tool.
- 3 Drag the handles to adjust the size and location of the tool to the object you wish to measure.

Smartzoom 5 also contains Smart Tools to automatically recognize and/or measure objects in the microscope image. For more information, see the Online Help.

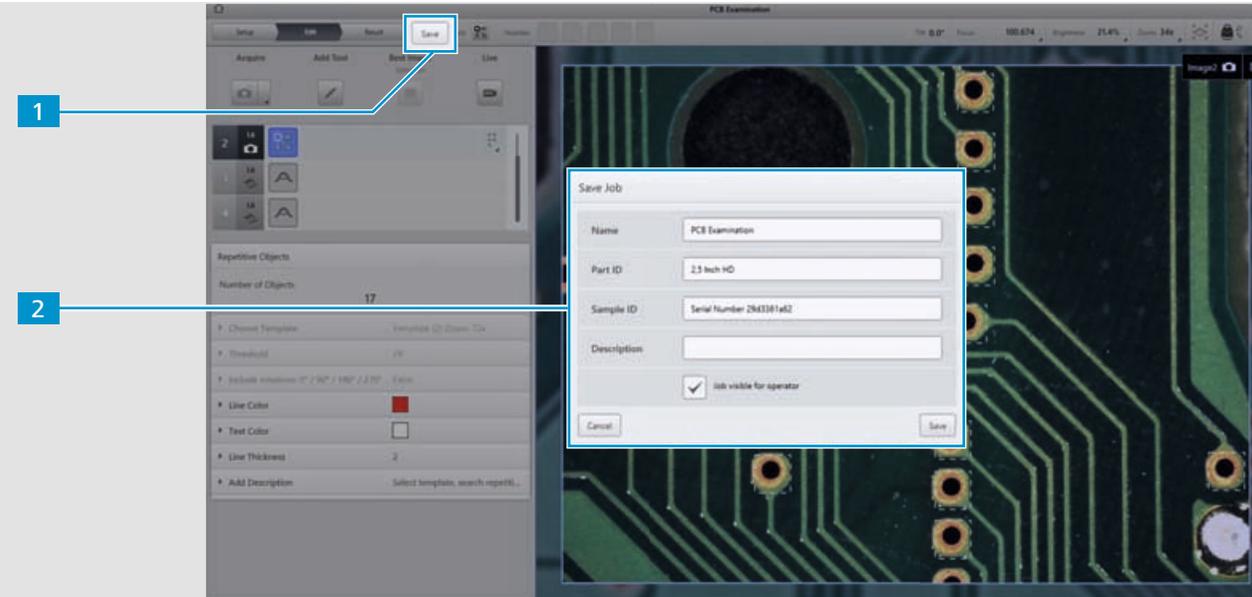


3.10 Checking and Exporting Job Results

Once you have acquired all desired microscope images and have performed all relevant examination tasks, you can review the job.

- 1 Tap the **Result** workflow step.
- 2 Tap a microscope image or examination task you wish to check.

- 3 If you wish to alter a measurement or acquire an alternative microscope image, switch back to the **Edit** workflow step.
- 4 Tap the  icon to export an individual microscope image or measurement.
- 5 Configure how the job should be reported.



