OLYMPUS

# Manual

# labSens

IMAGING SOFTWARE

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# Contents

# 1. Before you start

## 1.1. About this manual

The documentation for your software consists of two parts: the online help and this manual.

*Where do you find which information?*

In the manual, you will find both an introduction to the product and an explanation of the user interface. By using the extensive step-by-step instructions you can quickly learn the most important procedures for using this software.

In the online help, you will find detailed help for your software.

*Writing convention used in the documentation*

In this documentation, the term "your software" will be used for *labSens*.

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## 1.2. What is labSens?

***labSens*** is a software used for microscopy in laboratory environments and in a pathological routine environment. It supports various kinds of hardware such as digital cameras and motorized microscopes and stages.

*Main features of your software*

The main functions of *labSens* ensure quick and handy workflows for the following tasks:

- Controlling digital cameras
- Acquiring images
- Annotating images
- Measuring images

*Additional functionality*

There are additional software solutions available for *labSens* offering enhanced functionality.

- ***NetCam***
  *NetCam* enables the user to transmit/stream a live image via a web server to browser based clients.
- ***Patho***
  The *Patho* solution extends the workflow and enables the case wizard. This package contains a dedicated database system. The *Patho* solution guides the users through image acquisition and allows them to save all acquired images by case and slide in dedicated folders in the database.

*labSens tool window*

The *labSens* tool window guides users during image acquisition and helps to store all acquired images by case and slide.

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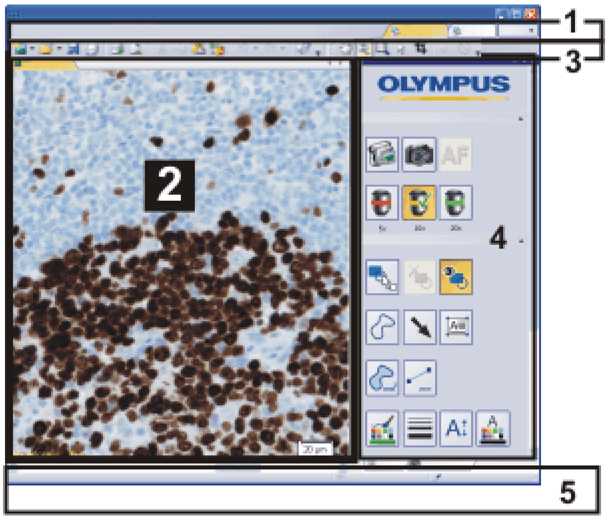
# 2. Working with labSens

## 2.1. User interface

The graphical user interface determines your software's appearance. It specifies which menus there are, how the individual functions can be called up, how and where data, e.g. images, is displayed, and much more. Here, the basic elements of the user interface are described.

Appearance of the user interface




The illustration shows the schematic user interface with its basic elements.

*(1) Menu bar* You can call up many commands by using the corresponding menu. Your software's menu bar can be configured to suit your requirements. Use the *Tools > Customization > Start Customize Mode...* command to add menus, modify, or delete them.

Further information is available in the online help.

*(2) Document group* The document group contains all loaded images.
When you start your software, the document group is empty. While you use your software, it gets filled - e.g., when you load or acquire images, or perform various image processing operations to change the source image and create a new one.

*(3) Toolbars* Commands you use frequently are linked to a button providing you with quick and easy access to these functions. Please note that there are many functions which are only accessible via a toolbar, e.g., the drawing functions required for annotating an image. Use the *Tools > Customization > Start Customize Mode...* command to modify a toolbar's appearance to suit your requirements.

*(4) Tool windows* Tool windows combine functions into groups. These may be very different functions. For example, in the *Properties* tool window you will find all the information available on the active document.

In contrast to dialog boxes, tool windows remain visible on the user interface as long as they are switched on. That gives you access to the settings in the tool windows at any time.

*(5) Status bar* The status bar shows a lot of information, e.g., a brief description of each function. Simply move the mouse pointer over the command or button for this information.

Further information is available in the online help.

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## 2.2. Layout

**Overview - Layouts**

To switch backwards and forwards between different layouts, click the name of the layout you want in the menu bar, or use the *View > Layout* command.

Please note: There is usually only one layout available in your software version. A description of this layout can be found in the online help. If only one layout is available, the name of the layout is not displayed in the menu bar.

If you received the "Patho" solution with your software, the following layouts are available:

- Acquire images ("Acquisition" layout)
- Manage records and measurements ("Review" layout)

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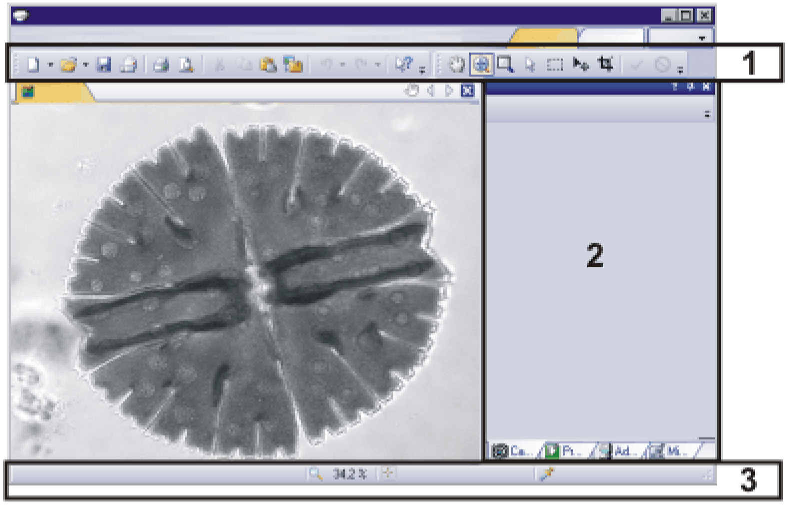
**What is a layout?**

The user interface is configurable, so that you can easily adapt it to meet the requirements of individual users or tasks. You can choose a so-called "layout" that is suitable for the task on hand. A "layout" is an arrangement of the control elements on your monitor that is optimal for the task at hand. In any layout, only the software functions that are important in respect to this layout will be available.

Please note: There is usually only one layout available in your software version.

**Which elements of the user interface belong to the layout?**




The illustration shows you the elements of the user interface that belong to the layout.

- (1) Toolbars
- (2) Tool windows
- (3) Status bar

### Activating a layout

Please note: There is usually only one layout available in your software version. For this reason, you can't activate any other layouts and no other layouts are displayed in your menu bar.

There are several ways in which you can activate a layout.

1. Use the *View > Layout* command to open a menu containing all of the available layouts. Select the layout you want from this menu.
2. You will find a tab for each layout at the top right corner of the user interface. Click the name of the desired layout (1).

3. For each layout, you will find the *Layout* (2) button next to the tabs located to the right side of the menu bar. Click this button to open a menu with all of the available layouts. Select the layout you want from this menu.

### Editing layouts

You can change a layout at any time. Use the commands in the *View* menu to have the user interface's individual elements shown or hidden.

