

Import Formats

- DICOM (version 3.0 and 2D stacks) including:
 - 4D (time-resolved) DICOM with time step selection (in Simpleware ScanIP Medical only)
 - Option to store DICOM tags with imported data
- DICOM encapsulated STL surface models (in Simpleware ScanIP Medical only)
- ACR-NEMA (versions 1 and 2)
- DICONDE
- Interfile
- Analyze
- Meta-image
- Raw image data
- 2D image stacks:
 - BMP
 - GIF
 - JPEG
 - PCX
 - PNG
 - TIFF
 - XPM
- Natively supported pixel types:
 - 8-bit Unsigned Integer
 - 16-bit Unsigned Integer
 - 16-bit Signed Integer
 - 32-bit Floating Point

Export Formats

- Background 3D image:
 - RAW image
 - MetalImage
 - Stack of images (BMP, JPG, PNG, TIF)
 - DICOM
- Background 4D image (in Simpleware ScanIP Medical only):
 - RAW image (all frames/active frame)
 - MetalImage (all frames/active frame)
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Export Formats cont.

- Surface model (triangles) cont.:
 - ABAQUS surface
 - OPEN INVENTOR
 - POINT CLOUD
 - MATLAB file surface
 - DICOM encapsulated STL (in Simpleware ScanIP Medical only)
- Animations:
 - AVI
 - Ogg Theora
 - H.264/MPEG-4 AVC
 - Windows Media Video (WMV)
 - PNG sequence
 - Transparent PNG sequence
- 2D and 3D screenshot:
 - JPEG
 - PNG
 - Postscript (*.eps)
 - BMP
 - PNM
 - PDF
- Generate virtual X-Ray, with object burn (in Simpleware ScanIP Medical only)
- Export scene – export the current 3D view:
 - 3D PDF
 - 3MF
 - OBJ
 - PLY
 - VRML

General User Interface

- Modern ribbon interface
- Custom ribbon with user-selected tools (My tools)
- Quick find search feature for tools
- User-defined customization: dockable toolboxes, range of 2D/3D view options
- Undo/redo operation support
- Independent part visibility control in 2D and 3D
- Keyboard shortcuts: set user-defined shortcuts to commands or tools to customize and speed up repeated workflows
- Ability to import multiple image sets into the workspace to aid segmentation
- Histogram and profile line utilities assist in finding optimal threshold values

- Automatic logging and timestamp of filters and tools applied since the creation of a project
- Workspace tabs: toggle between the active document, mask statistics, model statistics, centerline statistics, the document log, and the scripting interface
- Integrated dynamic help tool
- Interactive tutorials
- Links to external support resources
- Preferences: a number of different options available for default settings:
 - General: number of undos to save, default startup layout, max permissible CPUs for parallelized operations
 - Slice views: display orientation labels, choose whether to use a dark background, specify model contour and mask voxel outline colors
 - PACS (in Simpleware ScanIP Medical only): two-way PACS communication, configure access (servers, ports, keys etc.)
 - Segmentation: options to adjust behavior of some segmentation tools and set Hounsfield presets for the Threshold tool
 - 3D view: save last camera position before exiting the document, stereo rendering settings, options to further divide higher-order mesh elements (for FE meshes and NURBS patches)
 - Volume rendering: GPU rendering supported, Background volume rendering visibility on startup
 - Folders: options to change locations of temporary files
 - Statistics: default template for Mask, Model and Centerline statistics
 - Number formatting: customize how numbers are formatted within Simpleware ScanIP
 - Annotations: set default styles for annotations
 - Scripting: enable/disable supported scripting languages
 - Licensing: change license location
 - Miscellaneous: reset suppressible dialogs, clear the undo/redo stack, mask name/color creation options

2D User Interface

- 3x 2D views
- Orientation labels
- Scale bars
- DICOM information overlay (in Simpleware ScanIP Medical only)
- Interactive cropping using 2D view
- Window/Level values and control options
- Ability to work on single slice, selection of slices or whole volume
- Slice cursors to identify the position of 2D slices

Image Processing Tools cont.

- Advanced filters (more specialist applications) cont.:
 - Smoothing and noise removal:
 - Bilateral
 - Curvature anisotropic diffusion
 - Curvature flow
 - Discrete Gaussian
 - Gradient anisotropic diffusion
 - Min/max curvature flow
 - Patch-based denoising
 - Level sets:
 - Canny segmentation
 - Fast marching
 - Geodesic active contours
 - Laplacian level set
 - Shape detection
 - Threshold level set
 - Skeletonization:
 - Pruning
 - Thinning
- Morphological filters:
 - Erode
 - Dilate
 - Open
 - Close
 - 3D Wrap
- Segmentation tools:
 - Paint/unpaint
 - Paint with threshold
 - Smart paint
 - Interpolation toolbox – Contains the following options:
 - Slice interpolation: smooth or linear
 - Slice propagation: adapts to image or uses direct copy
 - Confidence connect region growing
 - Background flood fill
 - Mask flood fill
 - Threshold
 - 3D editing tools for application of filters to local regions – option to apply in multiple regions and on camera facing surface only in advanced tool version
 - Mask ungroup tool

Statistical Analysis cont.

