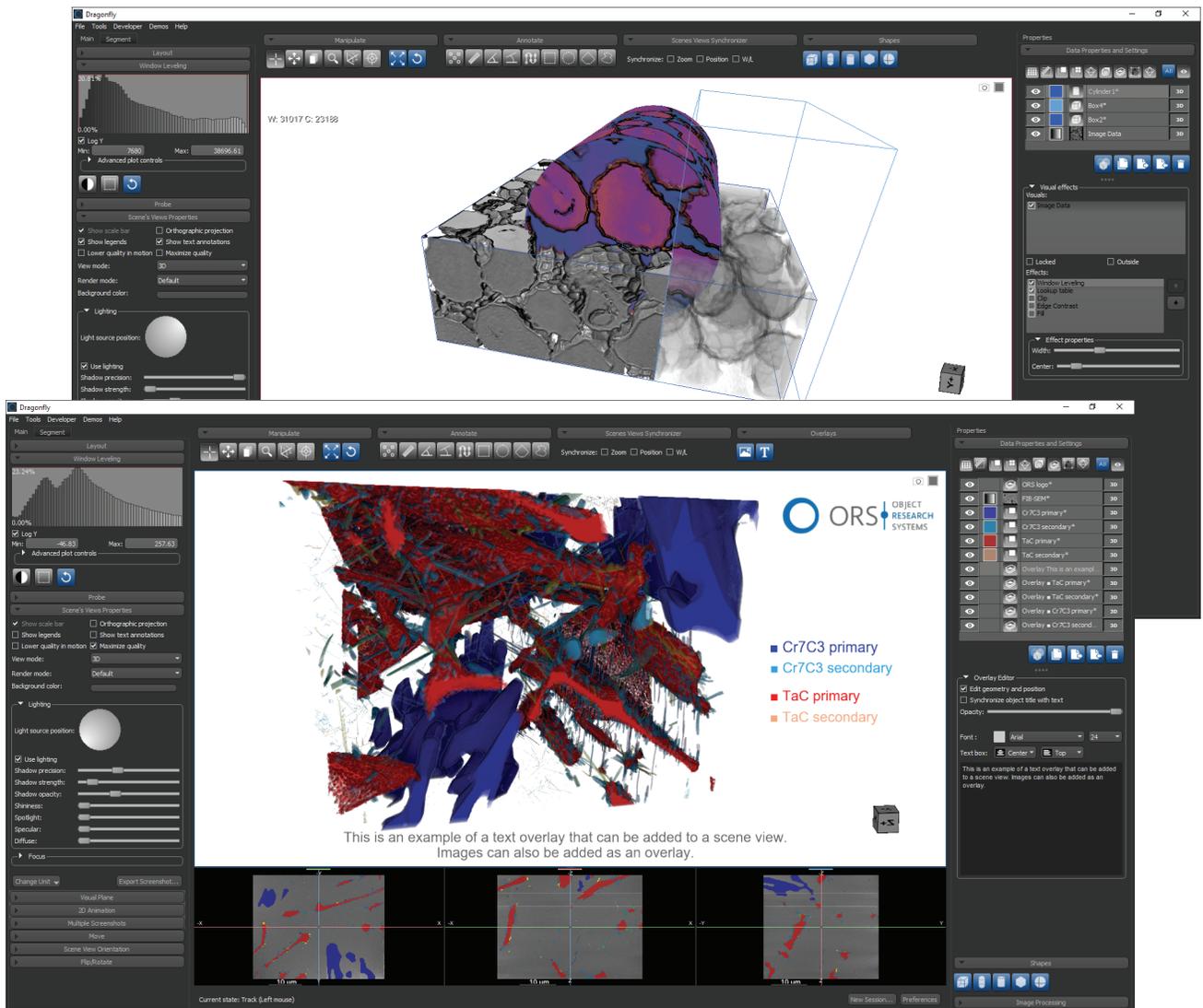




DRAGONFLY RELEASE NOTES



VERSION 3.5

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Release date 2018.03.29
Reference number TM021-A-03

Release Notes

Version 3.5

This document describes the new features, product enhancements, and other improvements implemented in the Dragonfly and Dragonfly Pro 3.5 software release. You should read these release notes carefully before you install this new version.

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New Features

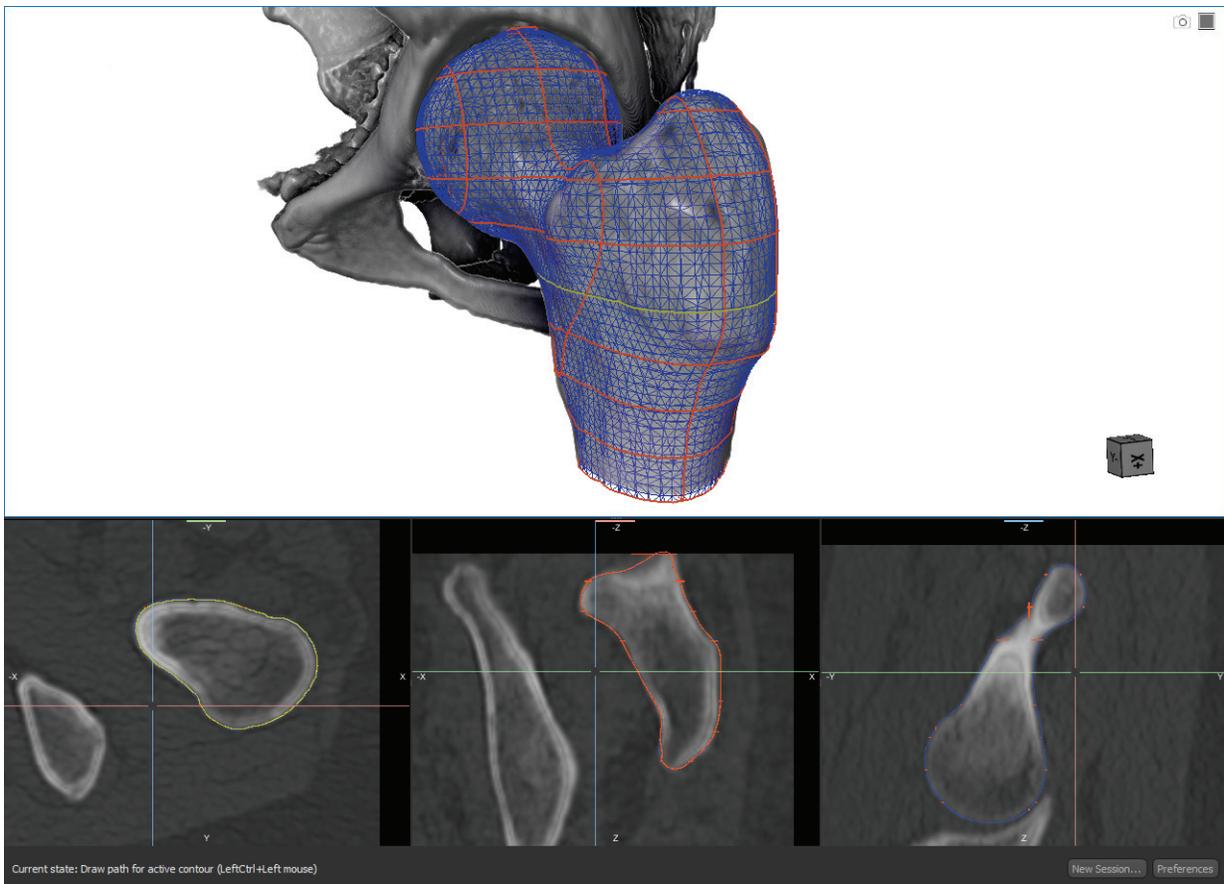
The 3.5 software release for Dragonfly and Dragonfly Pro provides the following new features. For information about product enhancements and other changes, such as new registration methods and other improvements for aligning slices in an image stack, visual effects for clipped regions, optimized lighting controls, and support for time-enabled data, see [Product Enhancements and Other Changes](#) on page 28.

Active Contour

You can use the new Active Contour tools to quickly and efficiently complete segmentation tasks by adding a series of paths to the 2D views of volumetric image data and then generating a mesh that fully describes the surface of the targeted feature of interest.

In the example below, a surface mesh was generated from the marked paths added to the contour of the femoral head, neck, and top of the thigh bone. Marked paths are shown in orange, while the generated surface mesh appears in blue.

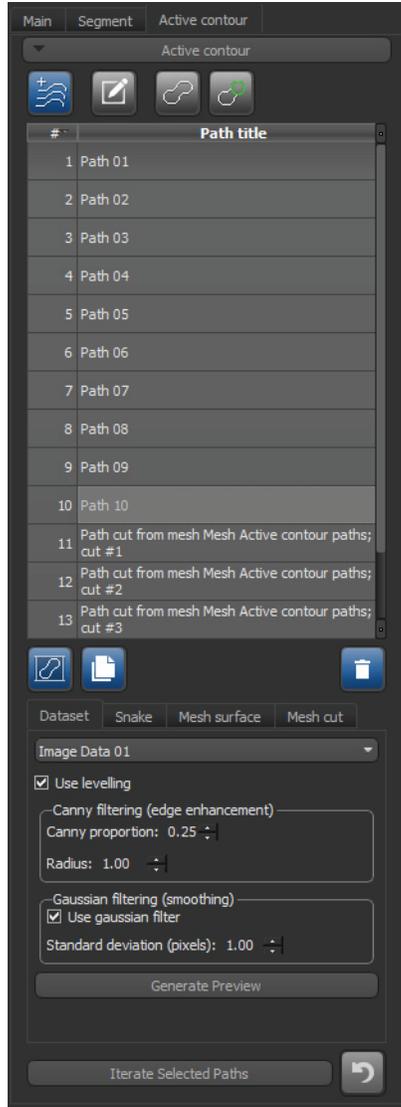
Surface mesh generated with the Active Contour tools



TM021-A-03

Choose **Tools > Active Contour** on the menu bar to open the Active Contour panel, shown below.