You have not only the possibilities of hiding or showing the user interface's elements and changing their size and position. As well as that, you can also change existing toolbars, or even set up your own. These changes will not be saved in the layout, but instead, in the configuration. They will remain available to you, even when you return the layout to its standard form.

**Saving and resetting layouts**

Changes made in layouts will be automatically saved. Use the *View > Layout > Reset Current Layout* command to reset the layouts to their default configuration.

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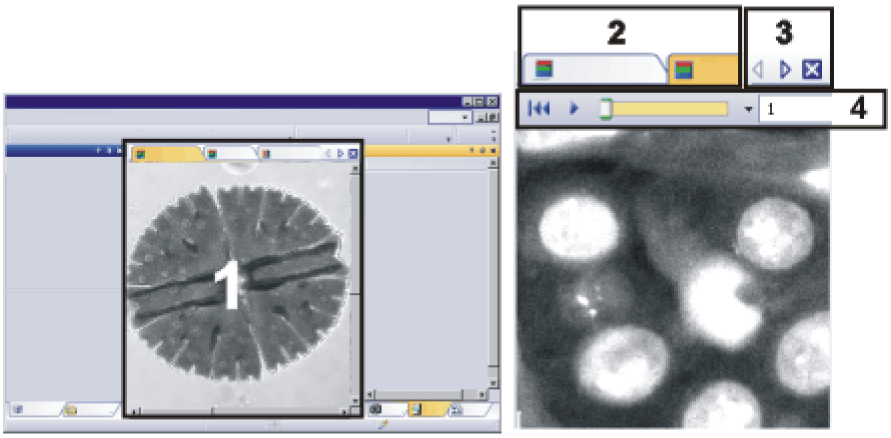
## 2.3. Document group

The document group contains all loaded documents.

*Appearance of the user interface*




On the left, the illustration shows a schematic representation of a user interface. On the right, the document group is shown enlarged.

**(1) Document group in the user interface**

You will find the document group in the middle of the user interface. In it you will find all of the documents that have been loaded or acquired. Also the live-image and the images resulting from, e.g., any image processing function, will be displayed there.

**(2) Document bar in the document group**

The document bar is the document group's header.

For every loaded document, an individual field will be set up in the document group. Click the name of a document in the document bar to have this document displayed in the document group. The name of the active document will be shown in color. Each type of document is identified by its own icon.

**(3) Buttons in the document bar**

At the top right of the document bar you will see several buttons.

*Button with a hand*

Click the button with a hand on it to extract the document group from the user interface. In this way you will create a document window that you can freely position or change in size.

If you would like to merge two document groups, click the button with the hand in one of the two document groups. While pressing the left mouse button, drag the document group with all the files loaded in it, onto an existing one.

You can only position document groups as you wish when you are in expert mode. In standard mode the button with the hand is not available.

*Arrow button* The arrow buttons located at the top right of the document group are, to begin with, inactive when you start your software. The arrow buttons will only become active when you have loaded so many documents that all of their names can no longer be displayed in the document group. Then you can click one of the two arrows to make the fields with the document names scroll to the left or the right. That will enable you to see the documents that were previously not shown.

*Button with a cross* Click the button with a cross to close the active document. If it has not yet been saved, the *Unsaved Documents* dialog box will open. You can then decide whether or not you still need the data.

**(4) Navigation bar in the image window**

Some images have their own navigation bar directly in the image window. Use this navigation bar, e.g., to specify how a Z-stack is to be displayed on your monitor, or to change this.

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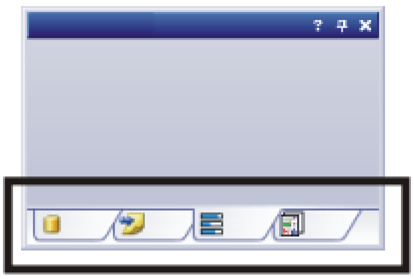
## 2.4. Tool Windows

Tool windows combine functions into groups. These may be very different functions. For example, in the *Properties* tool window you will find all the information available on the active document.

**Position of the tool windows**

The user interface is to a large degree configurable. For this reason, tool windows can be docked, freely positioned, or integrated in document groups.

*Docked tool windows* Tool windows can be docked to the left or right of the document window, or below it. To save space, several tool windows may lie on top of each other. They are then arranged as tabs. In this case, activate the required tool window by clicking the title of the corresponding tab below the window.



*Freely positioned tool windows* You can only position tool windows as you wish when you are in expert mode.

You can set a tool window to float at any time. The tool window then behaves exactly the way a dialog box does. To release a tool window from its docked position, click on its header with your left mouse button. Then while pressing the left mouse button, drag the tool window to wherever you want it.

**Buttons in the header**

In the header of every tool window, you will find the three buttons *Help*, *Auto Hide* and *Close*.

Click the *Help* button to open the online help for the tool window.
Click the *Auto Hide* button to minimize the tool window.
Click the *Close* button to hide the tool window. You can make it reappear at any time, by using the *View > Tool Windows* command.

**Context menu of the header**

To open a context menu, rightclick a tool window's header. The context menu can contain the *Auto Hide* and *Transparency* commands. Which commands will be shown, depends on the tool window.

Additionally, the context menu contains a list of all of the tool windows that are available. Every tool window is identified by its own icon. The icons of the currently displayed tool windows will appear clicked. You can recognize this status by the icon's background color.
Use this list to make tool windows appear.

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## 2.5. Working with documents

You can choose from a number of possibilities when you want to open, save, or close documents.

Please note: Your software version supports only documents belonging to the document type "Image". Thus, the term "Documents" means "Images" in this manual.

*Saving documents*

You can recognize documents that have not been saved by the star icon after the document's name.

There are a number of ways to save documents.

1. Save your documents in a database. That enables you to store all manner of data that belongs together in one location. Search and filter functions make it quick and easy to locate saved documents. Detailed information on inserting documents into a database can be found in the online help.
   A database is only available if you have the "Patho" solution for your software.
2. To save a single document, activate the document in the document group and use the *File > Save As...* command.
3. Use the *Gallery* tool window.
   Select the desired document and use the *Save* command in the context menu. For the selection of documents, the standard MS-Windows conventions for multiple selection are valid.

*Autosave and close*

1. If you have purchased the "Patho" solution with your software, you have a database available to you.
   In the *labSens* tool window, the workflow is then organized as a series of cases for you to work on. First, click the *Start Case* button and perform all of the image acquisitions, annotations and measurements necessary for this case. The images are automatically saved in the database.

2. When you exit the software, all of the data that has not yet been saved will be listed in the *Unsaved Documents* dialog box. This gives you the chance to decide which documents you still want to save.
3. With some acquisition processes, the acquired images will be automatically saved after the acquisition has finished. You will find an overview of the acquisition processes that are supported in the online help.
4. You can also configure your software in such a way that all images are saved automatically after image acquisition. To do so, use the *Acquisition Settings > Saving* dialog box.

