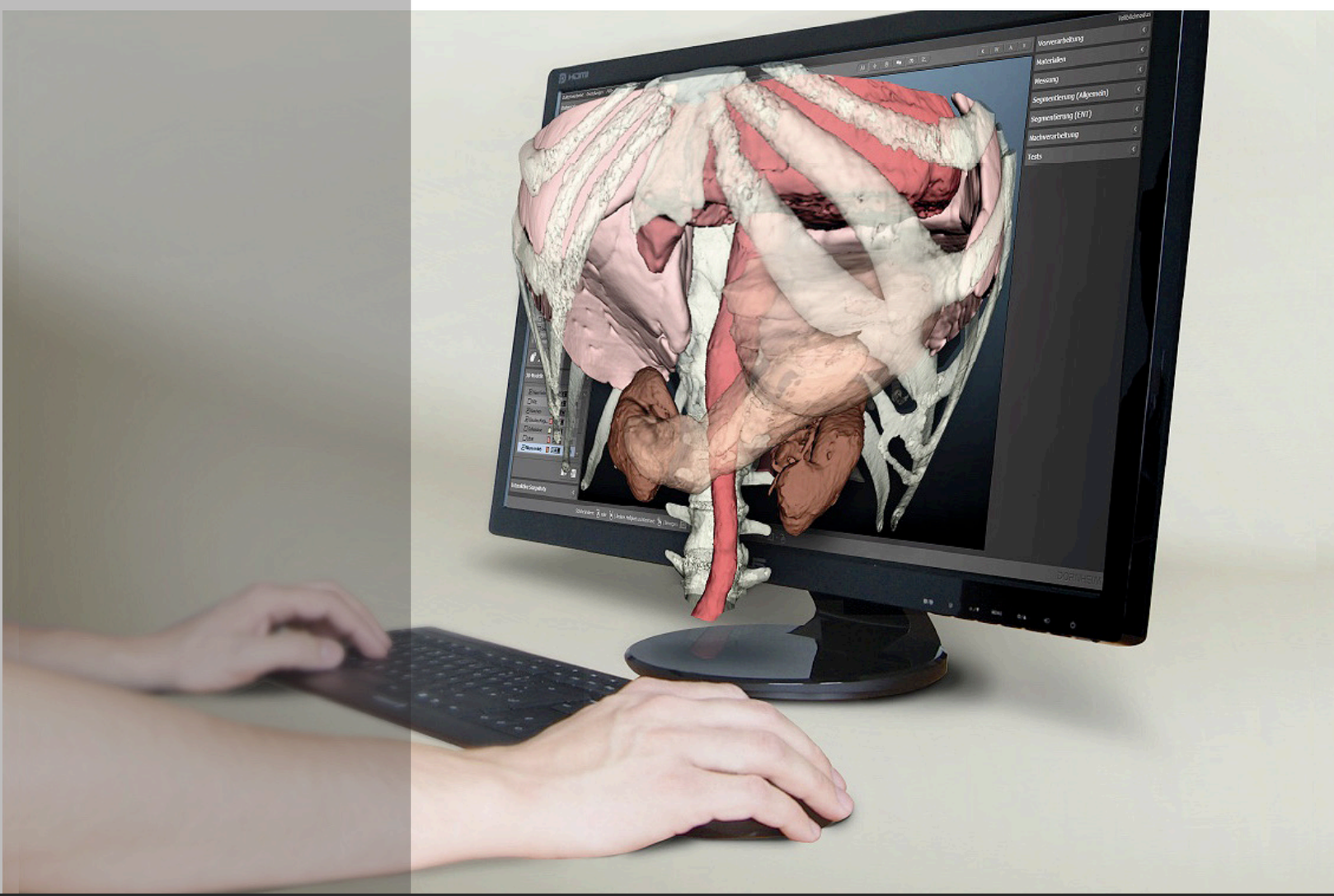
DORNHEIM



USER MANUAL

Dornheim Segmenter Modeler 2019

IMPRESSUM

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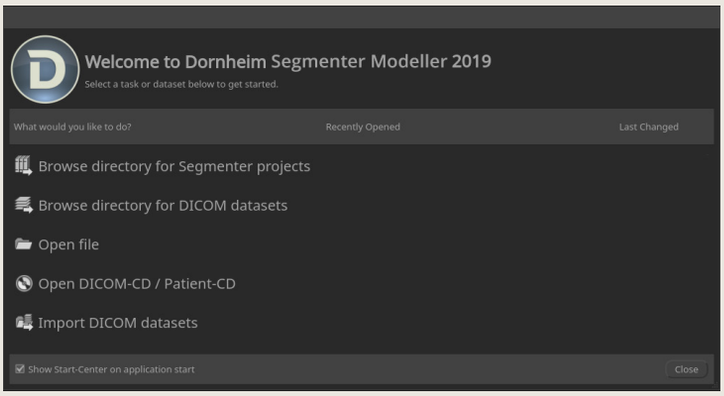
CONTENT

Welcome!