Active Contour tab



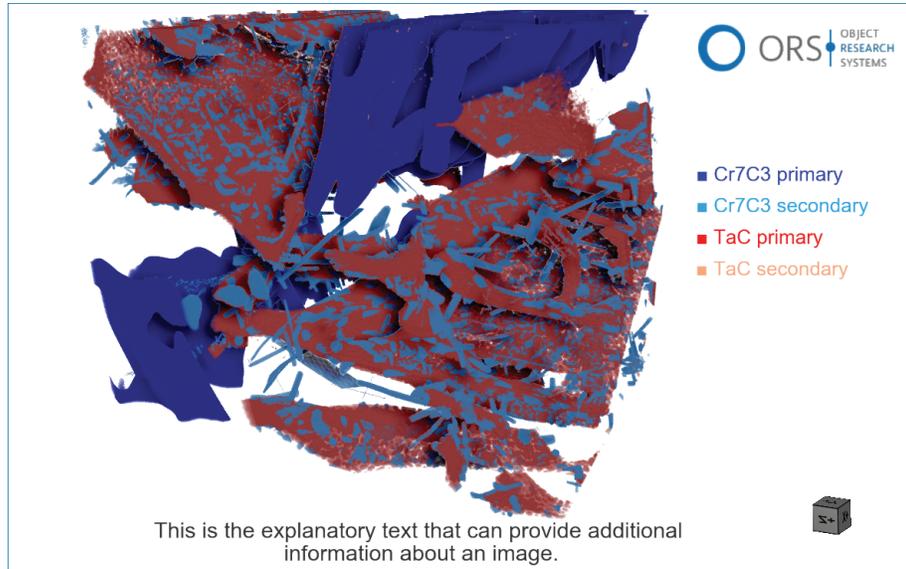
The Active Contour panel includes tools to create a group of paths, draw paths in Freehand or Snap mode, edit paths, and iterate selected paths.

You can generate a surface mesh that describes the segmentation target after the required number of paths have been added to a group. Generated meshes are added automatically to the Data Properties and Settings panel.

Overlay Panel

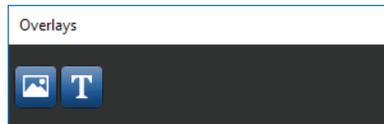
Image and text overlays can now be added to 2D and 3D scene views to illustrate findings with text, graphs, screen captures, and other information. For example, you can display a corporate or institutional logo as an image overlay over an animated sequence and annotate key frames with titles and captions that describe important transitions.

3D view with image and text overlays



The overlays available on the Overlays panel, shown below, can be included in animated sequences and screen captures and can be saved with a session or in the .ORSObject file format.

Overlays panel



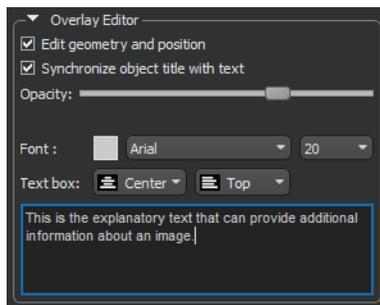
The following overlay options are available in Dragonfly 3.5.

Options for overlays

		Description
Image		Adds a selected image to the current scene view, such as a company or institutional logo, graph, or image captured from Dragonfly. Images can be resized and positioned as required, and opacity is adjustable.
Text		Adds a text overlay to the current scene view. The text color, font face, size, and alignment are selectable in the Overlay Editor and opacity is adjustable. Text overlays can be resized and positioned as required.

The options for editing overlays are available in the Overlay Editor, shown below.

Text Overlay Editor

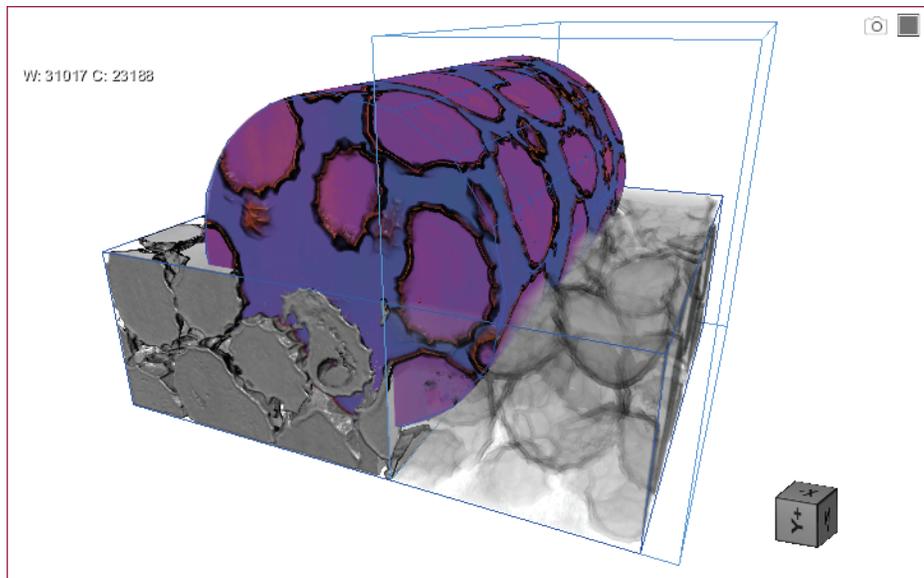


Shapes Panel

This Dragonfly release features a new Shapes panel. Shapes are fully editable geometrical forms that can be added to a scene to enhance 3D visualizations of selected objects. The visual effects for shapes — boxes, capsules, cylinders, planes, and spheres — include clipping, edge contrast, fill, look-up table functions, and window leveling. These effects can be applied to volumetric image data, regions of interest, multi-ROIs, and meshes.

In the example below, multiple shapes with different effects — clip, edge contrast, and a look-up table — were applied to volumetric image data.

Shapes and visual effects



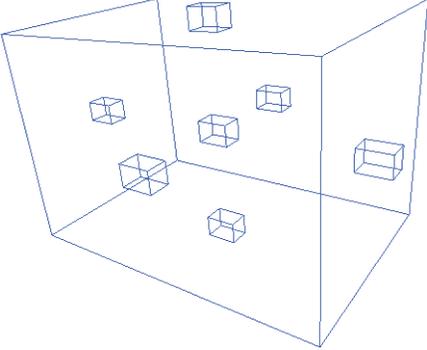
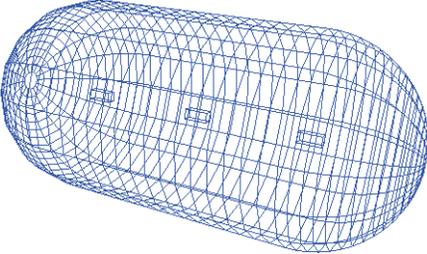
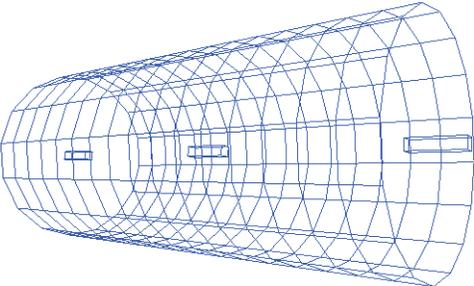
The visual effects that you create with the shapes available on the Shapes panel can be included in animated sequences and in screen captures.

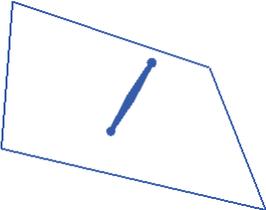
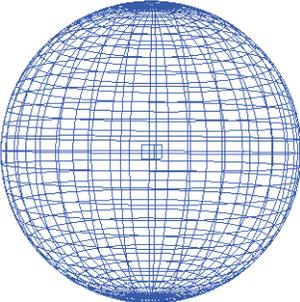
Shapes panel



The different geometrical forms available in the Shapes panel — Box, Capsule, Cylinder, Plane, and Sphere — are described in the table below.

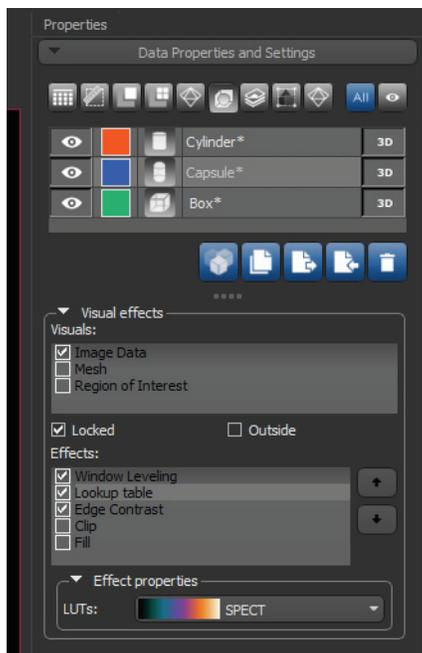
Types of shapes

		Description
Box		<p>Creates a basic box-shaped object, or cuboid, that has six flat sides. All of its faces are rectangles and all of its angles are right angles.</p>  <p>You can resize and rotate the box, as well as change its position within a 2D or 3D view with the control points.</p>
Capsule		<p>Creates a three-dimensional geometric shape consisting of a cylinder with two hemispherical caps on each end.</p>  <p>You can increase or decrease the height and radius of the capsule, rotate it, as well as change its position within a 2D or 3D view with the control points.</p>
Cylinder		<p>Creates an object with two identical flat ends that are circular and one curved side. The cylinder has the same cross-section from one end to the other.</p>  <p>You can increase or decrease the height and radius of the cylinder, rotate it, as well as change its position within a 2D or 3D view with the control points.</p>

		Description
Plane		<p>Creates a flat, two-dimensional surface.</p>  <p>You can rotate the plane, as well as translate it with the handle.</p>
Sphere		<p>Creates a 3D object shaped like a ball, in which every point on its surface is the same distance from the center.</p>  <p>You can resize a sphere, as well as change its position within a 2D or 3D view.</p>

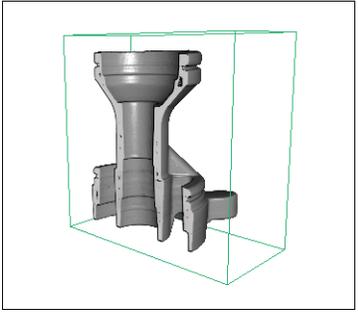
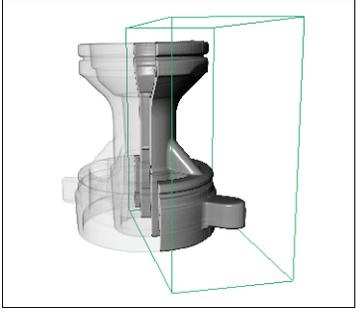
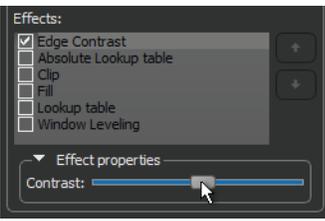
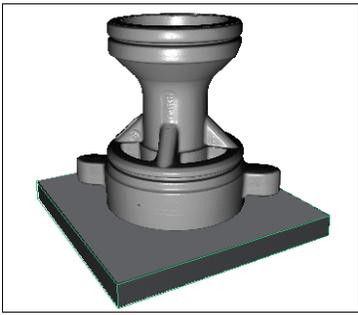
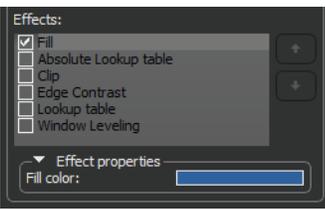
Each shape that is created or imported appears on a separate line in the top section of the Data Properties and Settings panel, as shown below. The bottom section contains a list of all available objects — volumetric image data, regions of interest, multi-ROIs, and meshes — to which shape effects can be applied. You should note that it is possible to apply shape effects to multiple objects and to apply multiple effects simultaneously.