*Closing documents*

There are a number of ways to close documents.

1. To close a single document, activate the document in the document group and use the *File > Close* command. Alternatively, you can click the button with the cross ☒. You will find this button on the top right in the document group.
2. Use the *Gallery* tool window.
   Select the desired document and use the *Close* command in the context menu. For the selection of documents, the standard MS-Windows conventions for multiple selection are valid.

*Opening documents*

There are a number of ways to open or load documents.

1. Use the *File > Open...* command.
2. Use the *File Explorer* tool window.
3. Drag the document you want directly out of the MS-Windows Explorer, onto your software's document group.
4. To load documents out of a database into the document group, use the *Load Documents* command.

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# 3. Configuring the system

## 3.1. Overview - System Configuration

*Why do you have to configure the system?*

After successfully installing your software you will need to first configure your image analysis system, then calibrate it. Only when you have done this will you have made the preparations that are necessary to ensure that you will be able to acquire high quality images that are correctly calibrated. When you work with a motorized microscope, you will also need to configure the existing hardware, to enable the program to control the motorized parts of your microscope.

*When do you have to configure the system?*

You will only need to completely configure and calibrate your system anew when you install and start the software on your PC for the first time. When you later change the way your microscope is equipped, you will only need to change the configuration of certain hardware components, and possibly also recalibrate them.

**Process flow of the configuration**

To set up your software, the following steps will be necessary:

**Selecting the camera and the microscope**

**Specifying which hardware is available**

**Configuring the interfaces**

**Configuring the specified hardware**

**Calibrating the system**

All these commands are only available to you when you start the software as Administrator or Power User. Further information on user rights is available in the online help.

**Selecting the camera and the microscope**

The first time you start your software after the installation has been made, a quick configuration with some default settings will be made. In this step you need only to specify the camera and microscope types in the *Quick Device Setup* dialog box. The microscope will be configured with a selection of typical hardware components. Further information is available in the online help.

**Specifying which hardware is available**

Your software has to know which hardware components your microscope is equipped with. Only these hardware components can be configured and subsequently controlled by the software. In the *Acquire > Devices > Device List* dialog box, you select the hardware components that are available on your microscope.

*Quick Device Setup*

If you use a preset configuration in the *Quick Device Setup* dialog box, check in this step whether the preset hardware components really comply with your system.

**Configuring the interfaces**

Use the *Interfaces* dialog box to configure the interface between your microscope or other motorized components, and the PC on which your software runs.

*Quick Device Setup*

If you use a preset configuration in the *Quick Device Setup* dialog box, you can skip this step.

**Configuring the specified hardware**

Usually various different devices, such as a camera, a microscope and/or a stage, will belong to your system. Use the *Acquire > Devices > Device Settings...* dialog box to configure the connected devices so that they can be correctly actuated by your software.

**Calibrating the system**

When all of the hardware components have been registered with your software and configured, the functionality of the system is already ensured. However, it's only really easy to work with the system and to acquire top quality images, when you have calibrated your software. The detailed information that helps you to make optimal acquisitions will then be available.
Your software offers a wizard that will help you while you go through the individual calibration processes. Use the *Acquire > Calibrations...* command to start the software wizard.

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## 3.2. Device Settings - Nosepiece

*Why must the nosepiece be configured?*

Your software has to know with which objectives your microscope is equipped, and at which position in the nosepiece each one is fitted. Only then will the buttons on the *Microscope Control* toolbar be correctly defined. Then you will find that every objective has its own button on the toolbar.
Before you make an image acquisition, click the button with the objective in use, otherwise the image you acquire will not be correctly calibrated. Only on correctly calibrated images will the scale bar show the correct scale. Also for making measurements, correctly calibrated images are an essential prerequisite.

When you exchange or add objectives, you must register the new objectives and their position in the objective revolver with the system.

*Documentation of the microscope settings during image acquisition*

All of the information in this dialog box will be automatically adopted in the *Properties* tool window during the acquisition. You will find this information in the *Microscope* group. This information is saved with the image if you save it in the TIF or VSI image file format. It will be displayed again when the image is loaded.

**Configuring the objective nosepiece**

1. Use the *Acquire > Devices > Device Settings...* command.
2. Select the *Lightpath* entry in the *Sort by* list.
3. In the tree structure, select the *General > Manual Nosepiece* entry (if you have a manual microscope), resp. *General > Nosepiece <Name of the nosepiece>* (if you have a motorized microscope).
   - On the right hand side of the dialog box, the current configuration of the nosepiece will be displayed. When you configure the software for the first time, the fields for the details referring to your objectives will be empty.
4. Enter all of the objectives that are currently fitted to your nosepiece.
5. Close the *Device Settings* dialog box with *OK* or continue with the configuration of further hardware components.
   - Every objective you have selected will then be offered on the *Microscope Control* toolbar and in the *labSens* tool window.

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## 3.3. Setting up a new database

If you have purchased the "Patho" solution with your software, you have a database available to you. In the *labSens* tool window, the workflow is then organized as a series of cases for you to work on. First, click the *Start Case* button and perform all of the image acquisitions, annotations and measurements necessary for this case. The images are automatically saved in the database.

**Only the database administrator can set up a database.**

Use the database template that is provided to set up a new database. Only then can you use the *labSens* tool window to create new cases in a database.

1. Select the *Database > New...* command.
   - The *New Database* dialog box will open. This dialog box works in a similar manner to a wizard. It guides you step-by-step through the setting up of a database.

*Step 1: Selecting a database server*

2. Specify in the *Database Server* field on which database server the database is to be set up. If you have already set up a database on this server from your PC, you will find the required server in the picklist.
   - Alternatively, click the button [ … ] with the three points. The *Select Servers* dialog box will open. Here, select the server from the *Available database servers* list, then click the *Add >>* button. Click the *OK* button to close the dialog box and return to the *New Database* dialog box.
   - The database file is located on the database server. The documents e.g., the images, can also be located on another PC, or even on several different PCs. You will find more information on document storage in a database in the online help.
3. In the *User Authentication* group, you select the way you (and all future users) are to log on to this database.

Select *Single Sign On* entry. With Windows Authentication, the data with which the user logs on to MS-Windows will also be used for logging on to the database.

- You can also select the *SQL Authentication* entry.
  With SQL Authentication the log-on data that has been defined for Microsoft SQL Server will be used. Every user of your database must know the log-on data (supplied by the database administrator) and has to enter them in the *User Name* and *Password* fields to be able to open the database.
- The first step in setting up a database has now been completed.

4. Click the *Next >* button.

*Step 2: Entering the name of the database, and specifying the storage location for documents*

5. Enter the name of the database in the *Database Name* field. The name must not be longer than 20 characters and must not contain any spaces or special characters. Under this name you'll find the database in the *Open Database* dialog box later on.
6. If the new database is to become your standard database, select the *Use as standard database* check box. This option makes sense when you mostly work with the same database.
   - Later on, you can use the *Tools > Options > Database > Standard database* command to specify that the standard database will be automatically opened whenever you start your software.
7. Enter the directory in which the documents are to be stored. To do so, click the button [ … ] with the three points located next to the *Document Storage Path* field, then browse to the directory you want to use.