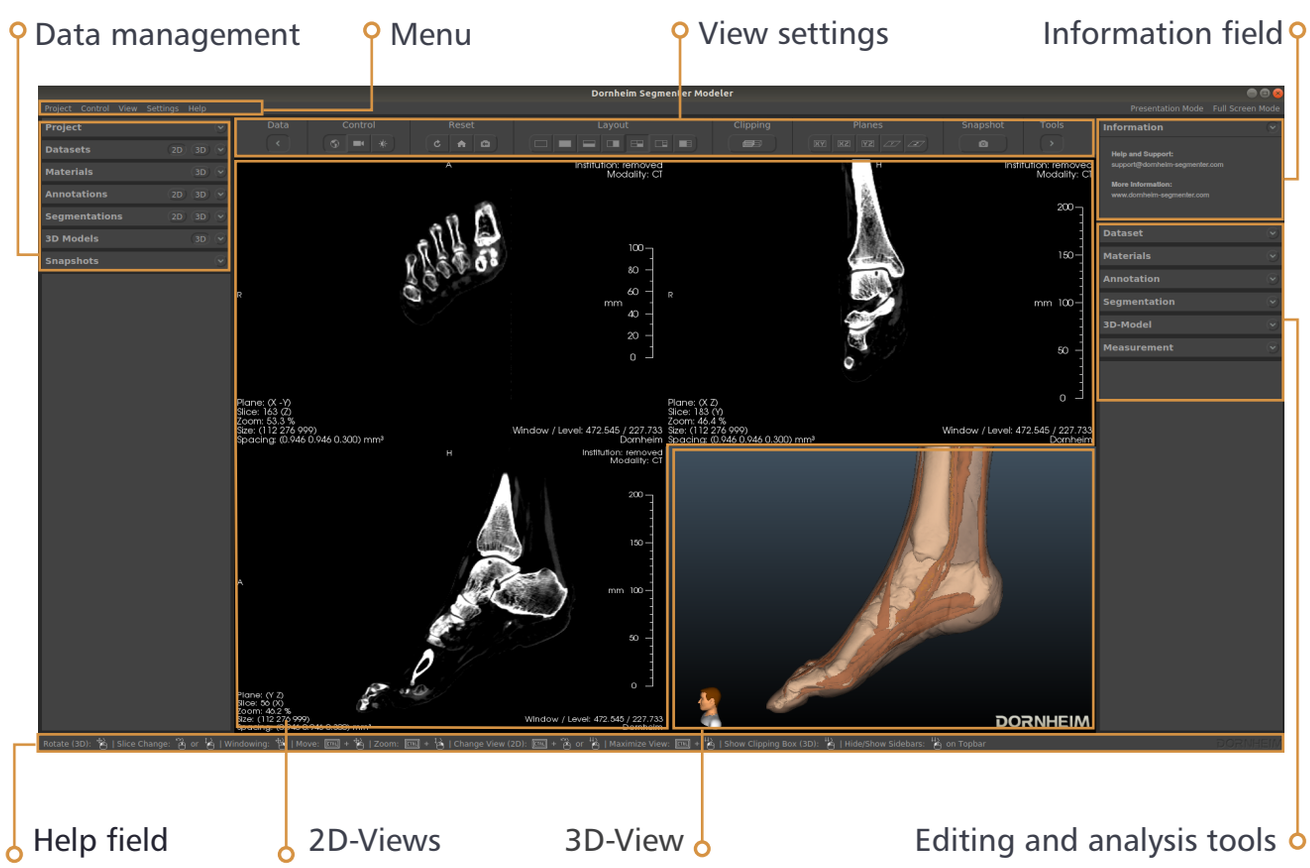
It is nice that you discover the Dornheim Segmenter Modeler with us.
When you start the Dornheim Modeler, the start center welcomes you first.



In order to provide you with a quick introduction, all options for opening data are summarized here. Choose whether you want to open one of the last opened files, a project, a DICOM dataset or any other file. You can also access a patient CD or DICOM CD directly, or import a dataset.

The working environment

Now you can see the complete working environment of the Dornheim Segmenter Modeler. In order to provide you with a quick introduction, all options for opening data are summarized here. Choose whether you want to open one of the last opened files, a project, a DICOM dataset or any other file. You can also access a patient CD or DICOM CD directly, or import a dataset.



Initially

First, the axial, coronal, sagittal layer images (2D views) and a 3D visualization (3D view) of your dataset are displayed in the views in the 2x2 view setting.

Data management

Here you can define which objects are displayed in your views. Select the objects with the left mouse button and use the 2D/3D buttons in the datasets to show or hide them. The management of datasets, materials, annotations, segmentations, 3D models and snapshots are all structured in the same way. You can use the function buttons (from left to right) to import new data or objects, for example from existing collections, or to create an empty object. In addition, you can adjust the properties and last but not least you can export the object or convert it into a new object. You can customize the data management according to your needs. If you do not want to see a certain area in your desktop, deactivate it under the menu item settings.

Information field

If a description or important information about your image data has been saved, it will be displayed in the upper right corner of the working environment. You can also edit or complete these yourself in the project properties.

View settings

In the view settings, you determine how your dataset is displayed in the view field and and which areas of your working environment you want to display. Change the section of your 3D view yourself or show additional planes. Change the contrast setting of the 3D visualization and capture all significant views with a snapshot.

Editing and measurement tools

If you want to fill an empty Segmenter object, edit or measure an existing one, you will find the tools for this in the corresponding editing tool to the right of the view field. Starting on page 15, we will show you the advantages and disadvantages of the different Segmenter objects and give you an introduction to the various functions and editing options.

Help field

You can perform all functions using the right and left mouse buttons, the mouse wheel, CTRL and SHIFT. Hints for helpful key combinations can be found in the Segmenter, in the help field below the views. A look here is always worthwhile!
Starting on page 10, we have compiled a summary, the use of the editing tools is described in detail in the corresponding Segmenter objects.

These data formats can be imported and exported

Import

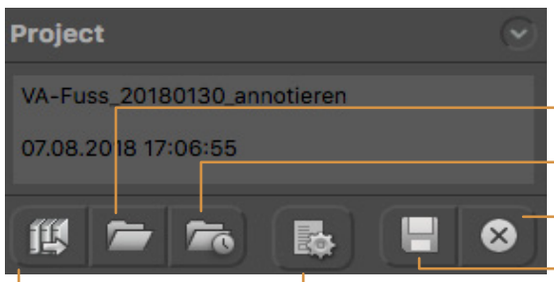
Segmenter-projects	seg
segmentations	RAW, mhd, MetaIO, VTI
generic volume datasets	RAW, mhd, MetaIO, VTI
DICOM	2D-stacks, 3D-Multiframe
VGStudio	VGI
3D ultrasound	VOL Kretzfile/GE
polygon meshes	OBJ, PLY, STL, VTP

Export

Segmenter-projects	seg
segmentations	RAW, mhd, MetaIO, VTI
generic volume datasets	RAW, mhd, MetaIO, VTI
DICOM	2D-stacks, 3D-Multiframe
VGStudio	VGI
3D ultrasound	VOL Kretzfile/GE
polygon meshes	OBJ, PLY, STL, VTP
scenes	U3D
3D PDF (scenes and views)	
views	BMP, JPG, PNG
stereoscopy - views and animations	
animations	AVI, MPG

Manage projects

A **project** consists of a **data set** and any number of segment objects (**materials, segmentations, annotations, 3D models, snapshots**). The file name ends with .seg . In the data management you will find the projects tab at the top. There you can open projects and manage the opened project.



Open

Open recently opened files

Close project

Save project

Project properties:

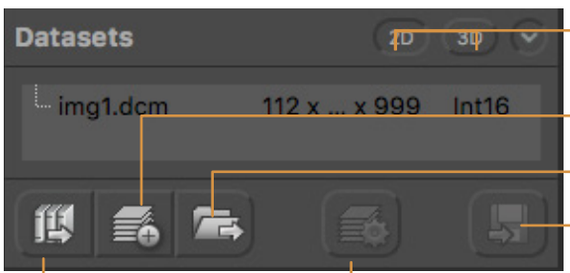
Here you can find the project properties, edit and complete them. You can restrict the editing **rights** in the **rights** tab. This allows you to create an edit-protected project. Make sure to save it with a new **file name** using **save project as**! You can also add a description to be displayed in the information field.