3.11 Saving a Job

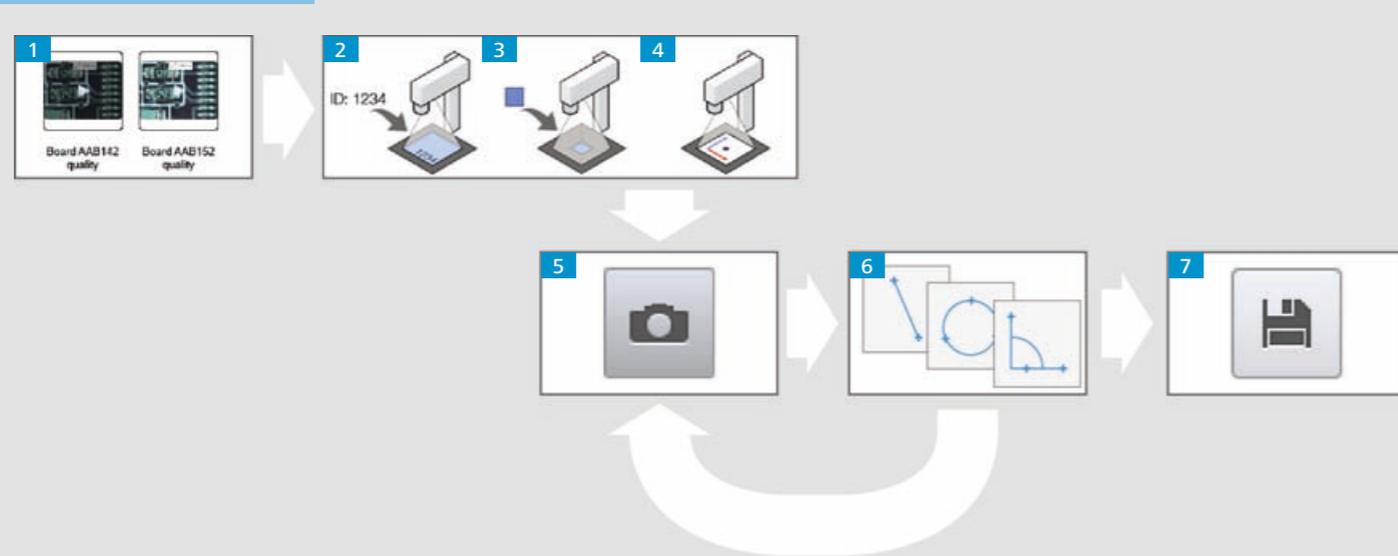
The final step in creating a job is saving it so that it can be run by an operator.

- 1 Tap the **Save** button.
- 2 Confirm the meta data entered in the **Setup** workflow step.

All saved jobs are automatically displayed for the operator after logging in. Administrators can run or modify jobs from the Archive.

4 RUNNING A JOB

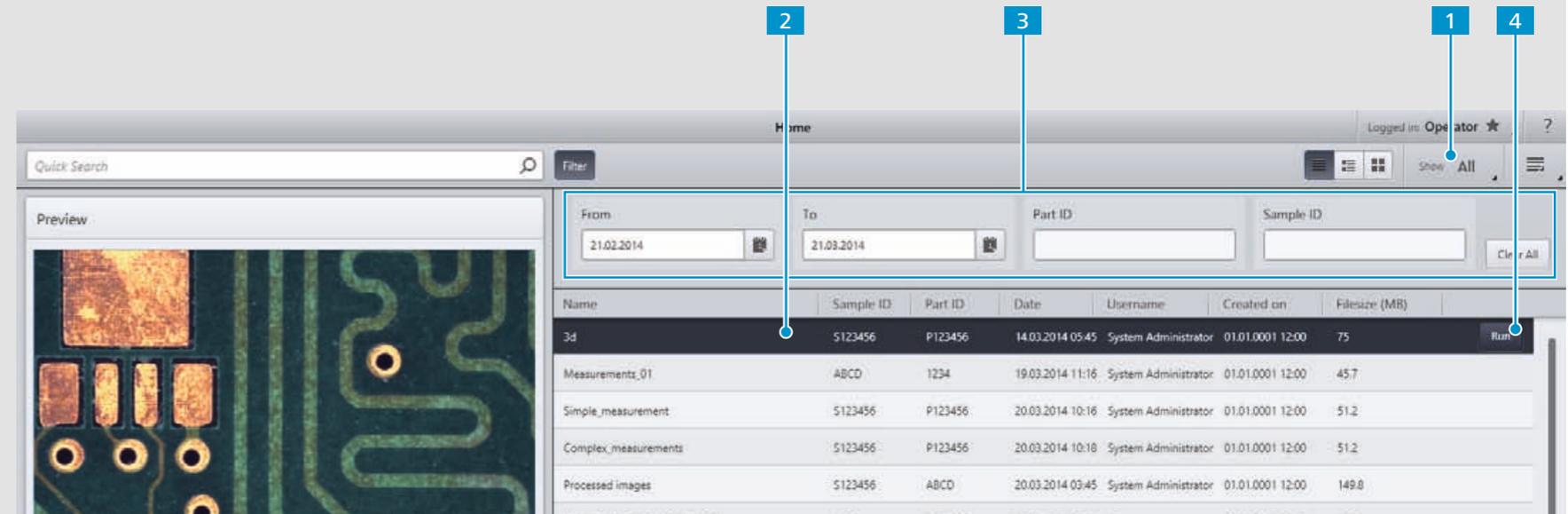
The workflow for running a job is identical for administrators and operators. However, for the sake of simplicity, this chapter is described from the operator's perspective.