- Note: When several people are to work with the database, select a directory which is also available to other users of this database.
  If you're the only user of the database, you can also choose a local directory on your own PC.
- Note: To have your database with all of its documents regularly saved, make sure that both the database server, and the PC on which the documents are stored are incorporated in an automatic data back-up process (e.g., every night).

8. When you work with several databases, enter a descriptive text for the new database in the *Database Description* field. This text will later be displayed in the *Open Database* dialog box (when you use the *Use database connection file* connection mode).
9. Click the *Next >* button.

*Step 3: Selecting a database template*

10. In the *Template File Path* field, choose a database template. A database template has the file extension DBE.
    A database template already contains a defined database structure.
    - Your software will have been supplied with a database template. During the software installation, the template is installed in the following directory:
      ..\Documents and Settings\All Users\Application Data\Olympus\OSIS \ <Name of the software>\Database\DBE

11. Click the *Next >* button.
    - The wizard's next dialog box shows you all of the options that you have set up for the new database.

*Step 4: Checking the options for the new database*

12. Check the options for the new database.
    Should you want to correct an option, click the underlined term. For example, click the term "Database Name", if you want to change the name you've entered.
    - Should you want to change an option, your software will jump back to the *New Database* wizard's corresponding dialog box.
13. Click the *Finish* button to have the database set up.
    - The *Logging* tool window will automatically appear. In it you can follow the setting up of the new database.
    - When a database is set up, a database connection file (DBC file) will be automatically created too. The database connection file makes it possible for you to quickly log on to this database in the future. You will find the DBC file in the following directory:
      ..\Documents and Settings\All Users\Application Data\Olympus\OSIS \ <Name of the software>
    - The database will be set up and opened. You can see the database in the *Database* tool window.

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# 4. Tool window - labSens

Use the *labSens* tool window as an easy-to-use graphical user interface. All of the commands that you use on a regular basis are available in this tool window and are displayed as large buttons.

If the *labSens* tool window is hidden, use the *View > Tool Windows > Record Details > labSens* command to make it appear.

*What can you use the tool window for?*

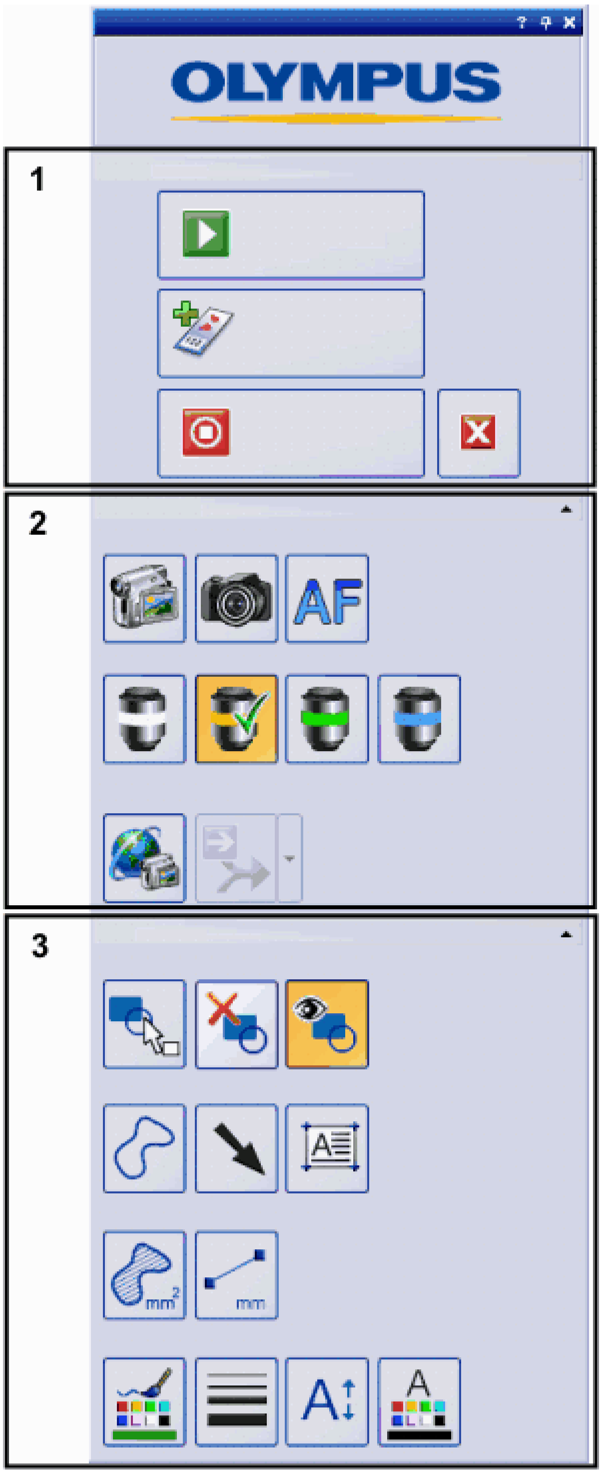
Use the *labSens* tool window to acquire, annotate, and measure images. If you have purchased the "Patho" solution with your software, you have a database available to you. The workflow is then organized as a series of cases for you to work on. First, click the *Start Case* button and perform all of the image acquisitions, annotations and measurements necessary for this case. The images are automatically saved in the database. A case folder is created in the database for every case that you work on. Every case folder contains a subfolder for each microscope slide that you've examined.

Please note: If you haven't purchased the "Patho" solution with your software, you won't have a database and the case processing feature available to you. In this case, use the *File > Save* and *File > Save As...* commands to save the images on your hard disk.

*Buttons colored gray in the tool window*

In the *labSens* tool window, buttons are only active if their function is relevant to the current step. Inactive buttons appear in gray. In this way, you'll be guided through the case step by step after clicking the *Start Case* button.

*Structure of the tool window*




- (**1**) Starting and ending cases
- (**2**) Acquiring images
- (**3**) Annotating and measuring images

## 4.1. Starting and ending cases

Please note: The buttons relevant to cases are only available if you have purchased the "Patho" solution with your software.


*Start Case*

Click this button to start working on a new case. At the beginning of a case, this button is the only active one.

1. Click the *Start Case* button.
   - The database opens if it is still closed.
2. In the *Insert Case Folder* dialog box, enter the barcode of the new case. You can also enter an accession number and a patient ID here.
3. Click the *Insert* button in this dialog box.
4. In the *Insert Slide Folder* dialog box, enter the bar code of the microscope slide that you want to acquire an image of.
   You can also enter more information on the microscope slide here.
5. Click the *Insert* button in this dialog box.
   - A new record of the "Case Folder" type is automatically created in the database, as well as a child record of the "Slide Folder" type for the first microscope slide.
6. Acquire all of the necessary images of the microscope slide and use the annotation and measurement functions if required.