Open project collection:

Search your computer or storage device for projects.

Manage datasets

Datasets are image stacks or volume data on which you work. They form the basis of your observations and analyses. In addition to medical DICOM datasets, you can also open images of technical objects.



2D / 3D - activate view

Create new record

Import dataset

Export data record

Dataset properties:

In the dataset properties you will find information regarding geometry, data set size, date and place of admission, patient information as well as detailed information about your DICOM file. You can also **anonymize** the dataset here if necessary to comply with data protection regulations.

DICOM collection:

Here the DICOM data is collected and summarized for each patient. You can also access the **PACS library** if your administrator has set this up.

View settings

Reset

Reset all views or just the 3D viewing angle or return to the last snapshot. The selection of objects displayed is only chan-ged when you return to the last snapshot.

TIP! Changes made to structures such as segmentations, annotations or 3D models are not undone, deleted objects are not restored.

Views

All view settings, such as contrast, viewing angle and planes, are reset to their original settings.

3D viewing angle

Only the 3D view including the clipping box is reset to its original setting.

Last snapshot

Here you can return to the last snapshot.

For more information on snapshots, see page 23.

VIEW SETTINGS

Splitting

Splitting up the display field

Do you want to view more 2D views in addition to the 3D view or arrange multiple ones conveniently? In the upper part of your Segmenter working environment there is the field **splitting**, which you can use to adjust it.

BY THE WAY! Within a 2D view, switch between the axial, coronal or sagittal plane by double-clicking the view with the left mouse button.

- 2D- maximize view
- 3D- maximize view
- 2D- and 3D- split view vertically
- 2D- and 3D- split view horizontally
- split view 2 to 2
- split view 1 to 3 (2D)
- split view 1 to 3 (3D)

Planes

Show orientation aids

Do you want to examine layered images in the context of the 3D view? The different planes that display layered images in the 3D view allow you to quickly and easily capture additional orientation and context information.

TIP! The free planes can be rotated in any direction. To do this, drag the left mouse button into the border fields and rotate the plane.

- XY-planes
- XZ-planes
- YZ-planes
- free planes

Control

Activate world control

This mode visualizes the object to be viewed as if you were holding it in your hand.
Rotate and turn it, move closer or further away. Activate this mode if you want to view and examine the dataset as a whole.

Activate direct camera control

If you want to see your dataset from an endoscopic point of view or move it through to see it from the inside, this is the right control mode for you. Use the **forward, backward**, and **scroll key** combination to move precisely and at walking pace through your dataset.

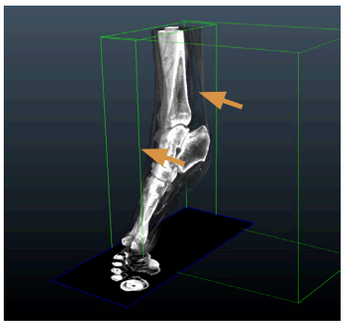
Activate contrast control

On mobile devices, contrast control allows you to adjust contrast without a mouse using the touchpad.

Clipping

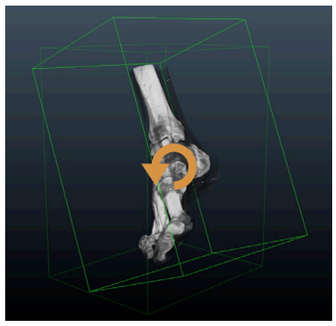
Show clipping box

The **clipping box** is one of the most important visualization tools of the Dornheim Segmenter Modeler. You can use it to hide parts of your dataset and thus make inner structures visible, independent of the windowing. Only structures that lie within the cutout box are displayed, those that lie outside are not deleted. The entire dataset is displayed again as soon as you enlarge the clipping box. Edit it by applying the following operations to the clipping box:



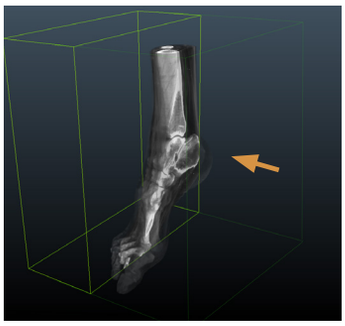
Clipping

Hold down the left mouse button and drag one side of the clipping box.



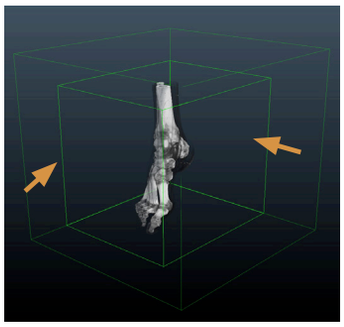
Rotate

Rotate a corner or edge of the clipping box while holding down the left mouse button.



Move

Move one side of the clipping box while holding down the left mouse button. You can move the entire section box by holding down the CTRL key.



Enlarge

Hold down the CTRL key + right mouse button and drag in the 3D view.

TIP! If you want to rotate, enlarge or move the clipping box together with the dataset, you can do this using the same key combinations by reaching next to the box.
Once you have found a suitable view using the described functions, you can capture it with a **snapshot** (see page 23).
In the segmentation tool Cut (see page 19) you can use the clipping box to reformat or cut your dataset (see page 13 or page 15).

Snapshot

Take a snapshot

This button gives you another way to take a snapshot of your view. All view settings will be saved so that the view can be recalled. Deleted 3D models, segmentations, materials or changes to the dataset cannot be restored from the snapshot. The created **snapshots** can be found as thumbnails in the tab **snapshots** in the data management on the left side of your segment working environment. Everything about snapshots and the **export of images, videos** and **scenes** can be found on page 23.

Shortcuts

A look at the help field is always worthwhile! Here, valuable hints and key combinations of functions that are offered as the next step are displayed in addition to all interaction and editing tools.

The most important shortcuts for working in the world control view are:

Rotate in the 3D view:

By grabbing your object with the left mouse button, you can rotate it around the center of the data set.

Move:

Hold down the CTRL key and move your object with the left mouse button.

Zoom:

If you want to zoom in or out, you can use CTRL+right mouse button to zoom in the relevant object. In the 3D view you can also do this with the mouse wheel.