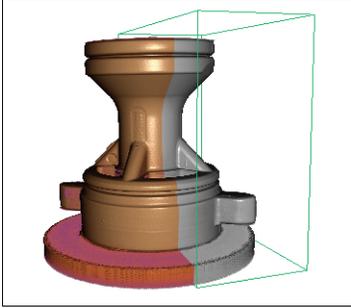
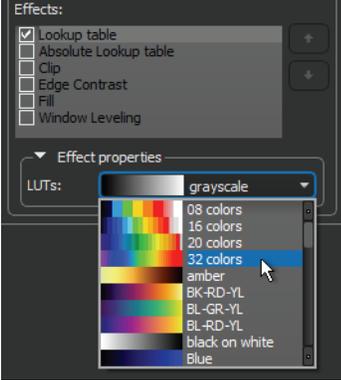
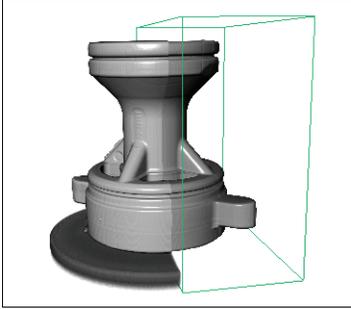
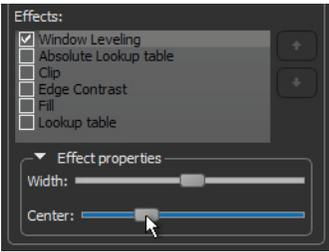
Shape properties and settings



The visual effects described below can be applied to data that corresponds either to the inside or outside of the selected shape.

Visual effects for shapes

	Example	Description
Clip		If checked, the data of the selected visuals that corresponds to the inside or outside of the shape will be clipped.
Edge Contrast*		If selected, the intensity values of selected image data that correspond to the inside or outside of the shape will be modulated with the values of their gradient modulus to produce an image in which edges are emphasized and other features are semi-transparent. The degree of contrast can be adjusted with the Contrast slider, as shown below. 
Fill**		If selected, voxels contained within the inside or outside of the shape will be filled with a solid color. To select a fill color, click the color swatch and then choose a color in the Color dialog. 

	Example	Description
<p>Lookup Table and Absolute LUT*</p>		<p>If selected, a lookup table function (LUT) or an absolute LUT will be applied to the image data of selected visual(s) that corresponds to the inside or outside of the shape. LUTs determine how regions within specific arrays of intensity are highlighted and how color is applied. Look-up tables can be selected in the drop-down menu, as shown below.</p>  <p>NOTE If you choose an absolute LUT, color mapping will be applied independently of window leveling. This means that the colors mapped to specific values will be retained whenever leveling values are changed. For regular LUT functions, colors will be remapped to the range of values defined by the window width.</p>
<p>Window Leveling*</p>		<p>If selected, new window level values can be applied to the image data of selected visual(s) that corresponds to the inside or outside of the shape. The width of the window, as well as its center value, can be selected with the Width and Center sliders, as shown below.</p> 

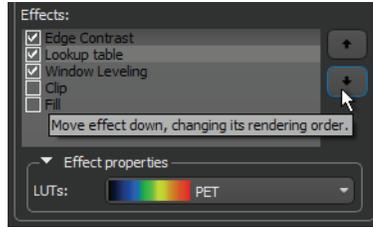
* Applicable to selected image data and image data corresponding to selected regions of interest and multi-ROIs.

** For selected image data, all voxels within the bounding box will be considered. For selected regions of interest and multi-ROIs, only labeled voxels will be considered. For selected meshes, only voxels that correspond to the surface of the mesh will be considered.

In some cases, you may find it advantageous to apply multiple effects to selected visuals. For example, edge contrast, window leveling, and a look-up table. You should note that Dragonfly applies selected effects in the order in which they appear in the Effects panel. Reordering effects will have an impact on the final look of the visual by either subtly or dramatically changing its appearance.

You can reorder selected effects with the **Up** and **Down** buttons on the right side of the panel, as shown below.

Reordering effects



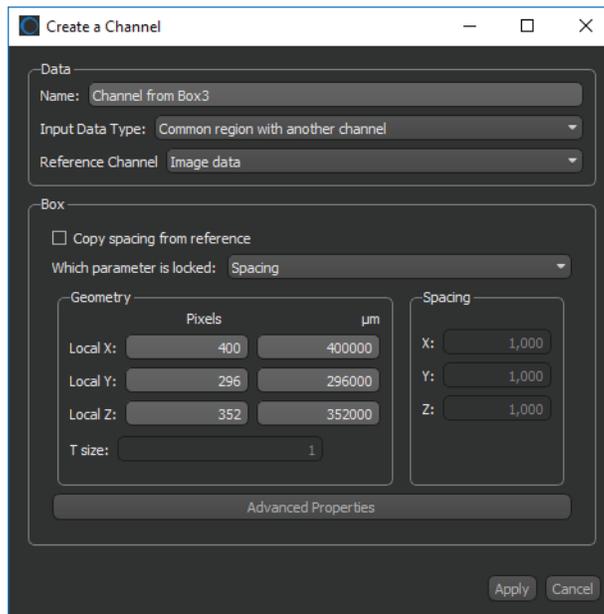
Shape Options

A number of options — Create Structured Grid, Extract a Structured Grid, and Add/Remove from a Region of interest — are available in the pop-up menu for shapes.

Create a Structured Grid

Creates a dataset (structured grid) from the subvolume defined by the box shape. The dataset type created can be a channel, region of interest, or multi-ROI, and the input data and geometry can be selected in the appropriate dialog — Create a Channel, Create an ROI, or Create a Multi-ROI.

Create a Channel dialog



Extract a Structured Grid

Extracts a dataset (structured grid) from the subvolume defined by the box shape and the intersecting data values of a selected object.

Modifying Regions of Interest

The following options are available for modifying regions of interest with the shapes available on the Shapes panel.

Add to ROI... Adds all voxels contained in the subvolume defined by the current shape to a selected region of interest. You should note that only intersecting voxels will be added to the region of interest.

Remove from ROI... Removes all intersecting voxels of the subvolume defined by the shape from the selected region of interest.

New Features for Meshes

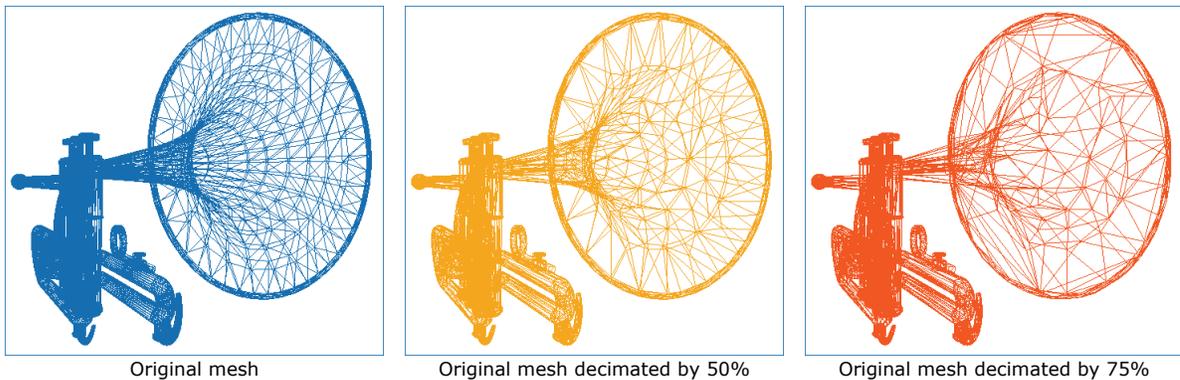
A number of new options are available in Dragonfly 3.5 for working with meshes. You can reduce the number of vertices, edges, and triangles in a mesh, register meshes to a reference, manage scalar information, and select sampling rates for generating thickness meshes from regions of interest. These new features are described in the following topics.

Mesh Decimator

This Dragonfly release provides a Mesh Decimator, for cases in which you need to reduce the number of vertices, edges, and triangles in a mesh. Surface simplification is one way to enable real-time, interactive visualization of large, complex meshes.

The example below illustrates a progressive mesh decimation.

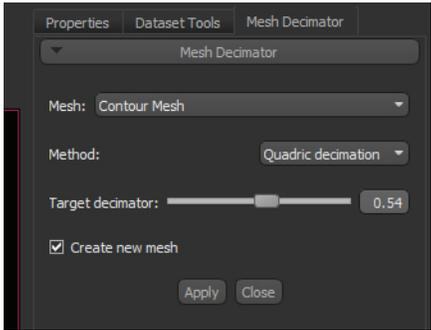
Decimated meshes



Dragonfly's new Mesh Decimator lets you choose a decimation method and a reduction target. The overall shape, volume, and boundaries of the original mesh will be preserved as much as possible during the simplification process.

Right-click the required mesh in the Data Properties and Settings panel and then choose **Mesh Decimator** in the pop-up menu to open the Mesh Decimator panel.

Mesh Decimator panel



The following parameters are available for decimating meshes.

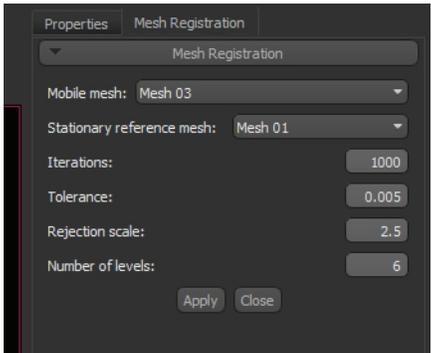
Parameters available for the Mesh Decimator

	Description
Mesh	Indicates the currently selected mesh, to which the decimation will be applied. If required, you can select another mesh in the drop-down menu.
Method	Two methods are available in Dragonfly to reduce the number of vertices, edges, and triangles in a mesh — Pro decimation and Quadric decimation. These methods work by the iterative elimination of components identified through local geometric optimality criteria. You should note that both methods will attempt to preserve the overall shape, volume, and boundaries of the original mesh as much as possible.
Target decimator	Lets you set the target reduction as a percentage ([0,1]) of components to be removed. For example, if the mesh contains 100 triangles and a Target Reduction of 0.90 is set, there will be approximately 10 triangles, a 90% reduction, after the decimation. NOTE If the cost of removing a component is too high, then it will not be removed and the selected target reduction may not be reached.
Create new mesh	Lets you choose an output target — at the input so that the original mesh is transformed, or at the output so that a new mesh is created and the original remains unmodified. NOTE Whenever possible, you should try to retain the original mesh so that you can compare the original and reduced versions.