*Add Slide*

Click this button if you want to acquire images of another microscope slide.

1. Click the *Add Slide* button.
   - You will then be asked whether all of the currently open images should be saved in the slide folder of the current microscope slide.
2. In the *Insert Case Folder* dialog box, enter the barcode of the new case.
3. Click the *Insert* button in this dialog box.
   - In the database, a new slide folder is automatically created for the new microscope slide. This slide folder is a child record of the current case folder.

*Finishing the slide analysis*

Only use the *Add Slide* button if you have finished acquiring, annotating and measuring all necessary images from the current microscope slide. All acquired images of the current microscope slide are opened in the document group and are displayed in the *Gallery* tool window as thumbnails. No other images will be open if you haven't manually loaded further images into the document group while using the *labSens* tool window.

You will be asked whether you want to save all images displayed in the gallery to the current slide folder. It usually makes sense to click *Yes*. The images will then be saved in this slide folder. Afterwards, the images are automatically closed, i.e., they are no longer shown in the document group or in the *Gallery* dialog box.

If you click *No*, the images aren't saved in the slide folder and remain open.

*Refusing some images of a slide*

You can manually close an opened image, such as an unsuccessful image acquisition any time you want. To do this, select the image in the *Gallery* dialog box and press the [Del] key on your keyboard.


*End Case*

Click this button to finish working on the current case.

*Finishing the slide analysis*

Only use the *End Case* button if you have finished acquiring, annotating and measuring all necessary images from the current microscope slide. Please note the explanations from the *Add Slide* button.


*Cancel*

Click this button to cancel working on a case.

## 4.2. Acquiring images

**Camera**


*Switch On Live display*

Click this button to start or stop live mode. The live-image is displayed in the document group.


*Acquire a Snapshot*

Click this button to stop live mode and acquire an image. The acquired image is displayed in the document group.

*Start Auto Focus*

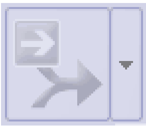
Click this button so that the software will switch to the live mode and verify the focus of various Z-positions. The stage then returns to the Z-position with the best focus in order to acquire the sharpest possible image.

**Magnification**


Click one of the objective buttons to select the corresponding magnification. The active button will then indicate the magnification you've selected. The active button can be identified by its orange color and a check-mark.

 *Switch on / off NetCam*

Click this button to turn the NetCam function on or off. The button will appear clicked when NetCam is active. You can recognize this by its orange color. Users can now make a connection between their own PCs and the NetCam server and receive the images you have loaded. The NetCam function is only available if you have purchased the "NetCam" solution with your software. Further information on the NetCam function is available in the online help.

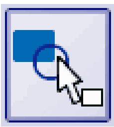


This button isn't relevant to your software version.

## 4.3. Annotating and measuring images

All image objects, text objects, and measurement objects you insert in the image are written as vector graphics to a specific vector plane. Further information is available in the online help.

**General**

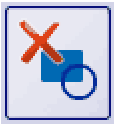
 *Select a drawing or measurement object*

Click this button to select an object in the image.

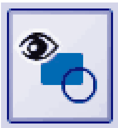
1. Click the *Select a drawing or measurement object* button.
2. Move the mouse pointer onto the image object.
   - The mouse pointer will then have the shape of a four-pronged arrowhead.
3. Click on the image object to edit it.
   - If you want to change the position of the image object, be sure that the mouse pointer is shaped like a four-pronged arrowhead.
   - If you want to change the size of the image object, move your mouse pointer over the handles of the image object until the mouse pointer

takes the shape of a small square. The small arrows next to the square indicate that you can move the handle. This is how you change the size of the image object.

- If you want to change the properties of the image object, doubleclick on the image object. The *Drawing Object Properties* dialog box opens. Here you can change the color, for example.

 *Delete selected drawing or measurement*

Click this button to delete the selected object from the image.

 *Show or hide drawings and measurements*

Click this button to display or hide the drawn objects.

**Drawings**

 *Draw a free hand polygon*

Click this button to draw an image object in the shape you need.

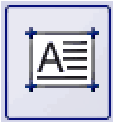
1. Click the *Draw a free hand polygon* button.
   - The software switches to drawing mode. You can see that the software is in drawing mode by the handles.
2. Press and hold the mouse button and draw the image object.
   You can still change an image object's position and shape later.
3. If you're satisfied with the position and shape of the image object, click the *Select a drawing or measurement object* button.
   - Your software then switches off drawing mode.

 *Draw an arrow*

Click this button to draw an arrow.

1. Click the *Draw an arrow* button.
   - The software switches to drawing mode. You can see that the software is in drawing mode by the handles.
2. Click on the image to set the start point of the arrow.
3. Press and hold the mouse button and set the arrow.
   - The start point and end point are both indicated by a handle.
   - You can still change the arrow's length and position later.

4. If you're satisfied with the arrow, click the *Select a drawing or measurement object* button.
    - Your software then switches off drawing mode.

 *Add a text field*

Click this button to add a text object to the image. Use this option to add text directly to an interesting part of the image.

*Adding a text field*

1. Click the *Add a text field* button.
    - The mouse pointer has the shape of a small cross.
2. Press and hold the mouse button and set a new text object.
   Alternatively, you can doubleclick on the image: By doing so, a text object with the default width and height is added to the image.
    - The software switches to text-entry mode. You can see that the software is in text-entry mode by the blinking cursor in the text object and dark background.
3. Enter the new text into the text object.
4. When you finish entering the text, click outside of the text object.
    - Your software then switches off the text-entry mode.
      You can still add text objects to other parts of the image once you've clicked the *Add a text field* button.

*Changing the width and height of a text object at any time*

You can still change the width, height, position or text of a text object later.

1. Click the *Add a text field* button, and then click on the text object.
    - The text object is surrounded by eight handles.
2. Move the individual handles.
   By doing so, you can change the width and height of the text object.
3. If you're satisfied with width and height of the text object, click in the image outside of the text object.
    - Your software then switches off the text-entry mode.

*Changing the position of a text object at any time*

1. Click the *Add a text field* button, and then click on the text object.
    - The mouse pointer will then have the shape of a four-pronged arrowhead.
    - The text object is surrounded by eight handles.
2. Press and hold the mouse button, and drag the entire text object.
3. Click outside of the text object.

*Editing text in a text object at any time*

1. Click the *Add a text field* button, and then doubleclick on the text object.
    - The software switches to text-entry mode. You can see that the software is in text-entry mode by the blinking cursor in the text object and dark background.

2. Edit the text.
3. When you finish editing the text, click outside of the text object.

**Measurements**

You can find more measurement functions in the *Measurements* tool window. This tool window is at the same time the measurement display and contains all of the values that have been measured on the active image.

*Measure a free hand polygon*

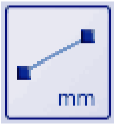
Click this button to measure the area of a two-dimensional image object.