In addition, you can:

Adjust contrast:

Depending on the windowing (contrast setting), different anatomical details can be seen from the same angle. To adapt this to your needs, move the mouse pointer over your view while holding down the right mouse button. Drawing eights with the mouse is particularly useful.

Change 2D layer:

If you want to display another layer in a 2D view, double-click the view with the left mouse button.

Maximize view:

If you only want to view a 2D or 3D view, hold down the CTRL key and double-click the relevant view with the left mouse button. In the same way, you can return to the previous split (see page 8).

Hide page areas:

If you want to expand your view area, you can hide the areas to the right and left of it by double-clicking on the view bar or using the arrows
Press.

Scroll:

With the mouse wheel you can slice through your 2D layer images. Alternatively, you can slide over the 2D view while holding down the left mouse button.

While you can use the functions described on the last page in **world control** as well as in direct **camera control**, the latter is characterized in particular by the following viewing options:

Forwards/ backwards:

If you want to move the camera forwards or backwards, use the up/down arrow keys on your keyboard.

Roll:

If you want to rotate the camera without changing your location, use the left/right arrow keys on your keyboard.

Zoom:

If you want to increase or decrease the camera's viewing angle (up to 180° is perceived as an increase or decrease), you can do this using the mouse wheel.
In both 2D and 3D, you can also zoom in the relevant object using the CTRL+right mouse button.

Rotate:

If you want to rotate the viewing angle, move the mouse with the left mouse button pressed over the 3D view. This allows you to steer the camera head. Attention: this movement is not possible with a rigid endoscope or a biopsy needle.

Move:

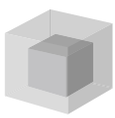
You can move the camera by pressing the CTRL key and the left mouse button. This function cannot be reproduced in reality.

You can also achieve the last three functions (Zoom, Rotate and Move) by adjusting the camera shown in the 2D views or its wings with the mouse.

What you should know about working with the dataset tools

The dataset tools are located on the right side of your Segmenter environment, in the editing and analysis tools. All changes made using the dataset tools, once saved, affect the original data. For this reason, we recommend that you make a backup copy of your dataset first.

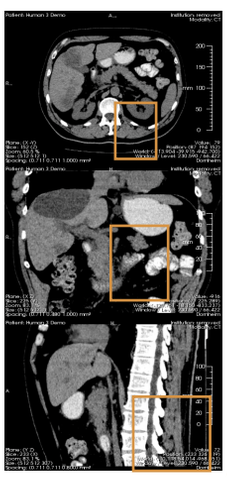
Crop



Define the dataset boundaries

With the mouse

In all 2D views (axial, sagittal or coronal plane), use the left mouse button to narrow the area of the dataset to be preserved.



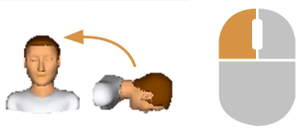
Enter the coordinates

Enter the coordinates manually or use one of the preset settings, **full dataset** or **fit to clipping box**. To accept all settings, confirm by clicking **apply**.

Orientate

Align the dataset correctly

If your dataset was recorded in an unfavorable or unusual position, you can correct it. To do this, rotate your dataset in the 3D view to the desired starting position. The oriantate tooll can now align the data correctly. This is especially useful if you use tools that automatically create analyses. To obtain an exact alignment parallel to the axis, select the **paraxial** option.



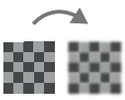
Flip

Reflect the dataset

This function is used to correct technical image data recorded mirror-inverted by offering the possibility of mirroring at the coordinate axis X, Y or Z.

Beware! This function is unsuitable for medical data and only recommended for a few special technical cases, since it works on the original image data and the operation can hardly be reproduced later.

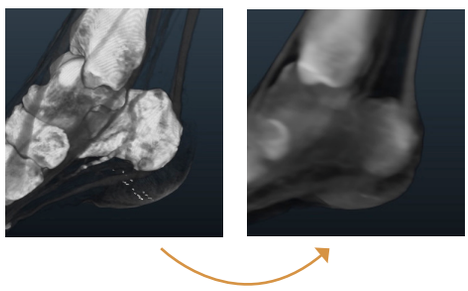
Smooth



The aim of smoothing filters is to free image data from annoying effects and thus enable new perspectives. For example, edges are highlighted or noise suppressed. No additional image information is generated that is not contained in the image data.

Gaussian filter:

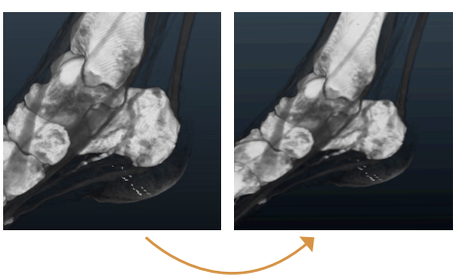
This minimizes image noise, the visual impression becomes softer and edge contrasts are also attenuated. This is an advantage for image distortions that produce edges (e.g. CT images of patients with metal implants). Especially with very noisy image data, such as ultrasound images, a visual enhancement can be achieved.



Beware! Do not use this method if you want to perform an exact segmentation of edges or a dataset analysis afterwards.

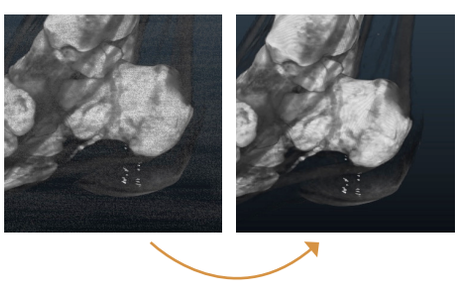
Bilateral filter:

The Bilateral filter minimizes noise on homogeneous surfaces, but maintains the edges. This is an advantage as preprocessing for segmentation.



Median filter

The Median filter adjusts the gray levels of individual pixels to eliminate noise, also known as salt and pepper noise. It has an edge-preserving effect. This is useful for preprocessing CT datasets.



Invert

Here the opposite grey value is determined

You should be aware that the gray values reflect physical properties and thus all gray value-based tools, such as preset materials, no longer represent reality.