4.1 Workflow

As an operator you have the following workflow:

- 1 Select the appropriate job
- 2 Enter the sample ID
- 3 Acquire an overview image
- 4 Place the coordinate system
- 5 Acquire a microscope image
- 6 Perform the specified measurements
You are automatically presented with the appropriate tool.
Repeat steps 5 and 6 as defined by the administrator.
- 7 Save the results

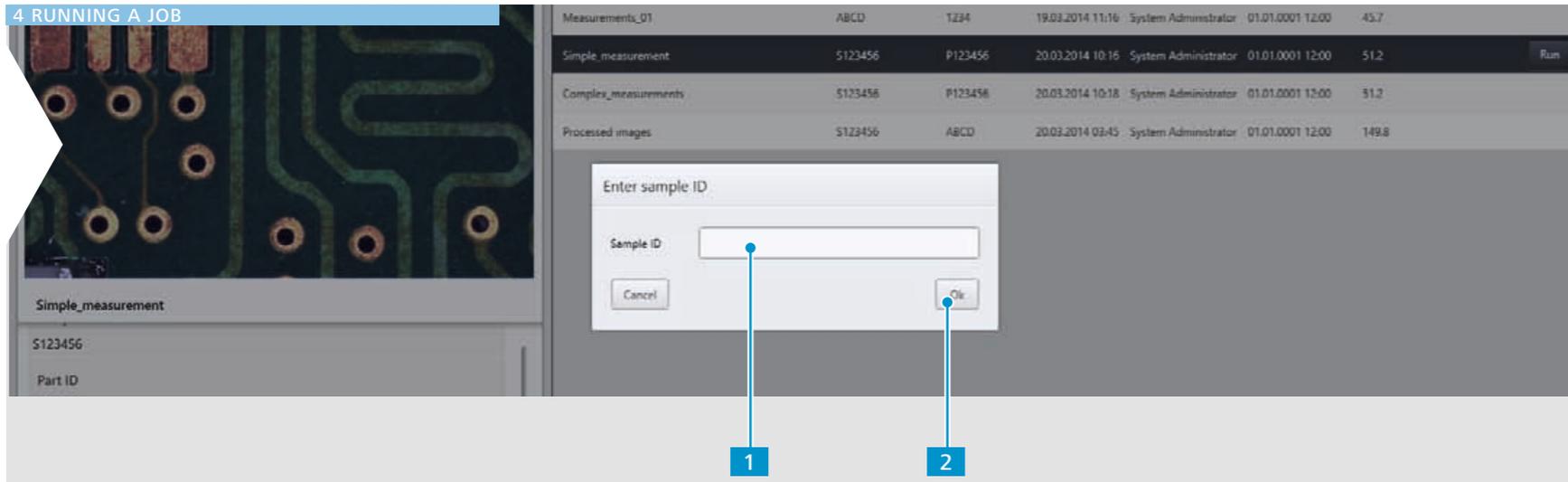


4.2 Selecting a Job

When you log in as an operator, you are immediately presented with a list of jobs.

- 1 Tap the **Show** menu and select **Templates**.
- 2 Tap the desired job in the list.

- 3 If you cannot see the job you wish to run in the list, you can reduce the number of jobs using the filters.
- 4 Tap the **Run** button.