Mesh Registration

Dragonfly's new iterative closest point registration workflow can automatically register meshes by applying the rotation and translation that best aligns the selected mesh with a reference. Right-click the required mesh in the Data Properties and Settings panel and then choose **Mesh Registration** in the pop-up menu to open the Mesh Registration panel, shown below.

Mesh Registration panel



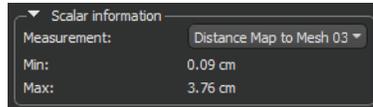
TM021-A-03

Deviation Maps

For analysis and visualization purposes, you can compute and generate color-coded meshes showing the deviation (distance) between the normals of two sets of meshes. Referential values are color-mapped according to the applied look-up table (LUT) and the type of distance map requested — signed or unsigned. Distance maps can be examined in 3D and 2D views.

Deviation (distance) map measurements are added to the selected mesh and appear in Scalar information box, as shown below.

Mesh scalar information

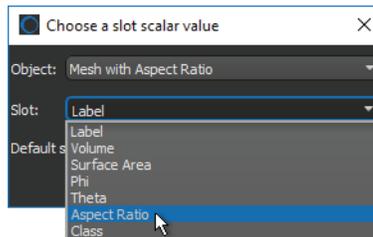


Map Scalar Values

This new option for Dragonfly 3.5, which is available in the Mesh pop-up menu, lets you map selected measurements contained within a scalar mesh to another mesh or multi-ROI.

You can choose the scalar values you want to map to the selected mesh in the Choose a scalar value dialog, shown below.

Choose a scalar value dialog



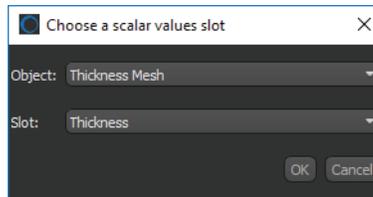
NOTE Mapping for meshes to meshes is done with a closest face matching criteria, while mapping for meshes to multi-ROIs is done through corresponding world coordinates.

Copy Scalar Values

This additional option for Dragonfly 3.5, which is available in the Mesh pop-up menu, lets you copy selected measurements contained within a scalar mesh to another mesh.

You can choose the scalar values you want to copy to the selected mesh in the Choose a scalar value dialog, shown below.

Choose a scalar value dialog

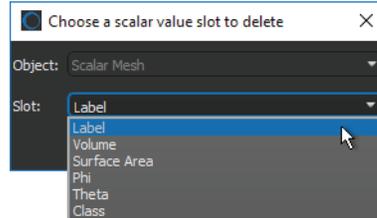


Delete Scalar Values

This new option for Dragonfly 3.5, which is available in the Mesh pop-up menu, lets you delete selected measurements from scalar meshes.

You can choose the measurements you need to delete from a selected mesh in the dialog shown below.

Choose a scalar value to delete dialog

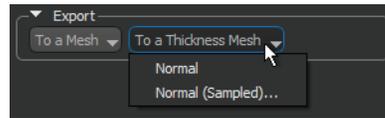


Sampling Rates for Generating Thickness Meshes

For analysis and visualization purposes, Dragonfly can compute and generate color-coded meshes that show the referential values of the local thickness between boundary points. Thickness is calculated as the diameter of a hypothetical sphere that fits within each boundary point.

As a new option for this software release, sampling rates for thickness meshes exported from regions of interest are selectable.

Export options for thickness meshes



NOTE The use of simplified models is one way to enable real-time, interactive visualization of large, complex meshes.

Export Meshes in VTK File Format

This Dragonfly release provides the option to export meshes in the VTK file format.

New Options for Regions of Interest

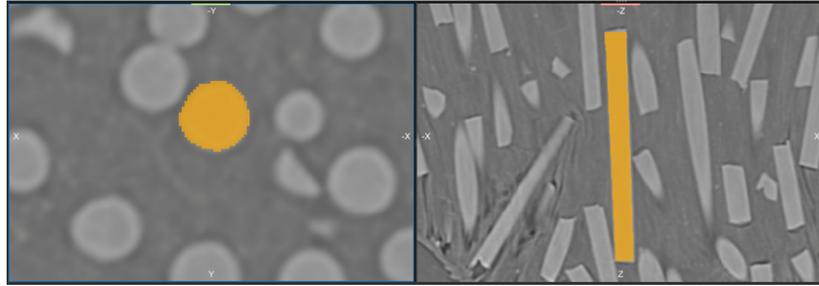
A number of new options are available in Dragonfly 3.5 for working with regions of interest. You can interpolate 2D regions, align axes of inertia, generate contour meshes, and perform other functions. These new features are described in the following topics.

Interpolate ROI

The new Interpolate operation for regions of interest lets you interpolate 2D regions through volumetric image data to create a 3D region of interest. You can choose the direction of the interpolation.

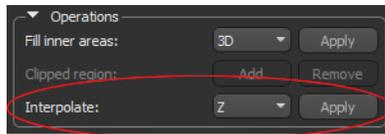
In the following example, a series of 2D regions were defined on a few slices in the XY oriented view (on left) and then interpolated in the Z axis. The results of the interpolation are shown on the right in an XZ oriented view.

Interpolated region of interest



The Interpolate option for regions of interest, circled below, is available in the Operations box on the ROI Tools panel.

Operations box

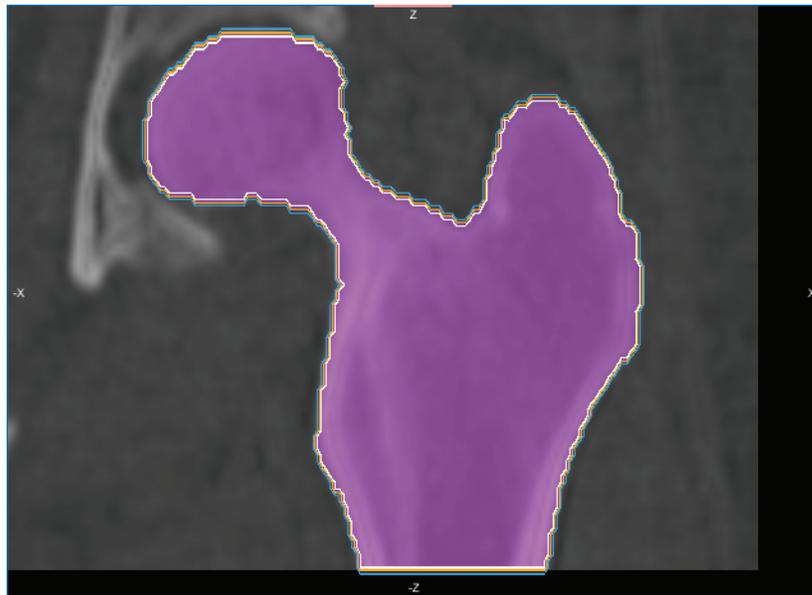


Generate Contour Mesh

In this Dragonfly release, you can generate contour meshes that describe the surface of a region of interest in the Generate Contour Mesh panel.

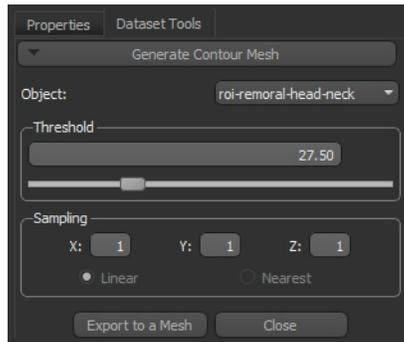
In the following example, three contour meshes with different threshold values were generated from a region of interest created on the femoral head and neck of a thigh bone.

Contour meshes (maximum threshold in white, mid in orange, minimum in blue)



The settings for generating contour meshes are available in the Generate Contour Mesh panel. Right-click the required region of interest in the Data Properties and Settings panel and then choose **Generate Contour Mesh** to access the panel.

Generate Contour Mesh panel



New Binary Image from ROI

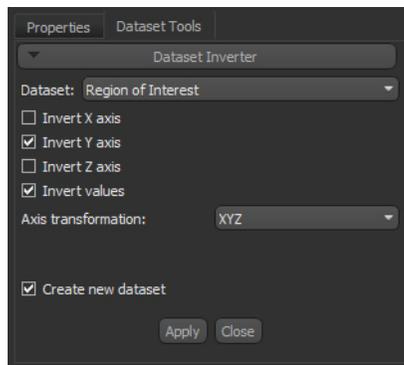
Automatically creates a new dataset(s) in which the labeled voxels in the selected region(s) of interest are assigned a value of 1 and unlabeled voxels are assigned a value of 0.

Invert

You can now invert the voxels in a region of interest, or multi-ROI, and change the order of axes in which they are read.

The settings for inverting regions of interest are available in the Dataset Inverter panel, shown below. Right-click the required region of interest in the Data Properties and Settings panel and then choose **Invert** to access the panel.

Dataset Inverter panel



Align Axis of Inertia

This new option, which is available in the Region of Interest pop-up menu, lets you automatically align the axis of inertia of a selected region of interest with the axis of inertia of another region of interest.

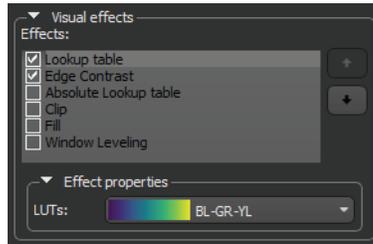
Look at Center of Mass

The new option automatically aligns the center of mass of the selected region of interest in the current 2D scene views. You should note that the center of mass is calculated from the labeled voxels contained within the bounding box of the region of interest.

Visual Effects for Regions of Interest

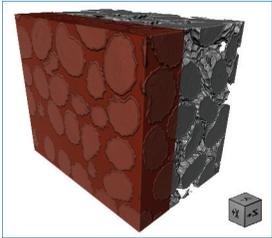
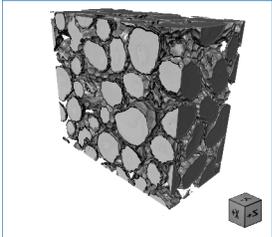
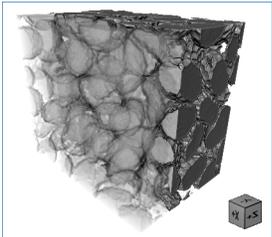
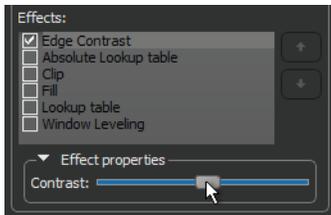
This Dragonfly release includes a series of visual effects that can be applied to a region of interest to enhance 3D visualizations of segmented features. Visual effects for regions of interest are available at the bottom of the Data Properties and Settings panel, as shown below.