Cut

Permanently remove areas of the dataset

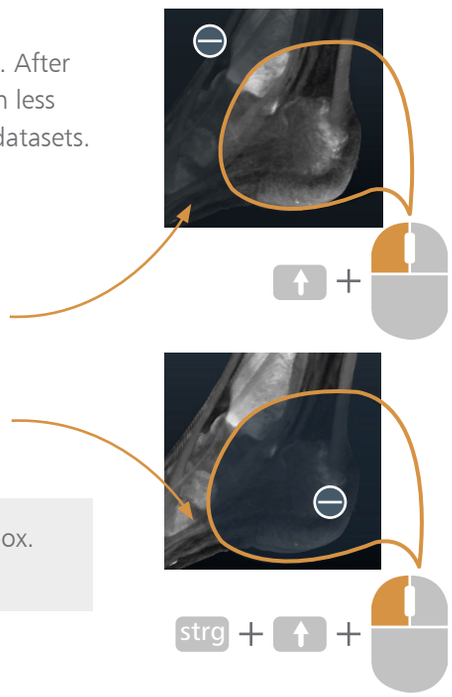
You can use the cut tool to cut the dataset to the essentials. After cutting, it requires less memory space and can be loaded on less powerful computers. This is especially useful for very large datasets. Only 3D models are not cut, but remain completely intact.

Cut to size in a restricted area

Use Shift + left mouse button.

Cut out the restricted area.

Use Ctrl + Shift + left mouse button.



TIP! In particular, we recommend the use of the clipping box. Its use is described on page 9.

MATERIALS

Better allocation of structures

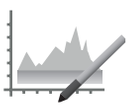
You can use the **materials** to display your dataset quickly and in a structured manner. An **intensity range** is defined and assigned a **color** and **transparency**. Materials are only displayed in the 3D view.

Show/hide in the 3D view
Set color/degree of transparency
Display/hide material
Material settings
Convert to segmentation
Export to material collection
Create new material
Import from material collection

Add material

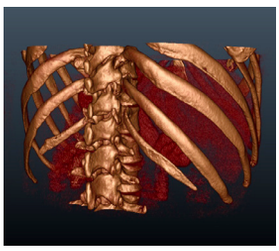
Frequently occurring tissue types are predefined in the **material collection**. You can import these into your project. The material collection is located in the materials management of your segment environment.

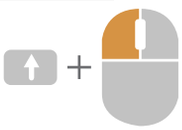
Edit material



Settings, colors, transparencies

You can create your own materials or edit existing ones according to your requirements. You will find the **Edit** tool on the right-hand side, under the Editing and Analysis Tools in the Material area.

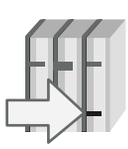




You can also use the **area**, **contour**, and **outer** drawing functions to describe an inner and an outer area in your view, on the basis of which a boundary is now calculated. The **preview** of the material is displayed in the 3D view. For **contour**, it is recommended that you orient yourself to an edge that you describe as precisely as possible with the contour by selecting close to it on the outside and inside. For **area**, the goal is to describe inner and outer surfaces. The selection should represent the variety of gray values of the tissue.

Alternatively, you can limit the **intensities** directly in the diagram. Here you will also find the options **gain, triangle, trapezoid** and **rectangle**. These describe the dependence of the transparency of your material on the intensity. If you select the rectangle, your entire material will be displayed with the same transparency; for the others, it will drop off at the edges of the intensity range according to its geometric shape. The differences can be easily compared in the 3D Preview. Move the mouse pointer with the right mouse button pressed over the 3D view to adjust the **basic transparency**, or enter the desired value in the editing tool. You can also adjust the color here.

Choose **apply** to confirm the material adjustments. You now have the option of overwriting the processed material or saving it as a new material.

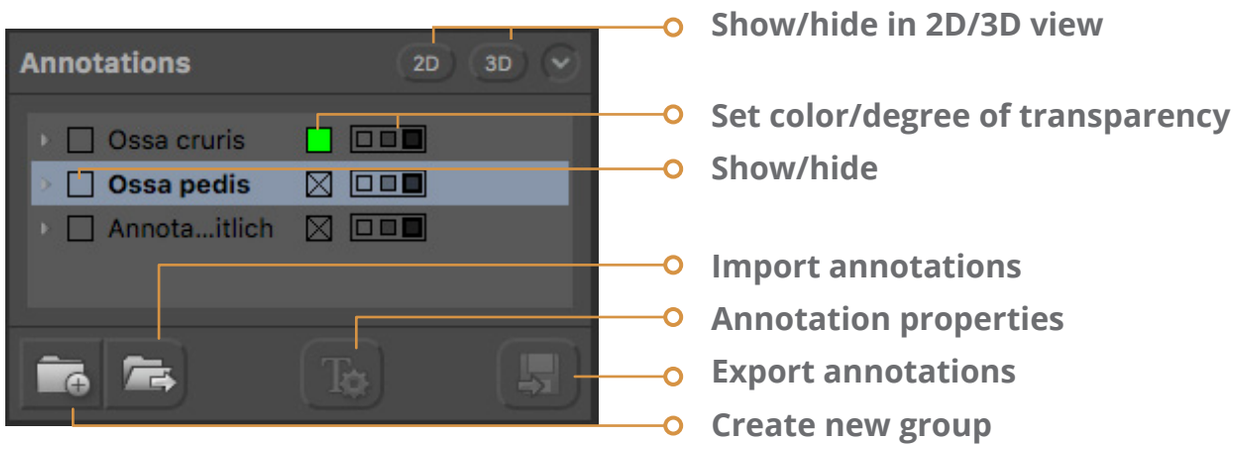


materials collection

You can add materials you have created yourself to the **materials collection**, by exporting them to the library. The materials saved here can now be used in other datasets as well.

Identify areas or structures

Mark and complete areas or objects in your project with additional information in the form of **text, images** or other elements. You can create annotations individually or in groups in your data management.



Add annotations

You will find your annotation tools on the right side of your Segmenter environment, in the editing and analysis tools.

This is how you place your annotation:

Select one of the annotation shapes and position it with SHIFT+left mouse button. Depending on the shape, one or more points must be set. You can also move them with SHIFT+left mouse button or remove them with SHIFT+CTRL + left mouse button.

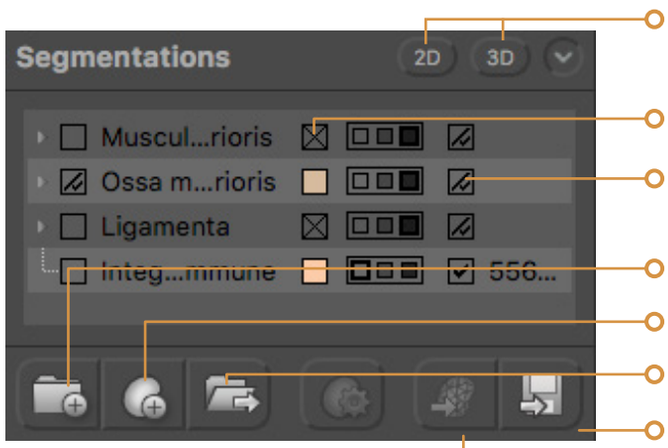
Complete or end annotation

If you want to close the path in the path annotation, you can do this with SHIFT+CTRL+left mouse button. No new point will be set. Now complete the annotation by adding information and clicking **apply**.