4.3 Entering the Sample ID

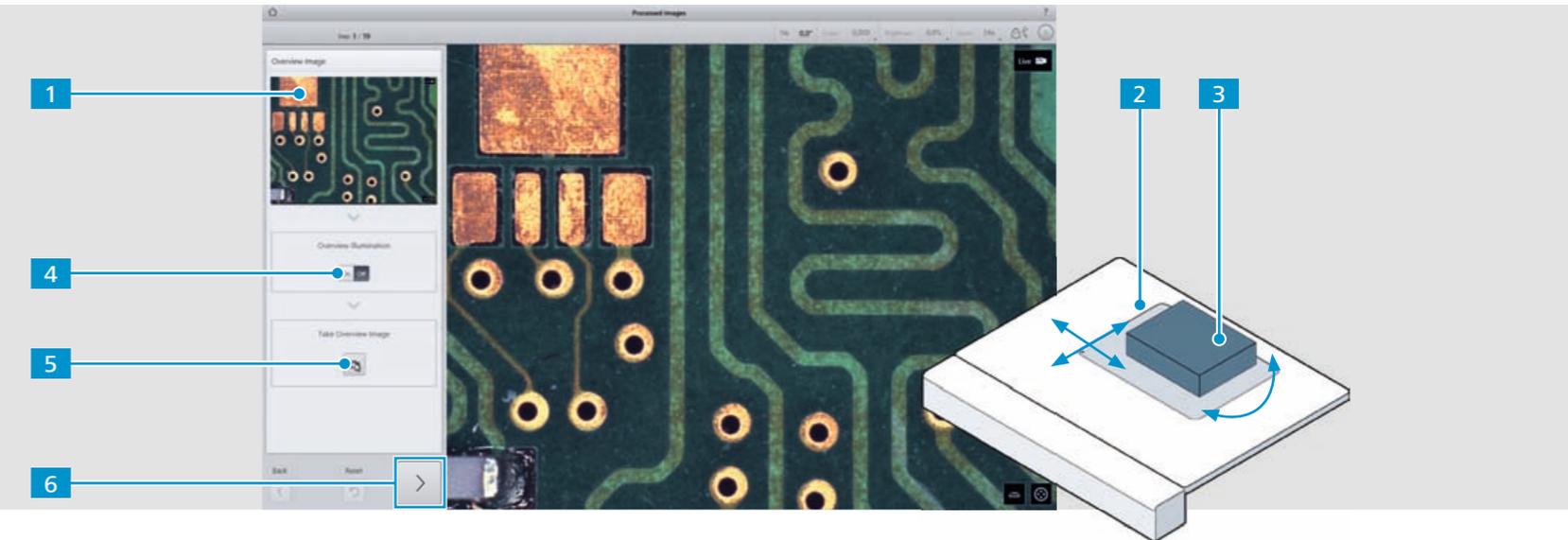
After selecting the job to run, a dialog is displayed to enter the sample ID. This is the unique ID of the sample you wish to analyze.

The sample ID is typically one of the following:

- Serial number of the sample
- SAP number of the sample
- Other unique identifier associated with the sample

If you are unsure about the sample ID, contact your administrator.

- 1 Enter the **Sample ID**.
- 2 Tap the **OK** button.