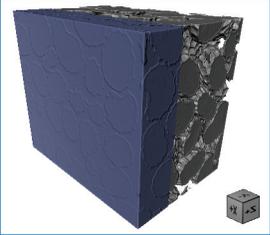
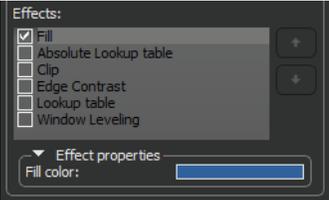
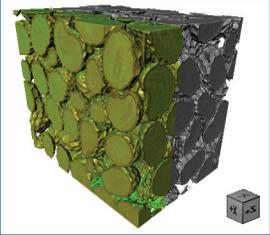
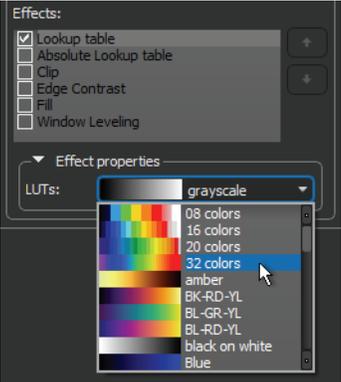
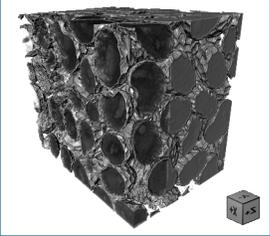
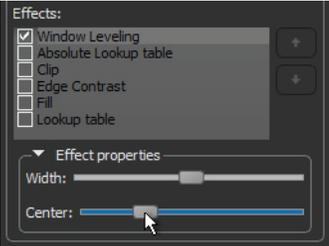
Visual effects for regions of interest



The visual effects available for regions of interest, and their associated properties, are described in the following table.

Visual effects and properties for regions of interest

	Example	Description
Original ROI		Included for reference purposes. This is the original appearance of the region of interest, with a highlight applied.
Clip		If selected, all data that corresponds to the region of interest will be clipped.
Edge Contrast		If selected, the intensity values of image data that correspond to the region of interest will be modulated with the values of their gradient modulus to produce an image in which edges are emphasized and other features are semi-transparent. The degree of contrast can be adjusted with the Contrast slider, as shown below. 

	Example	Description
Fill		<p>If selected, voxels that correspond to the region of interest will be filled with a solid color.</p> <p>To select a fill color, click the color swatch and then choose a color in the Color dialog.</p> 
LUT and Absolute LUT		<p>If selected, a lookup table function (LUT) or an absolute LUT will be applied to image data that corresponds to the region of interest. LUTs and Absolute LUTs determine how regions within specific arrays of intensity are highlighted and how color is applied.</p> <p>Look-up tables can be selected in the drop-down menu, as shown below.</p>  <p>NOTE If you choose an absolute LUT, color mapping will be applied independently of window leveling. This means that the colors mapped to specific values will be retained whenever leveling values are changed. For regular LUT functions, colors will be remapped to the range of values defined by the window width.</p>
Window Leveling		<p>If selected, new window level values can be applied to image data that corresponds to the region of interest.</p> <p>The width of the window, as well as its center value, can be selected with the Width and Center sliders, as shown below.</p> 

New Options for Multi-ROIs

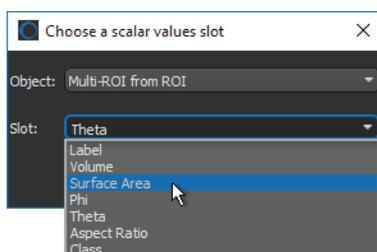
A number of new options are available in Dragonfly 3.5 for working with multi-ROIs. You can copy scalar values from one multi-ROI to another, as well as delete scalar values. These new features are described in the following topics.

Copy Scalar Values

This additional option for Dragonfly 3.5, which is available in the Multi-ROI pop-up menu, lets you copy selected measurements contained within a multi-ROI to another multi-ROI.

You can choose the object that includes the scalar values you want to copy to the selected multi-ROI in the Choose a scalar value dialog.

Choose a scalar value dialog



Delete Scalar Values

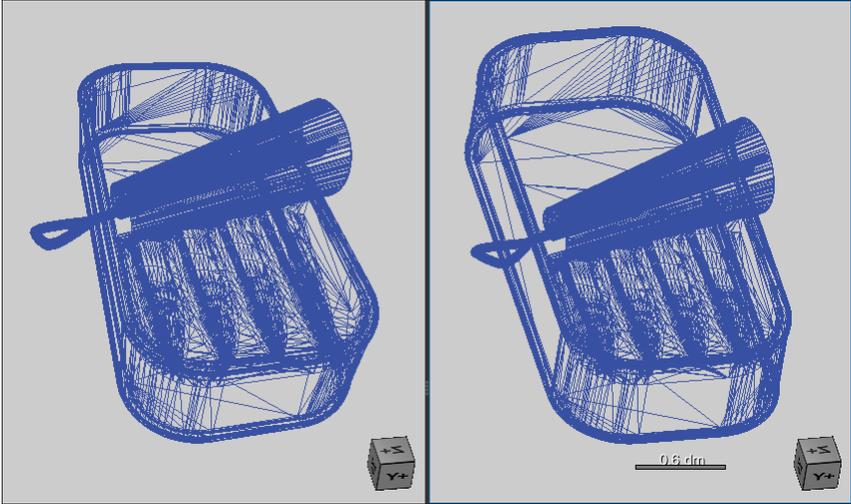
This new option for Dragonfly 3.5, which is available in the Multi-ROI pop-up menu, lets you delete selected measurements from multi-ROIs.

Orthographic Projection Mode

Dragonfly now offers the opportunity to view objects in both perspective and orthographic projection modes. In the familiar and default perspective mode, objects are subject to foreshortening and will appear smaller as their distance from the camera increases. In the parallel projection of orthographic mode, there is no foreshortening or vanishing point and dimensions can be communicated unambiguously.

Although perspective viewpoints can provide more information about depth and often tend to appear more realistic, orthographic viewpoints can make it much easier to compare objects, such as the parts of a molecule, as there is no question about how the viewpoint may affect the perception of distance or size. In addition, a scale bar is available for orthographic views.

Perspective (on left) vs. orthographic (on right) projections



While working, you can easily switch between orthographic and perspective modes to get a better sense of an object. Orthographic projection mode is selectable on the Scene's Views Properties panel and in the pop-up menu for 3D views. You can also choose *Orthographic* as the default projection mode (see [3D Views Preferences](#) on page 40).

NOTE Some lighting controls, such as shadowing and material properties, are not available for orthographic projections.

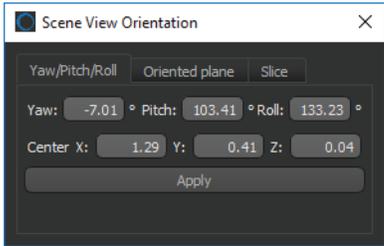
Scale Bar for Orthographic Views

A floating scale bar is available for 3D views showing orthographic projections to show the relative size of an object. If required, you can re-position the scale bar by dragging it anywhere inside the view, as well as set its length.

Scene View Orientation Panel

The options in the new Scene View Orientation panel, shown below, let you view and precisely adjust the angles of rotation — Yaw, Pitch, and Roll — of a selected 2D or 3D view, as well as to modify the position of the camera. Additional options for 2D views let you navigate to the different slices contained in volumetric image data.

Scene View Orientation panel



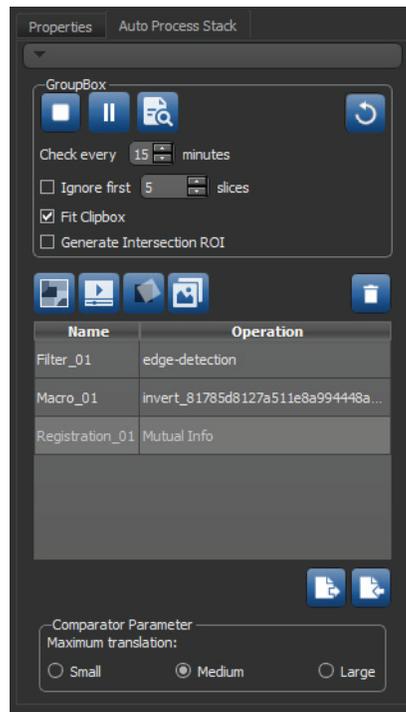
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Auto Processing

The Auto Process Stack feature for Dragonfly 3.5 enables real-time automatic processing of serial section 2D stack experiments. Instead of having to wait for the entire image stack to be available, you can set required operations — such as filtering, registration, classification, or any operation saved in a macro — to be applied automatically to new images as they arrive and interactively monitor the results as the 3D image channel grows.

Choose **Tools > Auto Process Stack** to open the Auto Process Stack panel.

Auto Process Stack panel



It's possible to indicate the time interval at which you'd like to have Dragonfly check for new images, as well as to select tasks that have been saved from previous jobs. Applicable tasks include classification with a saved classifier, slice alignment with Dragonfly's powerful matching methods, image filtering, and operations saved in a macro file.

When you're ready, simply click the **Start the Auto Process** button. As new images become available in the monitored folder, Dragonfly will process them according to the defined parameters and integrate them into a 3D image channel that can be volume rendered with a lookup table (LUT). If necessary, image stacks can be re-processed.

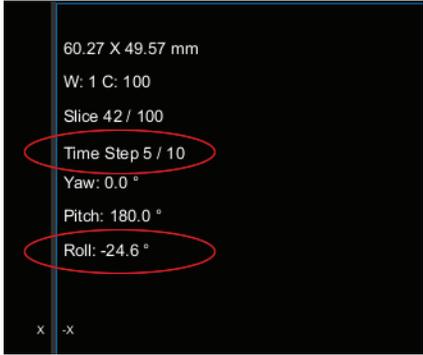
NOTE This feature is available only for TIFF images and for operations that use a single channel. All images must have the same pixel size and the same matrix dimensions.

NOTE The Auto Process Stack feature is not included in the standard Dragonfly installer. Contact Object Research Systems to request a copy of this module.

2D View Text Annotations

This Dragonfly release includes additional text annotations for rotating 2D scene views around its Z axis (Roll) and for navigating between the time steps of time-enabled image data. These text annotations are circled below.

Text annotations for 2D views



Advanced Options and New Filters for Image Processing

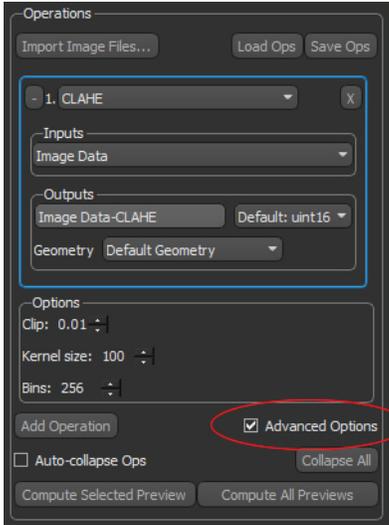
A number of new options and filters are available in Dragonfly 3.5 for processing image data.