TIP! If you want to set the points in the 3D view, fade in a plane as orientation. You can also save a measurement directly as an annotation. This is described on page 26.

Preparation for the 3D model

The segmentation tool is the heart of the Dornheim Segmenter Modeler. A segmentation is a summary of 3D image points (voxels) that belong together in terms of content. This is the first step towards a 3D model. Segmentations are suitable as orientation for measurements and are collected and managed in the data management.



Show/hide in 2D/3D view

Set color/degree of transparency

Show segmented area only
(is applied to dataset)

New group

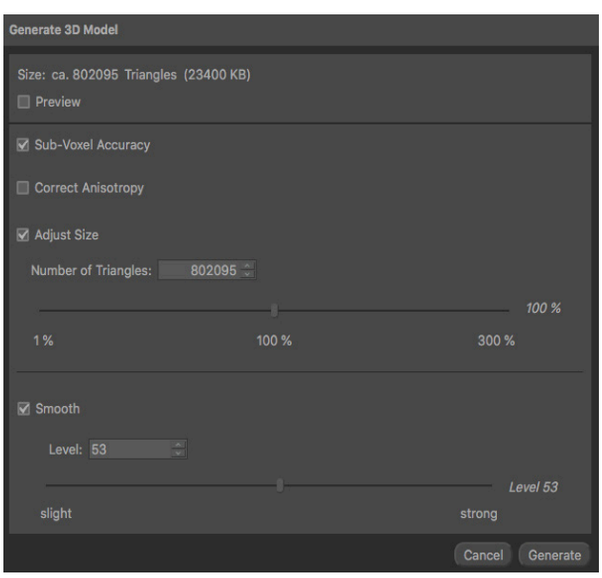
New segmentation

Import segmentation

Export segmentation

Convert to 3D model

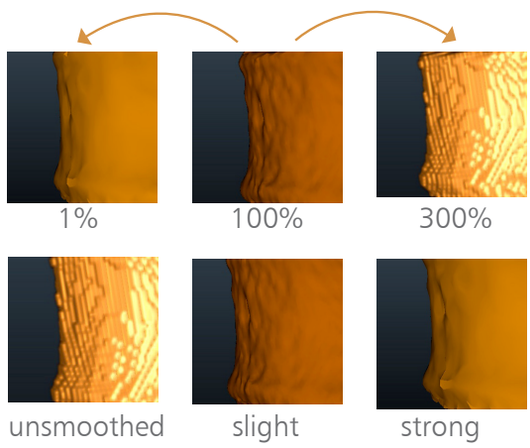
Convert to 3D model



Sub-Voxel accuracy: The surface is refined by interpolation on the voxel grid.

Correct anisotropy: The number of layers is increased using interpolation to make the 3D model more uniform.

Adjust size: Specify the number of triangles. The more triangles, the finer the 3D model, but the more memory you need.



Smooth: This rounds off the edges and the 3D model is smoother.

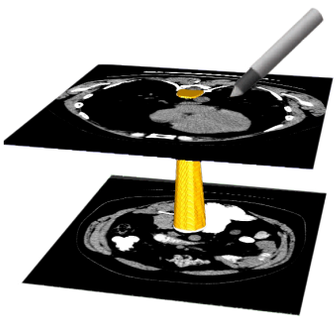
Beware! Do not use this method if you need exact measurements afterwards.

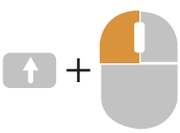
Paint

Border or mark the structure in one of the 2D views, scroll and repeat in multiple layers. You can use various **drawing tools** to do this, allowing you to segment by hand with great precision. The segmentation between the layers is automatically completed.

Refine segmentation by limiting an intensity range using the Threshold slider. Use the 3D view to monitor the progress of your segmentation.

TIP! Make sure that the 2D button is activated in the Segmentations area of the data management.

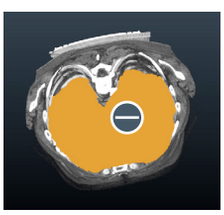


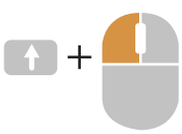


Cut

Cut your dataset back to the area containing the structure for segmentation. The **intensity, inverse intensity**, **materials** and **preview** modes are available as 3D views for this purpose.

TIP! Try different modes in the 3D view to find out which one is best for you. We can also highly recommend using the **clipping box**.





Cut to size in a restricted area

Use Shift + left mouse button.

Cut out the restricted area

Use Ctrl + Shift + left mouse button.

Refine with threshold value

Refine segmentation by limiting gray values using the Threshold slider. To apply all settings, click **apply**.

Threshold

Semi-automatic segmentation

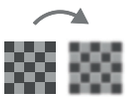
Create segments by specifying an **intensity range**. You can then cut or refine them with the other tools.

Region growing

Semi-automatic segmentation

In addition to the **intensity range**, you can also select a **starting point** so that a contiguous segment is created.

Smooth

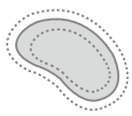


Refine segmentation

Smoothing the surface of the segmentation removes unevenness. This reduces the overall segmentation.

TIP! Do not use this method if you need exact measurements afterwards or if you want to perform a dataset analysis.

Morphological operations

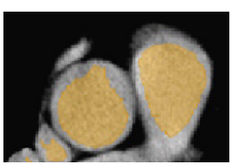


Adjusting segmentations

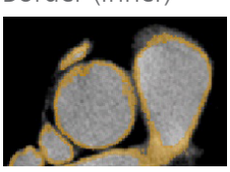
With these functions you can increase or decrease your segmentation by any number of voxels or hollow it out by making a border out of the segmentation.

Dilate

Erode



Border (Inner)



Border (Outer)

Open

When opening, the segmentation is first reduced and then enlarged. This allows small structures that only seem to belong to the segmentation to be removed.

Close

When closing, the segmentation is first enlarged and then reduced. This allows small holes in the segmentation to be filled.

Components/ holes

Filling of holes or removal of individual segments

With this tool you have the possibility to fill **holes** as well as to view **components** of your segmentation separately, remove them if necessary, or save them individually. A diagram shows the quantity of components as a function of the number of voxels.