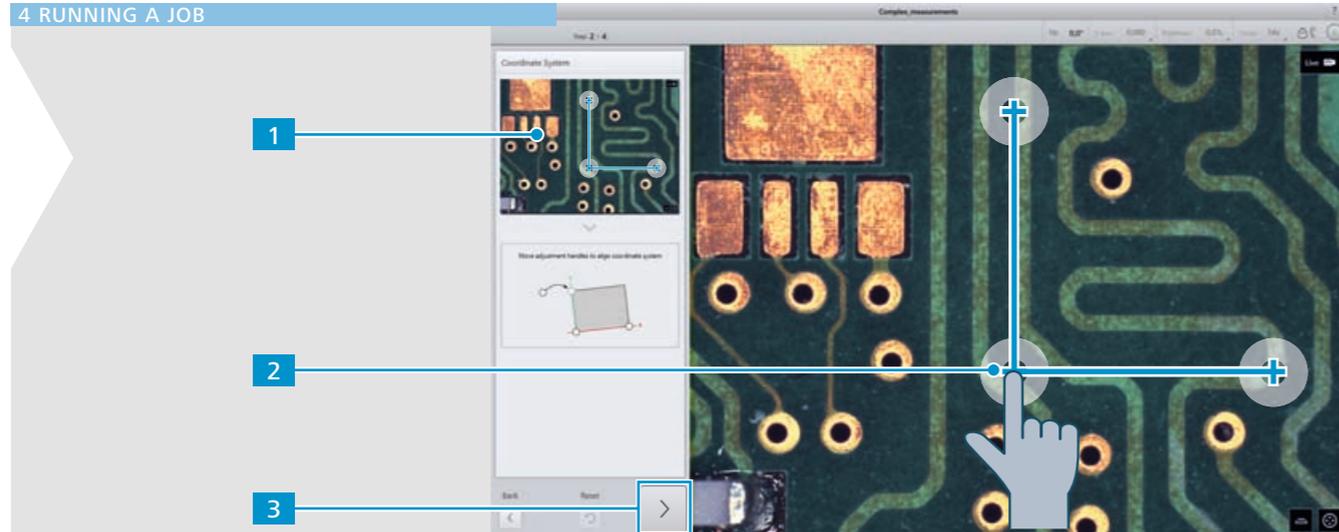
4.4 Acquiring an Overview Image

After entering the sample ID, a live image of the sample is displayed. Create an overview image so that you can orientate yourself on the sample when viewing microscope images.

- 1 Look at the appearance of the scanning stage insert in the reference image.
- 2 Ensure that the correct side of the scanning stage insert is facing up (flat side or side with guide).

- 3 Place the sample on the scanning stage in the identical position and orientation to that shown in the reference image.

- 4 If desired, turn the **Overview Illumination** on or off.
- 5 When you are satisfied with the appearance of the sample, tap the  icon.
- 6 Tap the  icon.