Advanced Options

The Advanced Options for image processing let you process multi-scale images in selected operations, as well as select different geometries and data types for your image processing outputs. You should note that multi-scale images are images with different geometries and/or image spacing.

To enable the Advanced Options, check **Advanced Options** in the Operations box, as shown below.

Advanced Options for image processing



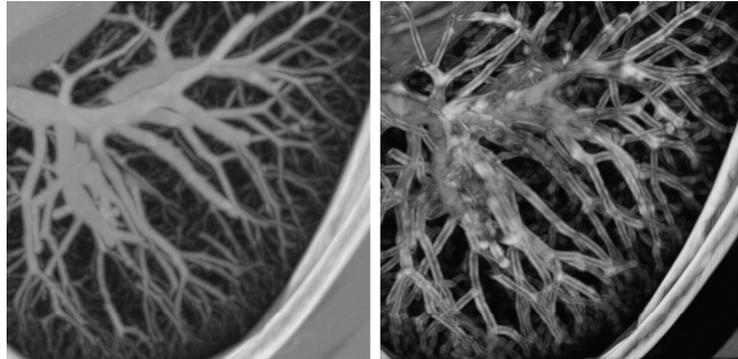
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New Filters

The following new filters are available in this software release.

Frangi Filter... The newly added Frangi filter is typically used to detect vessel-like or tube-like structures and fibers in volumetric image data. The screenshots below demonstrate the results of applying the Frangi filter to the image data of lung tissue on a coronary computed tomography (CT) scan.

Original image in MIP mode (left) and result after processing with Frangi filter (right)



Frequency Domain Filters... Two new filters, *Discrete Fourier Transform* and *Inverse Discrete Fourier Transform*, are available for working in the frequency domain.

Gradient and Divergence Filters... Available for Arithmetic operations, these filters are designed to extract information from images. The Gradient filter shows how quickly intensity values change from pixel to pixel, while the Divergence filter, which is the inverse of the Gradient filter, indicates minor gray scale variations.

Default Output for Arithmetic Operations

With this software release, all calculations and the default output for arithmetic operations are automatically set to the float data type. There is no longer any need to format operations with a decimal, such as $2.0 * A$, to avoid wrapping. You should note that if you select integer as the output data type, calculations will still be done in float, but results may be clipped.

Modified Filters

Two previously available filters for detecting edges — **Prewitt** and **Scharr** — now default to a combined mode, in which horizontal and vertical edges are extracted. You should note that options for detecting horizontal and vertical edges separately are still available for these filters.

New Options for Image Data

New functions are available in Dragonfly 3.5 for extracting datasets from marked slices, normalizing image data to a reference, and overwriting dataset values.

New Dataset from Marked Slices

Lets you extract a new dataset from the marked image slices of volumetric image data.

Normalize Histogram

Lets you normalize the histogram of a selected dataset to the histogram of another dataset.

Overwrite Dataset

Lets you overwrite the intersecting values of a selected dataset with the values of another dataset.

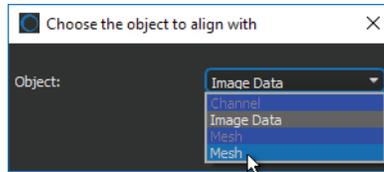
New Options for Selected Objects

The following new options are available for image data, regions of interest, multi-ROIs, and meshes in the Data Properties and Settings panel pop-up menus.

Align Centroids

This pop-up menu item lets you automatically align the centroid of the selected object with the centroid of another object. Applicable objects include volumetric image data, regions of interest, multi-ROIs, and meshes. Reference objects can be selected in Choose the object to align with dialog, as shown below.

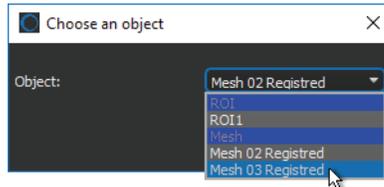
Choose the object to align with dialog



Apply Transformations

To help maintain consistency when you work with multiple objects, you can apply the transformations, such as translations and rotations, that were applied to a reference object to another object. You should note that only objects that were translated and/or rotated, will be available in the Choose an object dialog as the reference.

Choose an object dialog



Support for CZI Files

This software release provides support for importing and visualizing CZI files, a format used by ZEISS microscopes to save data, such as image stacks and time lapse series. Available for Dragonfly Pro only. Contact Object Research Systems for information about the availability of Dragonfly Pro.

Product Enhancements and Other Changes

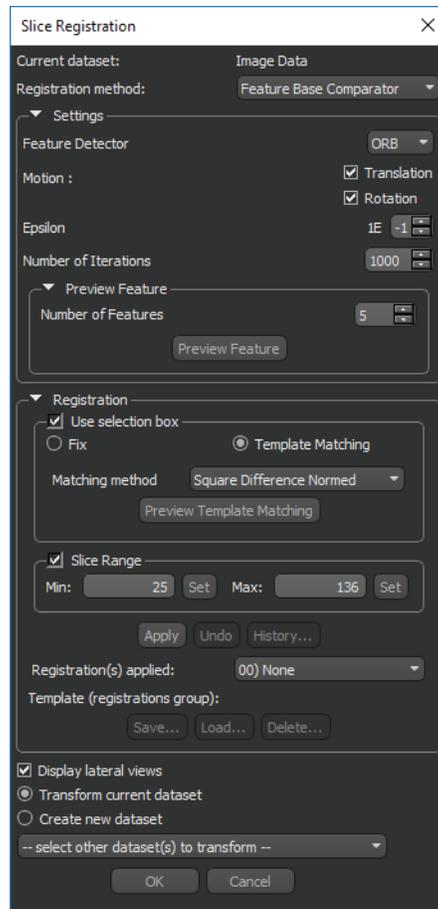
This release provides the following product enhancements for Dragonfly and Dragonfly Pro. For information about new features, such as the Active Contour tools, overlays, and shapes, see [New Features](#) on page 5.

Updates for Aligning Image Slices

This Dragonfly release provides a number of powerful new options and tools for properly aligning an image stack into a correct 3-dimensional model that ensures accurate image processing and analysis.

Choose **Dataset Slices Registration** in the Data Properties and Settings pop-up menu to open the Slice Registration panel shown below.

Slice Registration panel



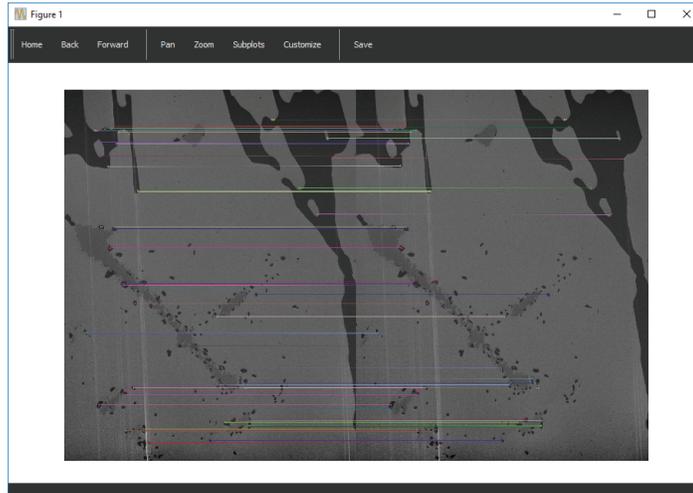
Registration Methods

The following additional registration methods are available in this Dragonfly 3.5 software release.

Enhanced Correlation Coefficient... Implements an area-based alignment that builds on intensity similarities.

Feature Base... Matches features between image slices by detecting corners, which are regions in the image with large variations in intensity in all directions. The preview for Feature Base comparisons, shown below, stacks two images horizontally and draws lines from the first image (the currently displayed slice in the workspace) to the next slice and shows the best matches for the number of features requested for the preview.

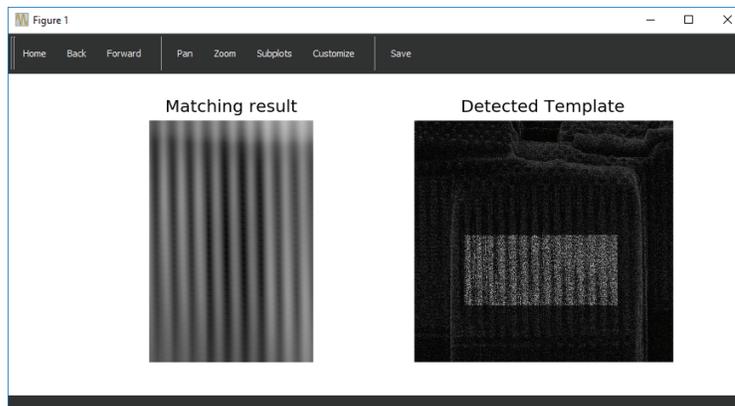
Preview for Feature Base registration



Template Matching... Provides a method for searching for and finding the location of a template image in the larger images within the 3D image stack. This registration method simply slides the template image over the input image (as in 2D convolution) and compares the template and patch of input image under the template image.

The preview for template matching, shown below, returns a grayscale image, in which each pixel denotes how much the neighborhood of that pixel matches with the template.

Matching result for a detected template



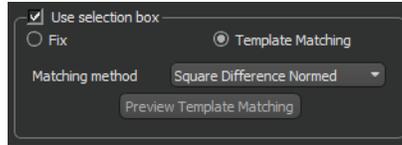
Selection Box Options

A number of new options are available for the selection box, which provides a mask for the registration inputs.

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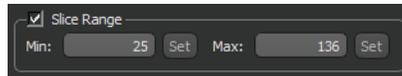
Follow Template... The **Follow Template** option for selection boxes lets you add a template that will be applied to subsequent slices during processing. It is a type of floating selection box.

Template Matching option



Selectable Slice Ranges... The options in the Slice Range box, shown below, let you select a range of images within the stack to which required transformations will be computed. You should note that any transformation applied to the last slice in the range will also be applied to the remaining slices in the image stack.

Slice Range option

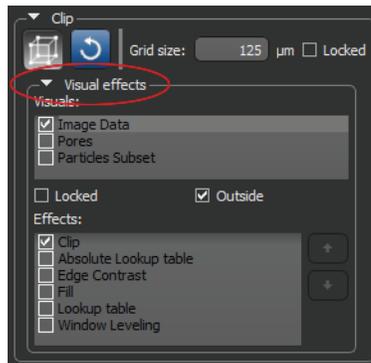


Visual Effects for Clipped Regions

The Clip tool allows you to interactively clip image data, regions of interest, multi-ROIs, and meshes along orthogonal planes in 3D views. This Dragonfly release introduces additional visual effects, such as look-up table functions, edge contrast, and window leveling, that can be applied to the clipped region of selected objects.