1. Click the *Measure a free hand polygon* button.
   - The software switches to measurement mode.
   - The mouse pointer turns into a small cross.
2. Move the mouse pointer onto a point on the object border. Click on it with the left mouse button.
   - The first handle, a small square, is then set.
   - The mouse pointer has the shape of a small square. The small arrows next to the square indicate that you can set the next handles.
3. Move the mouse pointer onto the next point on the object border. To set the handle, click with the left mouse button.
4. Set additional handles along the perimeter of the object.
5. Rightclick to finish the measurement.
   - The area is displayed next to the drawn image object.
   - In the *Measurement* tool window, the object's perimeter is listed in addition to the area.

*Editing an image object*

You can still change the drawn image object image object later.

1. Move the mouse pointer onto the image object.
   - As soon as you move the mouse pointer over a handle, the mouse pointer changes from a small cross into a small square. The small arrows next to the square indicate that you can move the handle.
2. Move the handle to a different position.
   By doing so, you can change the shape and area of the image object.
3. Repeat the last step for any other handles that need to be moved.
4. If you're satisfied with the shape of the image object, click the *Select a drawing or measurement object* button.
   - Your software then switches off the measurement mode.

 *Measure a length*

Click this button to measure the length of a line in an image.

1. Click the *Measure a length* button.
   - The software switches to measurement mode.
   - The mouse pointer turns into a small cross.
2. Position the mouse pointer over the start point of the line you want to measure. Click on it with the left mouse button.
   - The first handle, a small square, is then set.
   - The mouse pointer has the shape of a small square. The small arrows next to the square indicate that you can set the second handle.
3. Position the mouse pointer onto the end point of the line to be measured. To set the handle, click with the left mouse button.
   - The length is displayed next to the drawn line.

*Editing a line*

You can still change the drawn line later.

1. Move the mouse pointer onto the image object.
   - As soon as you move the mouse pointer over one of the two handles, the mouse pointer changes from a small cross into a small square. The small arrows next to the square indicate that you can move the handle.
2. Move the handle to a different position.
   By doing so, you can change the position and length of the image object.
3. Repeat the last step for the second handle if necessary.
4. If you're satisfied with the position and length of the line, click the *Select a drawing or measurement object* button.
   - Your software then switches off the measurement mode.

**Options**

 *Set the line color*

Click this button to change the color of the selected image objects and measurement objects. The button is also available if no object is selected. In this case, you select the color of the next object that you want to draw. The current color will always be displayed in the lower part of the button.

1. If the *Select a drawing or measurement object* button has not been clicked: Click the *Select a drawing or measurement object* button.
2. Select the objects in the image whose color you want to change.
   To do so, move the mouse pointer onto the objects. Once the mouse

pointer has the shape of a four-pronged arrowhead, you can select the object by clicking on it.

- You can see that the object is selected by the handles around it. It is also possible to select several objects. The standard MS-Windows conventions are valid for the Multiple Selection.
- If you don't select any objects, the color change will only affect the next objects that you draw.

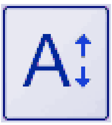
3. Click the *Set the line color* button.
   - A menu opens.
4. Select the color you want from this menu.
   - The selected objects adopt the selected color.
   - If you draw a new object, it will have the same color.

There are other software functions available offering additional settings for the color of measurement objects. Further information is available in the online help.

### *Set the line width*

Click this button to change the line width of the selected image objects. The button is also available if no object is selected. In this case, you select the line width of the next object that you want to draw.

1. If the *Select a drawing or measurement object* button has not been clicked: Click the *Select a drawing or measurement object* button.
2. Select the objects in the image whose line width you want to change. To do so, move the mouse pointer onto the objects. Once the mouse pointer has the shape of a four-pronged arrowhead, you can select the object by clicking on it.
3. Click the *Set the line width* button.
4. Select the line width you want.
   - The selected objects adopt the selected line width.

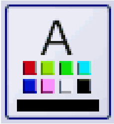


### *Set the font size*

Click this button to change the font size of the selected text objects. The button is also available if no text object is selected. In this case, you select the font size of the next text object that you want to add to the image.

1. If the *Select a drawing or measurement object* button has not been clicked: Click the *Select a drawing or measurement object* button.
2. Select the text objects in the image whose font size you want to change. To do so, move the mouse pointer onto the text objects. Once the mouse pointer has the shape of a four-pronged arrowhead, you can select the text object by clicking on it.
3. Click the *Set the font size* button.

4. Select the font size you want.
    - The text in the selected text objects adopts the selected font size.


*Set the text color*

Click this button to change the font color of the selected text objects. The button is also available if no text object is selected. In this case, you select the font color of the next text object that you want to add to the image.

1. If the *Select a drawing or measurement object* button has not been clicked: Click the *Select a drawing or measurement object* button.
2. Select the text objects in the image whose font color you want to change. To do so, move the mouse pointer onto the text objects. Once the mouse pointer has the shape of a four-pronged arrowhead, you can select the text object by clicking on it.
3. Click the *Set the text color* button.
4. Select the font color you want.
    - The text in the selected text objects adopts the selected font color.

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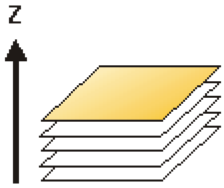
# 5. Acquiring specific images

In addition to the acquisition functions in the *labSens* tool window, you can use your software to make snapshots at your microscope and save the images as a file.

Furthermore, you can acquire images of specific types: Z-stacks and stitched images.

*What is a Z-stack?*

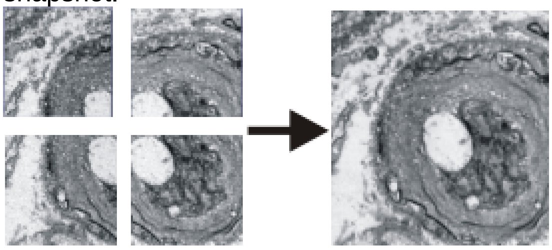



You can combine a series of separate images into one image file. A Z-stack contains frames acquired at different focus positions. You need a Z-stack, for example, to calculate an EFI image (Extended Focus Image) with the *Process > Enhancement > EFI Processing...* command.

A standard image is two dimensional. The position of every pixel will be determined by its X and Y-values. With a Z-stack, the focus position resp. the height of the sample, is an additional item of information for every pixel.

*What is a stitched image?*

Use the *Process > Multiple Image Alignment…* menu command to have several separate images combined, as with a puzzle, into a stitched image. (MIA stands for Multiple Image Alignment.) The stitched image will display a large sample segment in a higher X/Y-resolution than would be possible with a simple snapshot.



The illustration shows left, four individual images. On the right you see the stitched image made up from the four images.

20002

## 5.1. Acquiring a single image

You can use your software to acquire high resolution images in a very short period of time. For your first acquisition you should carry out these instructions step for step. Then, when you later make other acquisitions, you will notice that for similar types of sample many of the settings you made for the first acquisition can be adopted without change.