With the option **separate components** you can save these as **new segmentations** using **apply**. Alternatively, you can save only the largest component, select any component with CTRL+left mouse button or remove it with SHIFT+CTRL+left mouse button.

Logical operations

Combining segmentations

Activate the relevant segmentation in data management. If you now want to combine this with another segmentation, select the second structure under **combine with** and apply the desired operation.

Empty

This tool creates an empty segmentation by deleting all structures from the selected segmentation.

Full

Here a segmentation is created which includes all pixels of the dataset. The dataset area is completely filled in.

Inverse

The inverse segmentation contains exactly the pixels that the selected segmentation does not contain. The original segmentation is cut out of the datasset.

Intersection

The new segmentation here is the intersection, i.e. the area that is overlapped by both selected segmentations.

Sum

As a sum, a new segmentation is created that contains both selected segmentations; both merge to form a new structure.

Difference

The difference is the segmentation that contains all pixels contained in the selected segmentation, but not in the segmentation selected in „combine with“.

Quick guide: from dataset to 3D model

Open your dataset or segmenter project via the **project management**.

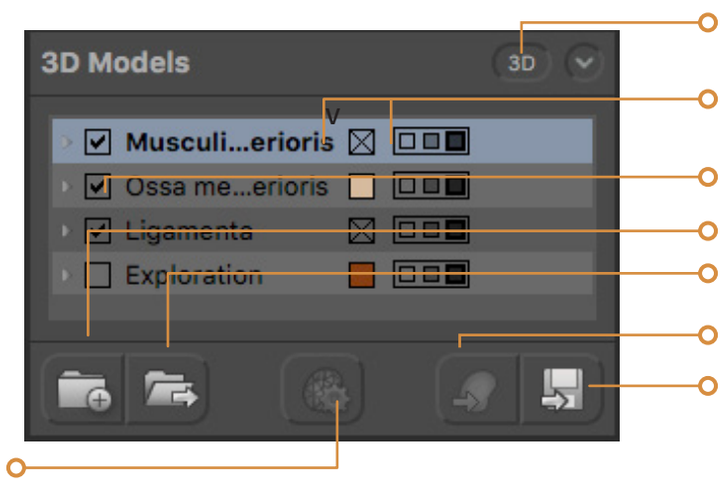
Create a **segmentation**. For an introduction, see page 18.

Convert the **segmentation** into a **3D model**. You will find the function button for this on the left side under **segmentation** in the data management.

Export the **3D model** by following the instructions in this chapter.

Your surface model

Use **3D models** for visualization and animation or as a pre-stage for more processing steps, for example 3D printing. All 3D models are collected and managed in the data management on the left side of the Segment environment.



Show/hide in the 3D view

Set color/degree of transparency

Show/hide single 3D model

Create new group

Importing a 3D model into the project

Convert to segmentation

Export 3D model

Features

Specify the display properties. You can also add a **description** to your 3D model in the form of text, links or images. This description is then displayed in the information field.

These formats are available for the export:

STL modell	.stl
Wavefront OBJ modell	.obj
VTK Polydaten	.vtp
U3D modell	.u3d
OpenInventor modell	.iv
VRML modell	.wrl
Step modell	.step
IGIS Cut modell	.igs

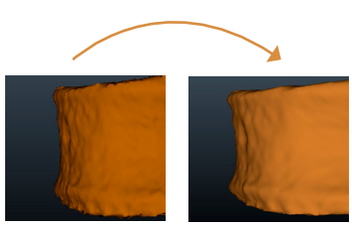
Edit 3D model

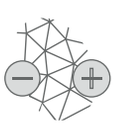
The tools for editing 3D models can be found on the right-hand side of your Segmenter environment in the 3D model areal.

Smooth

Reduce steps - smooth surface

Select the degree of smoothness of your 3D model by moving the step slider in the appropriate direction.

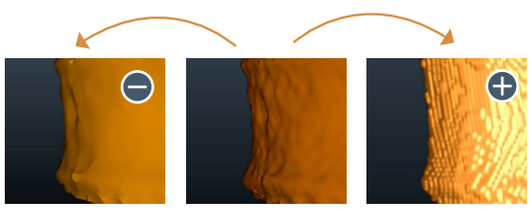




Simplify/refine

Increase/decrease number of triangles

Coarsen or refine your 3D model by dragging the step slider in the desired direction.

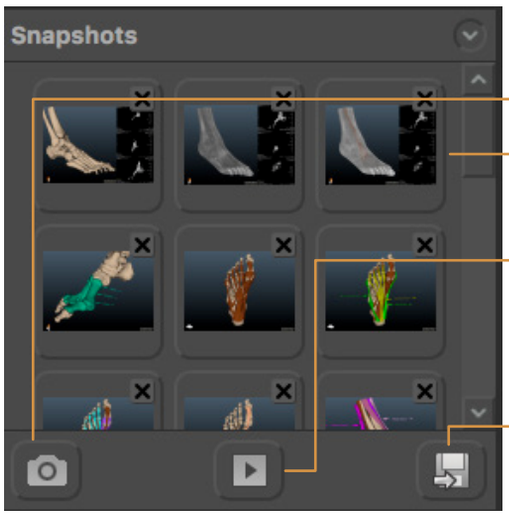


SNAPSHOTS

Capture and export views

The **Snapshots** tab allows you to capture any view to return to it at any time. To do this, click on the camera icon of your snapshot management or click on the camera on the right in the view settings. All settings from the view Settings will be applied. Deleted 3D models, segmentations, materials, or changes to the dataset cannot be reset.

You will find the snapshots in the form of thumbnails in your snapshot management.
To return to a snapshot, click with the left mouse button on its thumbnail. If you click on the cross, you delete the snapshot.



Create a new snapshot

Created snapshots

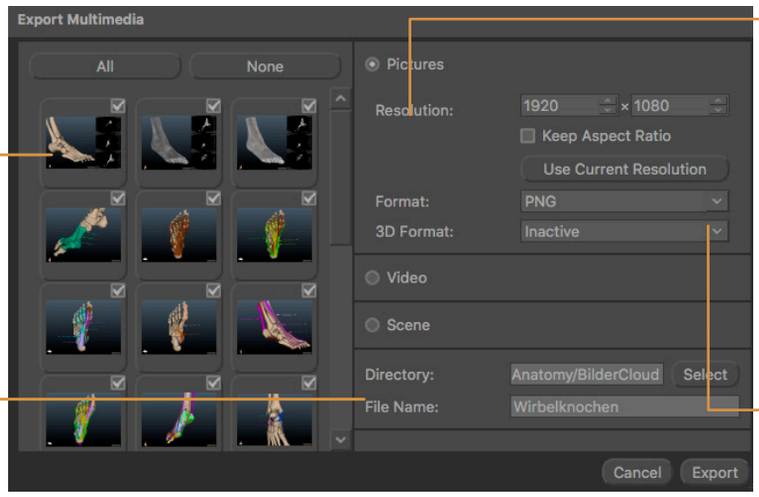
Animate snapshots in view
(Snapshots are played one after the other. Different object positions are animated fluently)

Export Multimedia

Export snapshots

Snapshots can be exported as different media. First, select the snapshots you want to export by checking the box.