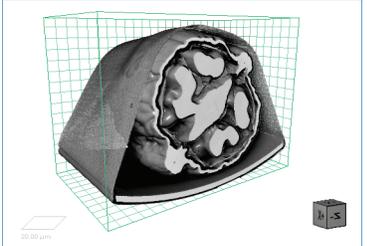
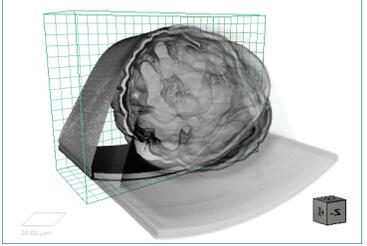
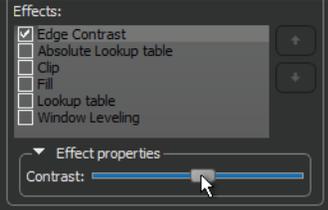
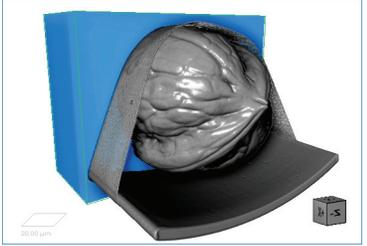
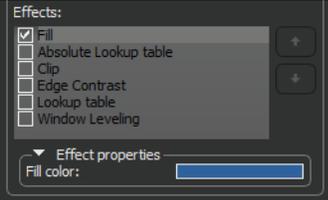
Visual effects for clipped regions are available on the Clip panel, as shown below.

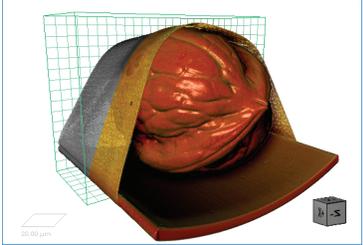
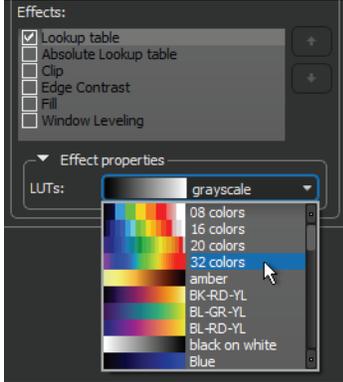
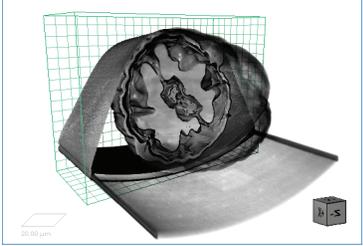
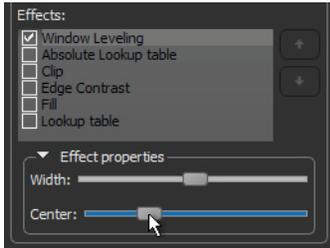
Visual effects for clip boxes



The following effects can be applied to the currently checked object or objects.

Clip effects and properties

	Example	Description
Clip		<p>If selected, the data of selected visual(s) that corresponds to the inside or outside of the Clip box will be clipped.</p> <p>NOTE In this Dragonfly release, Clip is applied as the default setting applied to volumetric image data, regions of interest, multi-ROIs, and meshes. You may have to remove this visual effect when you create exploded views.</p>
Edge Contrast*		<p>If selected, the intensity values of selected image data that corresponds to the inside or outside of the Clip box will be modulated with the values of their gradient modulus to produce an image in which edges are emphasized and other features are semi-transparent.</p> <p>The degree of contrast can be adjusted with the Contrast slider, as shown below.</p> 
Fill**		<p>If selected, voxels contained within the inside or outside of the Clip box will be filled with a solid color.</p> <p>To select a fill color, click the color swatch and then choose a color in the Color dialog.</p> 

	Example	Description
LUT and Absolute LUT*		<p>If selected, a lookup table function (LUT) or absolute LUT will be applied to selected data that corresponds to the inside or outside of the Clip box. LUTs determine how regions within specific arrays of intensity are highlighted and how color is applied. Look-up tables can be selected in the drop-down menu, as shown below.</p>  <p>NOTE If you choose an absolute LUT, color mapping will be applied independently of window leveling. This means that the colors mapped to specific values will be retained whenever leveling values are changed. For regular LUT functions, colors will be remapped to the range of values defined by the window width.</p>
Window Leveling*		<p>If selected, independent window level values can be applied to the data of selected visual(s) that corresponds to the inside or outside of the Clip box. The width of the window, as well as its center value, can be selected with the Width and Center sliders, as shown below.</p> 

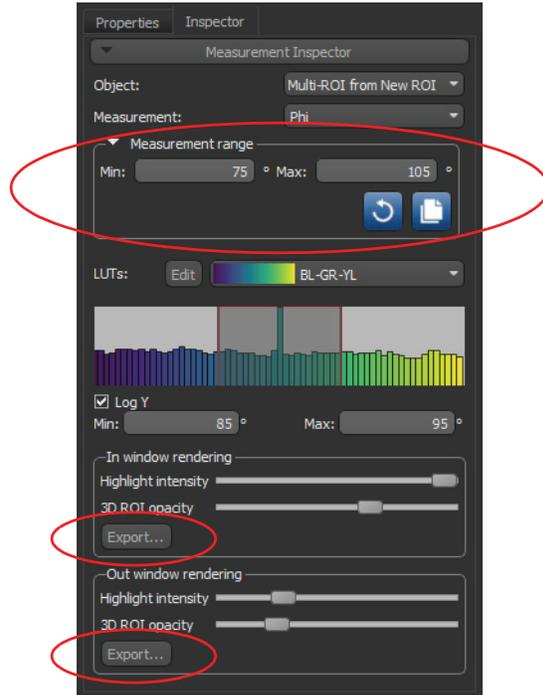
* Applicable to selected image data and image data corresponding to selected regions of interest and multi-ROIs.

** For image data, all voxels within the bounding box will be considered. For regions of interest and multi-ROIs, only labeled voxels will be considered. For meshes, only voxels that correspond to the surface of the mesh will be considered.

Measurement Inspector

The Measurement Inspector available for multi-ROIs and scalar meshes now includes a Measurement range selector, circled below, that lets you select the range of data that will be plotted in the histogram.

Measurement Inspector



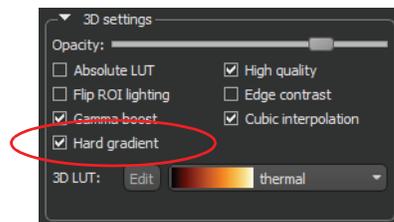
Options in the Measurement range box also let you copy the range of other measurements, either from the current multi-ROI or another multi-ROI, to the currently selected measurement. You can also reset the range to the original values.

Export Options... Additional updates to the Measurement Inspector include Export options in the In window and Out window rendering boxes, which let you create a new multi-ROI that includes all of the labeled objects that correspond to the selected range.

3D Settings

This Dragonfly release includes a new setting — Hard gradient — for modifying the appearance of volumetric image data in 3D views. This option, circled below, is available in the 3D settings box on the Data Properties and Settings panel.

3D settings



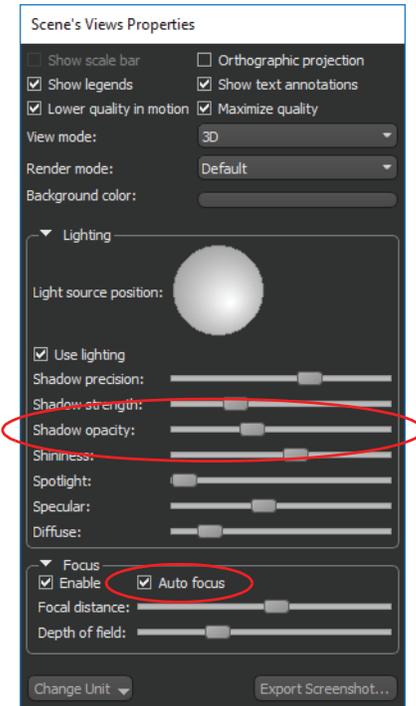
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Scene's Views Properties

In addition to accelerated rendering that lets you to easily combine 3D renderings, regions of interest, and meshes in the same 3D view, this Dragonfly release also features new lighting controls and an auto-focus option.

These updates, circled below, are available on the Scene's Views Properties panel.

Scene's views properties for 3D views



Shadow Opacity

Lets you adjust the opacity of shadows cast on and by objects in 3D views.

Auto Focus

An Auto focus option is now available for automatically optimizing the focus of the camera within a 3D view.

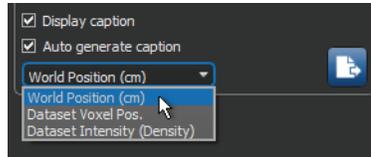
Points Tool

A number of updates — **Auto generate caption** and **Export** — are available for the Points tool in this software release.

Auto Generate Caption

Lets you automatically generate captions that show the position or value of each point added to 2D and 3D views.

Options for generated captions



Data Export

Lets you export Points data in the CSV file format.

NOTE The new options for the Points tool also includes configurable control points (see [Configurable Control Points for Annotation Tools](#) on page 35).

Path Tool

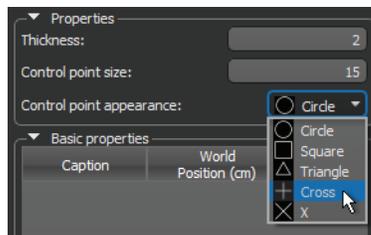
Options for the Path tool now include the function to profile intensity along the full length of a selected path. The resulting profile intensity graph indicates the maximum, minimum, and mean data values along the path.

NOTE The new options for the Path tool also includes configurable control points (see [Configurable Control Points for Annotation Tools](#) on page 35).

Configurable Control Points for Annotation Tools

You can now modify the appearance of the control points of an annotation by selecting their size and style. These options, which are applicable to rulers, angles, regions, and points, are available in the Data Properties and Settings panel as shown below.