*Selecting the objective*

1. In the *labSens* tool window, click the button with the objective that you use for the image acquisition.

*Switching on the live-image*

2. In the *labSens* tool window, click the *Live*  button.
3. Go to the required part of the sample in the live-image.

*Setting the image quality*

4. To set the image quality, activate the *Camera Control* tool window.
   - You can find a complete description of the *Camera Control* tool window in the online help.
5. Bring the sample into focus. The *Focus Indicator* toolbar is there for you to use when you are focusing on your sample.
6. Check the color reproduction. If necessary, carry out a white balance.
7. Check the exposure time. You can either use the automatic exposure time function, or enter the exposure time manually.
8. Select the resolution you want.
9. Return to the *labSens* tool window.

*Acquiring and saving an image*

10. In the *labSens* tool window, click the *Snapshot*  button.
    - The image you have acquired will be shown in the document group.
11. Use the *File > Save As...* command to save the image. Use the recommended TIF file format.

00048

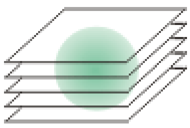
## 5.2. Acquiring a Z-stack

With the *Z-Stack* acquisition process, you acquire a series of frames one after the other, a Z-stack.

**Acquiring a Z-stack**

The acquisition process is only available when your microscope stage is equipped with a motorized Z-drive.

Example: You want to acquire a Z-stack. The sample is approximately 50 µm thick. The Z-distance between two frames is to be 2 µm.



1. Switch to the "Acquisition" layout. To do this, use, e.g., the *View > Layout > Acquisition* command.

*Selecting the objective*

2. On the *Microscope Control* toolbar, click the button with the objective that you want to use for the image acquisition.

*Setting the image quality*

3. Switch to the live mode, and select the optimal settings for your acquisition, in the *Camera Control* tool window. Pay special attention to setting the correct exposure time. This exposure time will be used for all of the frames in the Z-stack.

4. Search out the required position in the sample.

*Selecting the acquisition process*

5. Activate the *Process Manager* tool window.
6. Select the *Automatic Processes* option.
7. Click the *Z-Stack* button.
   - The button will appear clicked. You can recognize this status by the button's colored background.
   - The [ *Z* ] group will be automatically displayed in the tool window.

*Selecting the acquisition parameters*

9. Select the *Range* entry in the *Define* list.
10. Enter the Z-range you want, in the *Range* field. In this example, enter a little more than the sample's thickness (= 50 µm), e.g., the value 60.
11. In the *Step Size* field, enter the required Z-distance, e.g., the value 2, for a Z-distance of 2 µm.
    - In the *Z-Slices* field you will then be shown how many frames are to be acquired. In this example 31 frames will be acquired.
12. Find the segment of the sample that interests you and focus on it. To do this, use the arrow buttons in the [ *Z* ] group. The buttons with a double arrow move the stage in larger steps.

*Acquiring the image*

13. Click the *Start* button.
    - Your software now moves the Z-drive of the microscope stage to the start position. The starting positions lies half of the Z-range deeper than the stage's current Z-position.
    - The acquisition of the Z-stack will begin as soon as the starting position has been reached. The microscope stage moves upwards step by step and acquires an image at each new Z-position.
    - The *Start Process* button changes into the *Pause* button. A click on this button will interrupt the acquisition process.
    - The *Stop* button will become active. A click on this button will stop the acquisition process. The Z-stack as acquired up till then, will be preserved.
    - The acquisition has been completed when you can once more see the *Start* button in the *Process Manager* tool window, and the progress bar has been faded out.
    - You can see the acquired Z-stack in the image window. Use the navigation bar located in the image window to view the Z-stack. Further information on the navigation bar is available in the online help.
    - The Z-stack that has been acquired will be automatically saved. You can set the storage directory in the *Acquisition Settings > Saving > Process Manager* dialog box. The preset file format is VSI.

Tip: When other programs are running in the background on your PC, for instance a virus scanning program, it can interfere with the performance when a Z-stack is being acquired.

**Acquiring an EFI image**

Example: You have a thick section in the transmitted light mode, or a sample with a three dimensional surface in the reflected light mode, e.g., with holes, grooves, bumps peaks or slanting planes. In the image it's only possible to bring one focus plane, resp. only part of the surface, sharply into focus, higher-lying or deeper-lying areas are outside the depth of focus range. Acquire a Z-stack through the complete thickness resp. height, of the sample, and have the EFI image calculated for you.

*Setting the EFI parameters*

1. Activate the *Process Manager* tool window.
2. To open the *Acquisition Settings* dialog box, click the Acquisition Settings  button in the tool window's toolbar.
3. Select the *Acquisition > Automatic EFI* entry in the tree view.
4. In the *Algorithm* list, select the Transmitted light (exp) entry, if you're working in the transmitted light mode, and the *Reflected light* entry if you're working in the reflected light mode.
5. Select the *Automatic frame shift* check box when you're working with a stereo microscope and acquiring the sample at a viewing angle. Otherwise, clear this check box.
6. Close the *Acquisition Settings* dialog box with *OK*.

*Preparing for the acquisition of a Z-stack*

1. Carry out all the microscope settings.
2. In the *Microscope Control* toolbar, click the button corresponding to the objective you've set.
3. Activate the *Camera Control* tool window.
4. Switch to the live mode.
5. Optimize the exposure time. The exposure time will be kept constant during the acquisition of the Z-stack.
6. Click the *Autofocus*  button in the *Camera Control* tool window's toolbar to focus.

*Setting the Z-stack parameters*

1. Activate the *Process Manager* tool window.
2. Select the *Z-Stack*  acquisition process.
3. Select the *Top & Bottom* entry in the *Define* list.
4. Use the arrow buttons in the [ *Z* ] group to move your stage to the Z-position at which the lowest-lying position on the sample is sharply focused.
   The arrow buttons move the stage by steps of 2 µm resp. of 20 µm.
   - The stage's current position will be shown to you in the *Pos.* field.

5. Click the top *Set* button to define the starting position for the Z-stack acquisition.
   - The current Z-position will be adopted in the *Start* field.
6. Use the arrow buttons in the [ *Z* ] group to move your stage to the Z-position at which the highest-lying position on the sample is sharply focused.
7. Click the bottom *Set* button to define the position at which the Z-stack acquisition is to end.
   - The current Z-position will be adopted in the *Start* field.
8. In the *Step Size* field, enter the distance between two frames in the Z-stack. This Z-distance should be small enough to ensure that no positions on the sample between two images remain blurred. The higher your objective's Numerical Aperture is, the smaller the Z-spacing should be.
9. Use the [Enterl] key to confirm the Z-distance that you've set.
   - The number of images in the stack will be automatically calculated on the basis of the Start and End values, and the Z-distance.
10. Select the *Extended Focal Imaging* check box.
11. Finish the live mode.
12. Click the *Start* button.
    - The acquisition of the Z-stack will start immediately.
    - The acquisition will begin. After the acquisition has been completed the EFI image will be shown in the document group. This image was calculated from the variously focused separate images.