Specify the file name and directory where you want to save it.

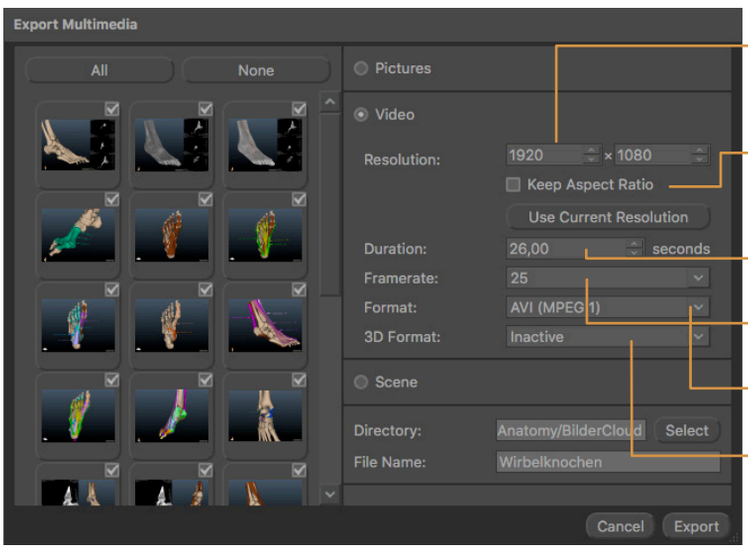


If you want to export **images,** you can select the **resolution** and **format**. Please note that only **BMP** and **PNG** are lossless formats that do not contain any artifacts. **JPG** requires less storage space for this.

Save in 3D format
(see page 25)

Export videos

You can create a **video** by selecting multiple views that animate one after the other.



The resolution immobilise

The aspect ratio vary proportionally

Duration of the animation

Number of frames/sec.

Select video format

Save in 3D format
(see next page)

Format settings (resolution) for video export

Standard format (4:3)	Widescreen format (16:9)	Application examples
800 x 600	854 x 480 (wide screen)	presentations, television presentations, film screenings with low resolution and data volume
1024 x 768	1280 x 720 (HDTV)	presentations, screen displays (PC, Smartphone, Tablet) with normal resolution
1600 x 1200	1920 x 1080 (Full HD)	presentations, television presentation
	3840 x 2160 (4K)	very high resolution television presentation

Length of the video

TIP! You can estimate the length of your video based on the selected animation duration and the number of snapshots you selected.

Number of frames per second

A jerk-free movement is realized from 25 frames per second. Fewer images allow a faster export with less data volume.

File format for video export

For general video export, we recommend using the AVI (MPEG 2) format. If you want to add subtitles, a menu or chapters next to an audio track, MPEG-TS (MPEG 2) is better suited. These two container formats can be used universally and can also be played by most video players. If your computer does not yet support MPEG 2, use the file format MPEG-TS (MPEG 1) or AVI (MPEG 1).

Save in 3D format

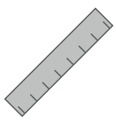
If you want to export your snapshots in 3D format to view them using polarization glasses or shutter glasses, first find out whether the playback device needs the file to be **stacked, side-by-side,** or **interlaced**. You can then set this under **3D format**.

You also have the possibility to export media in 3D to view them later with anaglyph glasses. Adjust their color filters. The default is **red cyan**, but also **red blue** and **green magenta** are possible.

More ways to take snapshots

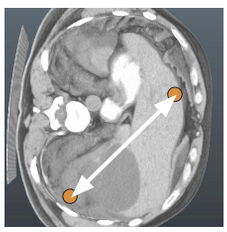
You can also capture views in the expanded view area by clicking the camera on the right side of the view bar. To create an image or video from the captured views, you can select and save them under export multimedia. To create a video, simply select multiple views and animate them one after the other.

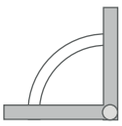
The analysis tool MEASUREMENT



Length

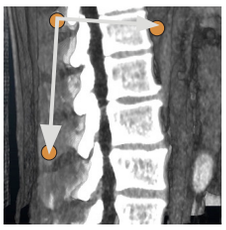
Two measuring points can be used to measure the length of an object or the distance between structures.

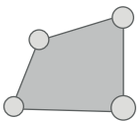




Angle

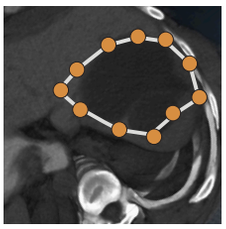
By setting three measuring points, an angle can be determined to describe the shape of an object or the position of several objects relative to each other.





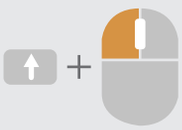
Area

If you want to analyze an area, you can describe it with an ellipse, a rectangle, or a polygon. In addition to the area, circumference and diameter, parameters specific to the geometric figure (e.g. side lengths, axes, corner points) are defined.



Measure length, angle and area:

Set or move the measuring points with SHIFT+left mouse button.



TIP! For ellipses and rectangles, displacement is of elementary importance, since a circle or square is created when the measuring points are set. To adjust these, you can then move the points.

If you want to move both opposite points simultaneously, use SHIFT+CTRL+ left mouse button. So you can also remove individual points or end the selection of polygon measurement points. No new point will be added.

Measuring in the 3D view

If you want to set the measuring points in your 3D view, you can use the same key combinations. In order to fix the points clearly in space, it is advisable, or even necessary for the measurement of surfaces, to fade in a plane (see page 8).

Save measurement as annotation

Once you have found a suitable measurement, click on „apply“ to save the view as an annotation (see page 17).

BY THE WAY!

Have you become curious about what else the Segmenter series has to offer, have you still got questions or would you like to get in contact with us? Please visit our website. There we have provided video tutorials for you. You will also find further information about our products. You can also send us an e-mail or give us a call. You can reach us under:

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