Annotation properties



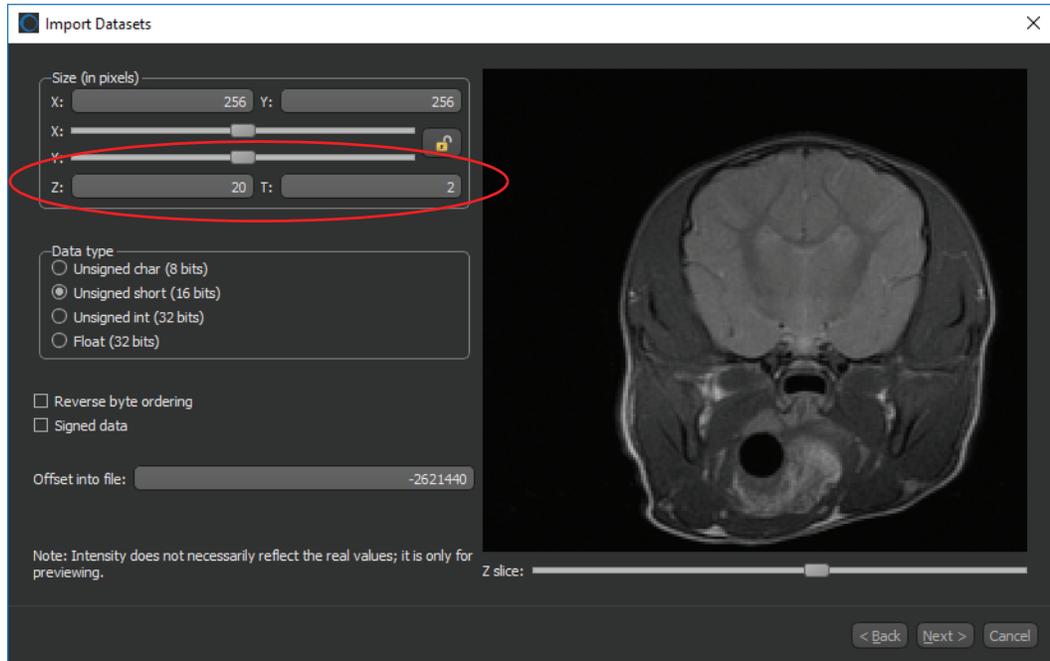
Additional Support for Time-Enabled Data

This Dragonfly release features additional support for importing and examining time-enabled data.

T Size for Importing Raw Data

For time-enabled data you can now enter the number of time steps in the T edit box, circled below. You should note that changing the number of time steps will automatically adjust the size of the image stack (Z axis).

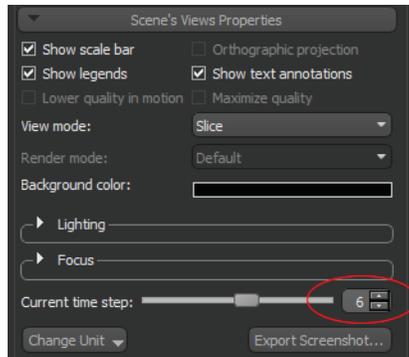
Import Datasets dialog



Navigation Tools

This Dragonfly release includes additional options for navigating through time-enabled datasets. These include a Time Step text annotation (see [2D View Text Annotations](#) on page 25) and a *spin box*, circled below, for moving between different time steps.

2D Scene's Views Properties panel



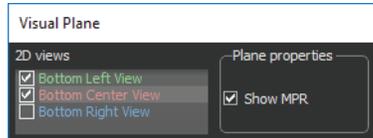
Export Options

The export options for the .ORSObject file format now let you choose to export multiple objects as separate files or to include them in a single file.

Visual Plane Panel

A number of modifications were made to the Visual Plane panel, shown below.

Visual Plane panel



In this Dragonfly release, Visual Planes will appear in the Data Properties and Settings panel, where you can control the visibility of a visual plane and add effects such as clip, edge contrast, window leveling, and others (see [Shapes Panel](#) on page 8 for more information about planes).

Support for 4K Displays

This software release features additional support for users who choose to work with 4K displays.

Developer Documentation

The developer documentation for Dragonfly has been updated for version 3.5. Choose **Help > Dragonfly Developer Documentation** on the menu bar to open the documentation system.

Menu Item Changes

The following changes and new menu items are implemented for Dragonfly 3.5.

Menu Bar Items

A number of new items, listed below, have been added to the File, Tools, and Developer menus.

New menu bar items

	Description
File menu	
Open Plugins	Lets you directly access Dragonfly plugins from a drop-down menu.
Tools menu	
Active Contour	Opens the Active Contour panel (see Active Contour on page 5).
Execute DOS Command	Opens the Command dialog, in which you can enter common DOS commands.
Developer menu	
Instance Observer	Opens the Instance Observer panel. Refer to the Dragonfly developer documentation for more information about the Instance Observer.
Profiler	Opens the Profiler panel, in which you can wrap a method dynamically and monitor the timing of an operation. Refer to the Dragonfly developer documentation for more information about the Profiler.

Dataset Pop-Up Menu

A number of new items, listed below, and other changes have been implemented for the dataset pop-up menu. These are listed below.

Dataset pop-up menu changes

	Description
Apply Registration to Other Dataset(s)	Lets you apply the transformations used to register a dataset to another dataset.
Align Centroid With	Lets you align the centroid of the selected dataset with a reference object (see Align Centroids on page 27).
Apply Transformation From	Lets you apply transformations, such as translations and rotations, that were applied to a reference object to the selected dataset (see Apply Transformations on page 27).
New Dataset from Marked Slices	Lets you extract a new dataset from marked image slices (see New Dataset from Marked Slices on page 26).
Normalize Histogram	Lets you normalize the histogram of a selected dataset to the histogram of a reference dataset (see Normalize Histogram on page 26).
Overwrite Dataset	Lets you overwrite the intersecting values of a dataset with the values of another dataset (see Overwrite Dataset on page 27).

Annotation Menu

A number of new items, listed below, and other changes have been implemented for the annotation pop-up menu. These are listed below.

Annotation pop-up menu changes

	Description
Apply Transformation From	Lets you apply transformations, such as translations and rotations, that were applied to a reference object to the selected annotation (see Apply Transformations on page 27).

Region of Interest Menu

A number of new items, listed below, and other changes have been implemented for the region of interest pop-up menu. These are listed below.

Region of interest pop-up menu changes

	Description
Invert	Lets you invert the axis representation(s) and values of a region of interest (see Invert on page 19).
Generate Contour Mesh	Lets you generate a contour mesh from a region of interest (see Generate Contour Mesh on page 18).
Align Centroid With	Lets you align the centroid of the selected region of interest with a reference object (see Align Centroids on page 27).
Apply Transformation From	Lets you apply transformations, such as translations and rotations, that were applied to a reference object to the selected region of interest (see Apply Transformations on page 27).
Create a Signed Distance Map	Lets you create a signed distance map, in which the deviation between two regions of interest is shown as a colored map.
Align Axis of Inertia	Lets you align the axis of inertia of a region of interest with another ROI (see Align Axis of Inertia on page 19).
Look at Center of Mass	Lets you automatically align the center of mass of a region of interest in the views of a scene (see Look at Center of Mass on page 19).
New Binary Image from ROI	Automatically creates a new dataset(s) in which the labeled voxels in the selected region(s) of interest are assigned a value of 1 and unlabeled voxels are assigned a value of 0.
Resample Geometry	Was previously named <i>Resample Shape</i> .

Multi-ROI Menu

A number of new items, listed below, and other changes have been implemented for the multi-ROI pop-up menu. These are listed below.

Multi-ROI pop-up menu changes

	Description
Invert	Lets you invert the axis representation(s) of a multi-ROI (see Invert on page 19).
Delete Selected Scalar Values	Lets you delete scalar measurements from a multi-ROI (see Delete Scalar Values on page 22).
Copy Scalar Values From	Lets you copy scalar values from one multi-ROI to another (see Copy Scalar Values on page 22).
Align Centroid With	Lets you align the centroid of the selected multi-ROI with a reference object (see Align Centroids on page 27).
Apply Transformation From	Lets you apply transformations, such as translations and rotations, that were applied to a reference object to the selected multi-ROI (see Apply Transformations on page 27).
Resample Geometry	Was previously named <i>Resample Shape</i> .

Mesh Pop-Up Menu

A number of new items, listed below, and other changes have been implemented for the pop-up menu for meshes. These are listed below.

Mesh pop-up menu changes

	Description
Mesh Decimator	Lets you reduce the number of vertices, edges, and triangles in a mesh (see Mesh Decimator on page 14).
Mesh Registration	Lets you register a mesh with a reference (see Mesh Registration on page 15).
Signed Deviation Map	Lets you create a signed distance map, in which the deviation between two meshes is shown as a colored map (see Deviation Maps on page 16).

	Description
Deviation Map	Lets you create a distance map, in which the deviation between two meshes is shown as a colored map (see Deviation Maps on page 16).
Delete a Scalar Value Slot*	Lets you delete selected measurements from scalar meshes (see Delete Scalar Values on page 17).
Map Scalar Values From	Lets you map scalar values contained in a mesh or multi-ROI to the selected mesh (see Map Scalar Values on page 16).
Copy Scalar Values From	Lets you map scalar values contained in a mesh to the selected mesh (see Copy Scalar Values on page 16).
Align Centroid With	Lets you align the centroid of the selected mesh with a reference object (see Align Centroids on page 27).
Apply Transformation From	Lets you apply transformations, such as translations and rotations, that were applied to a reference object to the selected mesh (see Apply Transformations on page 27).

* Available only for meshes with scalar values.

Preferences Changes

Colors Preferences

Changes for the Colors preferences are indicated in the following table.

Colors preferences

	Description
Shape lines	Lets you select the colors for selected and unselected shape lines (see Shapes Panel on page 8).

3D Views Preferences

A new set of preferences are available in this Dragonfly release for 3D views.

3D Views preferences

	Description
Default to orthographic perspective	If selected, 3D scene views will appear in Orthographic Projection mode by default (see Orthographic Projection Mode on page 22).

Additional preferences changes are summarized below.

Configured Actions

The Configured Actions preferences now include a description of their associated state.

System Requirements Changes

This release supports the base system requirements. Any differences in those requirements are noted below.

System requirements changes

Version	Changes to system requirements
3.0.0	None.
3.1.0	None. NOTE Dragonfly 3.1 includes a new Anaconda distribution for Python. You should note that the current version of Python accessed by Dragonfly will be updated automatically to version 3.6 when you install this new release.
3.5.0	None.

Extending Dragonfly

Dragonfly's Infinite Toolbox, an open exchange platform for the Dragonfly user community, lets you submit, browse, and download extensions that implement new features and workflows for all of your image processing or analysis needs.

Choose **Tools > Infinite Toolbox** on the menu bar to open Dragonfly's Infinite Toolbox.

Getting Help

Learning Dragonfly

Just by taking a quick look around www.theobjects.com/dragonfly, you'll find some great free resources, such as our latest instructional videos, recorded webinars, and user forums.

Reporting Issues

Dragonfly includes an integrated reporting module that lets you include comments and other information along with generated DMP and log files whenever you encounter an issue that results in a crash or application freeze.

Send Report to ORS dialog

Send Report to ORS

Please provide as much information as possible to help ORS understand the circumstances under which the problem occurred.

Name: John Smith

Email: john.smith@gmail.com

Details: An issue occurred when normalizing data after applying the polynomial filter to correct uneven shading.
The original dataset is available for testing, if required.
Sincerely,
JS|

OK Cancel

You should note that you can also report an issue at any time by choosing **Help > Report an Issue** on the menu bar.

Request a New Feature

Let us know if you have a suggestion for a new feature, or an idea for an improvement to an existing workflow.

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