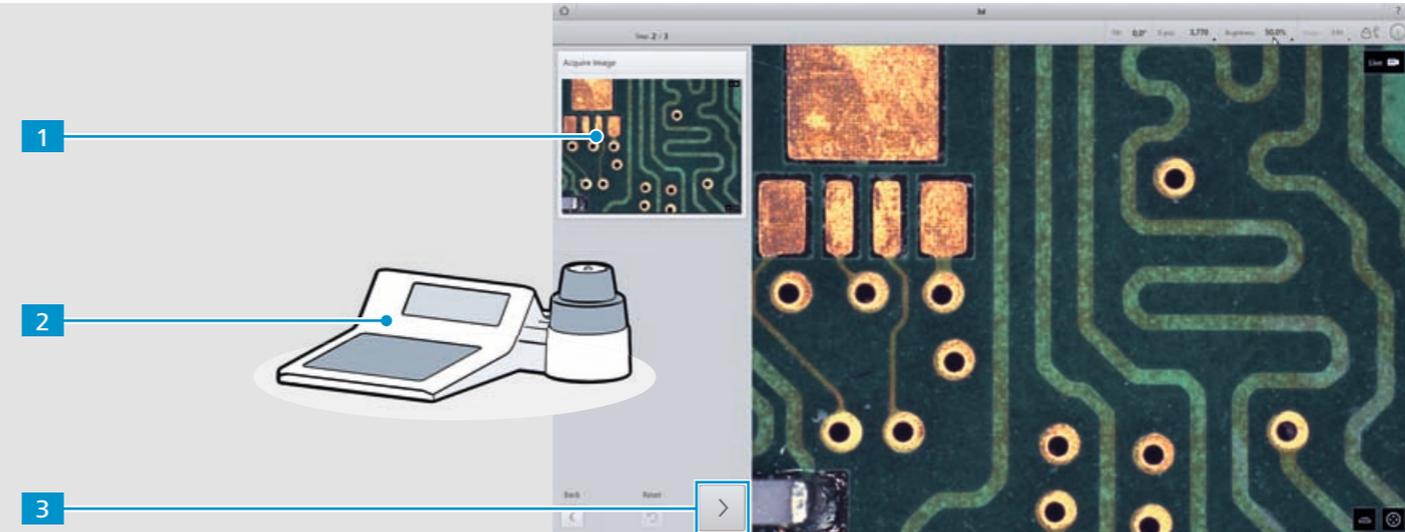


4.5 Placing the Coordinate System

Coordinate systems help to locate measurements exactly on the sample. The position of the coordinate system is defined by the administrator.

If the administrator chose a specific position for the coordinate system (for example a distinctive feature on the sample), you have to place the coordinate system in the same location. If the administrator chose the default position, this step is skipped.

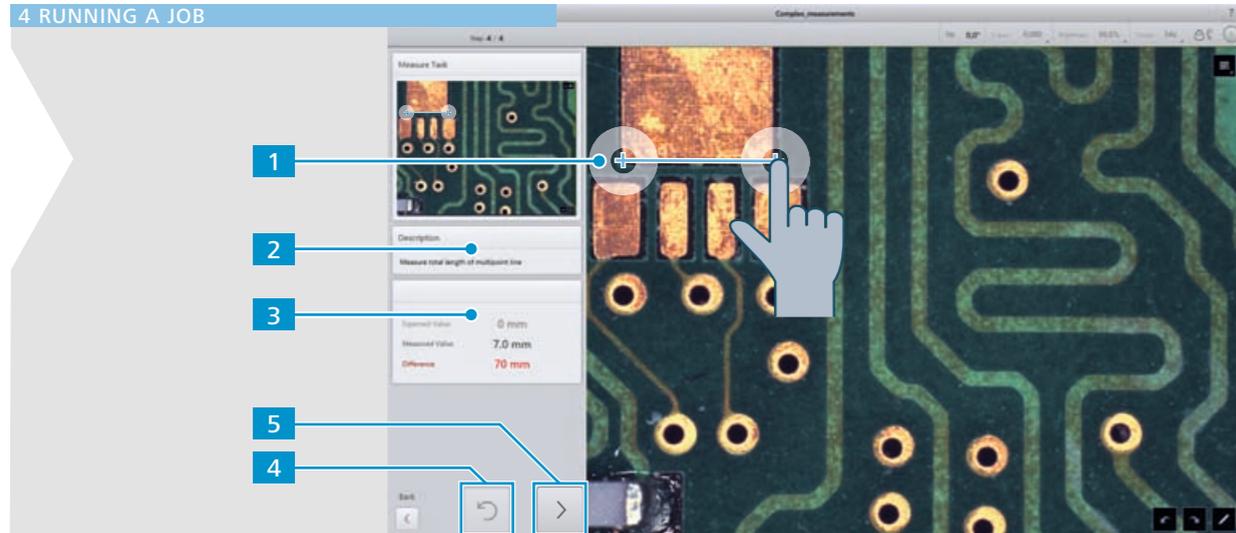
- 1 Look at the position of the coordinate system in the reference image. The coordinate system is placed in a similar location in the microscope image.
- 2 Drag the handles until the position and orientation of the coordinate system in the microscope image is identical to the reference image.
- 3 Tap the  icon.



4.6 Acquiring a Microscope Image

You have to acquire an identical microscope image to that in the reference image. Smartzoom 5 automatically moves to the correct area of the sample.

- 1 Look at the area of the sample depicted in the reference image and the microscope image.
- 2 If not, use the controller to move the microscope image until the areas are identical and the sample is in focus.
- 3 Tap the  icon to acquire the microscope image.