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## 5.3. Creating stitched images

*Without or with a motorized XY-microscope stage*

Please note: The following step-by-step-instructions describe how to acquire a stitched image using the *Manual MIA* acquisition process without a motorized XY-microscope stage. However, you can also use the *Manual MIA* acquisition process if your microscope is equipped with a motorized XY-stage. To do so, select the *Use motorized xy stage if available* check box. You'll find this check box in the *Acquisition Settings > Acquisition > Manual MIA* dialog box. To open this dialog box, click, e.g., the *Acquisition Settings* button in the *Process Manager* tool window's toolbar. In this case, you won't need to move the stage manually.

*Acquiring a stitched image without a motorized XY-stage (Manual MIA)*

Example: You want to acquire an image of a large sample area. Use the *Manual MIA* acquisition process, to acquire several individual images of adjoining positions on the sample, and to have them combined into a stitched image.

*Prerequisite*

The camera is aligned parallel to the XY-stage. The angle between camera and stage should be smaller than 1°.

1. Switch to the "Acquisition" layout. To do this, use, e.g., the *View > Layout > Acquisition* command.

*Selecting the objective*

2. In the *labSens* tool window, click the button with the objective that you want to use for the acquisition of the stitched image.

*Setting the image quality*

3. Switch to the live mode, and select the optimal settings for your acquisition in the *Camera Control* tool window. Pay special attention to setting the correct exposure time. This exposure time will be used for all of the stitched image's individual images.
4. Find the position on the sample at which you want to start acquiring the stitched image.
5. Finish the live mode.

*Selecting the acquisition process*

6. Activate the *Process Manager* tool window. To do this, use, e.g., the *View > Tool Windows > Process Manager* command.
7. Select the *Manual Processes* option.
8. Click the *Manual MIA* button.
   - The button will appear clicked. You can recognize this status by the button's colored background.
   - The *Manual MIA* group will be automatically displayed in the tool window.

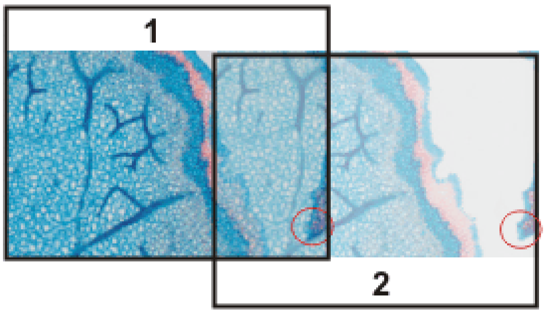
*Selecting the acquisition parameters*

9. Make quite certain that the *Auto Align* button appears clicked. It should then look like this: .
   - Then your software will search for the same image structures in neighboring individual images. The stitched image will be put together in such a way that image areas that are the same will be superimposed.
   - A tip if your system is equipped with a motorized XY-stage: Some motorized microscope stages work so precisely that you can dispense with an overlapping of the individual images. If you want to acquire the individual images edge to edge, release the *Auto align* button. The individual images will now be set next to one another just as they were acquired.

*Acquiring a stitched image*

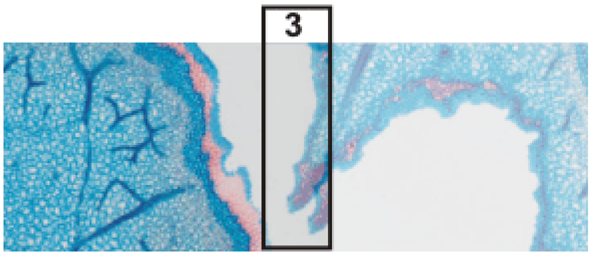
10. Click the *Start* button.
    - Your software switches into the live mode.
11. Bring the sample into focus.
12. Click on one of the arrow buttons to set the side of the current image at which the next image is to be arranged. For example, click this button if the next image is to be laid to the right of the current image.
    - Your system now acquires an image at the current position on the sample. In the image window, you now see on the left (1) the

acquired image, and on the right (2) the live-image.



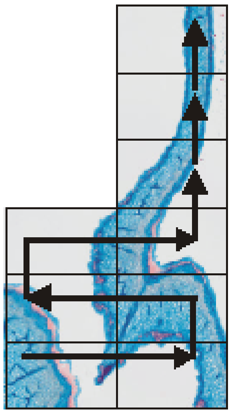

Since you haven't moved the sample, the live-image still shows the current sample position which means that you now see the current image twice.
The two images overlap. Since the live-image is shown transparent, you see both images in the overlap area simultaneously.

13. Make a note of a significant structure on the live-image's right border. You will find the same sample structure in the overlap area. On the illustration, a significant structure has been indicated by a circle.
14. Now, move the stage very slowly to make the structure on the live-image move to the left. Keep moving the stage until the image structures in the overlap area lie as exactly over each other as possible. The image structures need not lie precisely over each other, since your software will match the individual images with each other.
    - In the overlap area (3), the same image segments are shown now. This enables your software to seamlessly combine the two images.



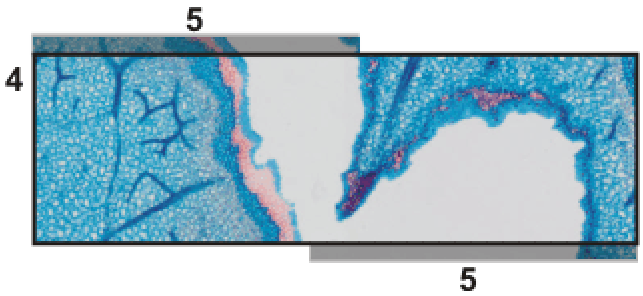

    - You can reverse the direction in which your stage moves, in the *Device Settings > Stage* dialog box. Depending on how you can best orient yourself, the live-image will then move to the left or to the right, when you move your stage to the right.
15. Check whether both images have been correctly combined. Otherwise you can undo the last step by using the *Undo last frame* button. You can then move the stage again, and match the structures better.
    - During the acquisition, you can change the current stitched image's zoom factor, e.g., to see certain parts in the overlap area better. You will find an overview on the possibilities of changing an image's zoom factor in the online help.
16. Define your way through the sample, with the arrow buttons, and follow that with the stage.

In this manner, you can display a sample in any form you like in the stitched image. The illustration shows a stitched image that is made up of 9 individual images, and the stage path.



17. Click the *Stop*  button when you want to end the acquisition of the stitched image.

    - You see the completed stitched image (4) in the image window. Since the individual images can lie a little askew of each other, the stitched image isn't as a rule, rectangular, but contains empty areas on its borders (5). These areas will, as a rule, be cut off in the stitched image.




- The stitched image will, by default, be automatically saved. The storage directory is shown in the *Acquisition Settings > Saving > Process Manager* dialog box. The preset file format is VSI.

*Properties of the stitched image*

- By default, in the overlap area, the intensity values of two adjoining individual images will be matched with each other to make the image's overall impression homogeneous.
- Stitched images are calibrated. This means that you can measure distances and objects on a stitched image.

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