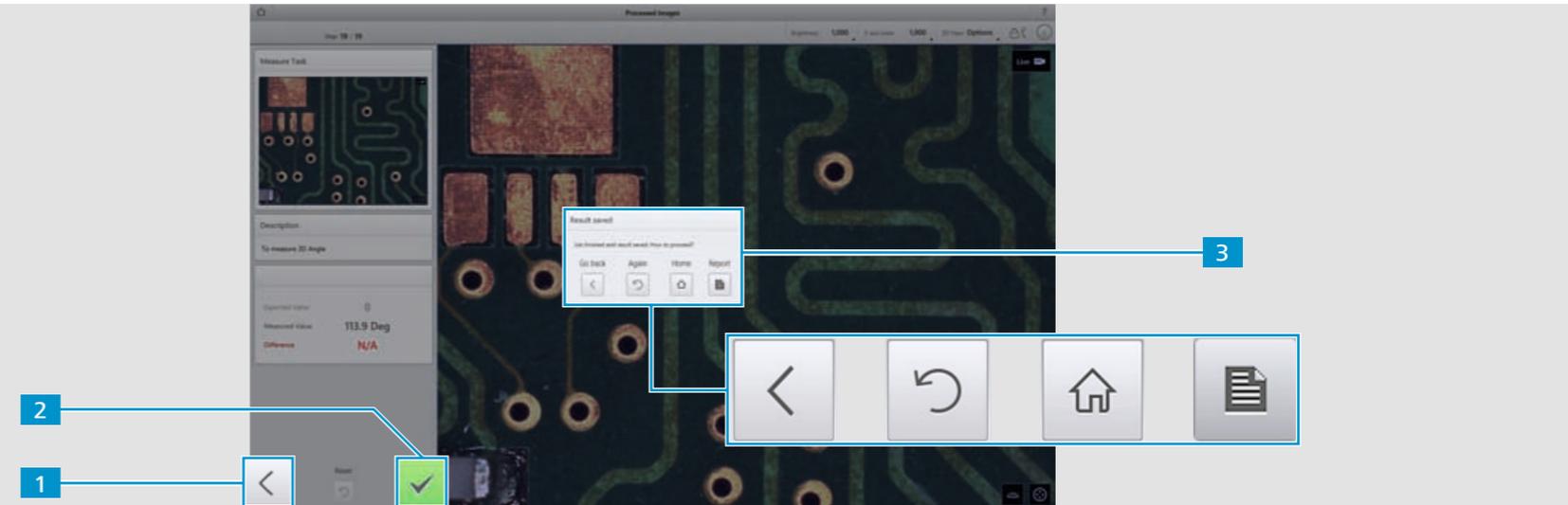
4.7 Performing Measurements

Once you have acquired a microscope image, the measurement to be performed is displayed in the reference image. The appropriate tool is displayed in the microscope image.

- 1 Drag the handles so that the tool is placed in the identical location to that in the reference image.
- 2 Follow any additional instructions added by the administrator.

- 3 The measurement value is displayed as well as the difference between your value and the expected value.
- 4 If you wish to reset a measurement, tap the  icon.
- 5 Tap the  icon.

The next measurement task or microscope image to be acquired is displayed.



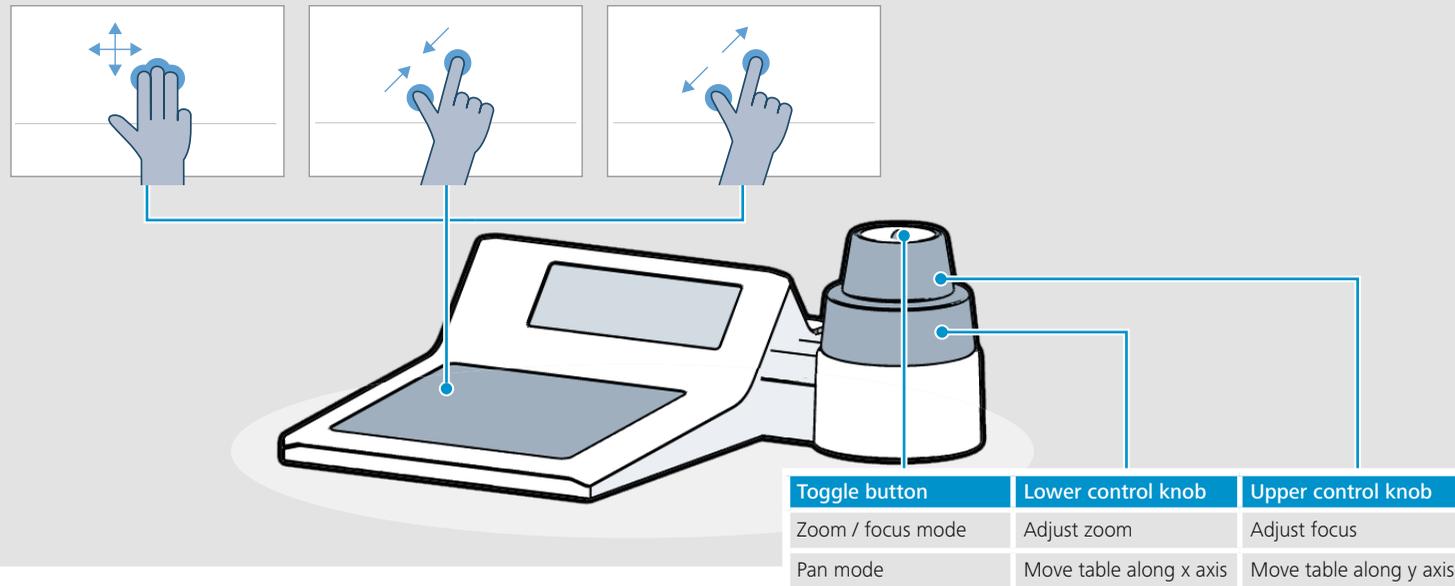
4.8 Saving the Job Results

When you have completed the last examination task, the  icon is displayed.

- 1 To return to a previous measurement, tap the  icon.
- 2 When you are satisfied with all the measurements, tap the  icon. The measurement results are saved and a report is generated automatically.

- 3 Choose what you want to do next:
 - Return to the last measurement task
 - Repeat the same job with a new sample
 - Return to the start screen
 - View the report of the measurement results

5 REFERENCE



5.1 Adjusting the Image Zoom, Focus, and Position

You can adjust the zoom, focus, and position of the image using the control knobs.

Each of the control knobs has two modes. Press the button on top of the controller to switch between the modes. The current mode is indicated by the  icon in the software.

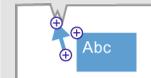
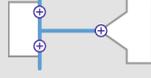
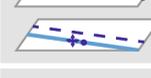
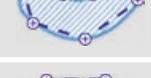
You can also adjust the zoom and image position using the touchpad:

- Scroll the scanning stage / image
- Zoom in / out

5.2 Measurement Tools

The table lists the most important measurement tools. For more information about Smart Tools see the Online Help.

| Icon | Description | Description |
|---|---|---|
|  | Angle between two connected lines |  |
|  | Angle between two lines that do not join |  |
|  | Distance between the centers of two circles |  |
|  | Diameter of a circle |  |
|  | Radius of a circle |  |
|  | Distance between two points |  |
|  | Count or indicate features |  |

| Icon | Description | Description | Icon | Description | Description |
|---|---|---|---|---|---|
|  | Total length of a multi-point line |  |  | Arrow with text label |  |
|  | Perpendicular distance between two parallel lines |  |  | Circle with text label |  |
|  | Perpendicular distance between a line and a point |  |  | Rectangle with text label |  |
|  | Height difference between two points (via difference in focus height) |  |  | Measurement scale |  |
|  | Average brightness of the sample within a user-defined polygon |  |  | Text label |  |
|  | Area enclosed by a circle |  |  | Horizontal distance between two points on the surface |  |
|  | Area enclosed by a polygon with curved sides |  |  | Height profile of the sample between two points |  |
|  | Area enclosed by a polygon with straight sides |  |  | Volume enclosed by a cuboid |  |
|  | Area enclosed by a rectangle |  |  | Angle between two planes |  |



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