- Mask statistics (based on voxel information) cont.:
 - Object-oriented bounding boxes
 - Object-oriented bounding ellipsoids
 - Create a user-defined statistic
- Model statistics (based on polygon information):
 - Ability to generate user-defined templates
 - Built-in templates: general statistics (perimeters, surfaces, volumes and NURBS surfaces), mesh quality (CFD, FE-linear elements and FE-quadratic elements), orientation (perimeters, surfaces, volumes), pore sizes, surface quality (linear, quadratic), volume mesh statistics
 - Variety of statistical information pertaining to:
 - Surface parameters: element count, node count, edge count, etc.
 - Perimeters: length, mean edge length, mean dihedral angle, etc.
 - Surface triangle and quadrilateral primitives: edge-length, in-out ratio, distortion, etc.
 - Tetrahedral, hexahedral, pyramid and prismatic volume element primitives: angular skew, volume skew, shape factor, Jacobian, etc.
 - Axis-aligned bounding boxes
 - Axis-aligned bounding ellipsoids

Particle Analysis

- Allows particles (either isolated or touching) to be analyzed from a mask or multi-label mask
- There are two types of pore analysis available, "Touching", for particles that are in contact with each other, "Isolated" for particles that are separated from each other.
- Statistics for analyzed region or region of interest:
 - Particle volume (Total, Mean, SD, Min, Max)
 - Particle area (Mean, SD, Min, Max)
 - Particle volume fraction
 - Particle equivalent volume sphere diameter (Mean, SD, Min, Max)
 - Particle bounding box extent (Mean, SD, Min, Max)
 - Particle ellipsoid diameter (Mean, SD, Min, Max)
 - Particle flatness
 - Particle elongation
 - Particle shape factor
 - Particle sphericity
- Plot statistics, export as *.png or *.csv:
 - Volume histogram
 - Area histogram
 - Flatness histogram
 - Elongation histogram
 - Shape factor histogram
 - Sphericity histogram
- Particle visualization:
 - Contact count
 - Voxel count
 - Surface area
 - Boundary contact area
 - Label contact area
 - Volume
 - Max greyscale
 - Mean greyscale
 - Major length
 - Flatness
 - Elongation
 - Shape factor
 - Sphericity
 - Orientation angle to x/y/z axis
 - Orientation to mean
 - Export as *.csv or *.txt files
- Map to mesh:
 - Export (or assign using FE Module) particle volume fraction information per mesh cell

Pore Analysis

- Allows pores (either open or closed) to be analyzed from a mask or multi-label mask
- There are two types of pore analysis available, "Open", for connected pore networks, and "Closed" for pores that are separated from each other
- Statistics for analyzed region or region of interest:
 - Total pores count
 - Total throat count volume
 - Volume fraction
 - Internal pore volume (Mean, SD, Min, Max)
 - Internal pore surface area (Mean, SD, Min, Max)
 - Pore equivalent volume sphere diameter (Mean, SD, Min, Max)
 - Pore Flatness (Mean, SD, Min, Max)
- Statistics for analyzed region or region of interest cont.
 - Pore Elongation (Mean, SD, Min, Max)
 - Pore Shape factor (Mean, SD, Min, Max)
 - Pore Sphericity (Mean, SD, Min, Max)
 - Pore coordination number (Mean, SD, Min, Max)
 - Throat contact count
 - Throat contact area
 - Throat radius (Mean, SD, Min, Max)
 - Throat Flatness (Mean, SD, Min, Max)
 - Throat Elongation (Mean, SD, Min, Max)
 - Throat Eccentricity (Mean, SD, Min, Max)
 - Throat Shape factor (Mean, SD, Min, Max)
- Plot statistics, export as *.png or *.csv:
 - Volume histogram
 - Area histogram
 - Flatness histogram
 - Elongation histogram
 - Shape factor histogram
 - Sphericity histogram
- Particle visualization:
 - Contact count
 - Voxel count
 - Surface area
 - Boundary contact area
 - Label contact area
 - Volume
 - Max greyscale
 - Mean greyscale
 - Major length

Pore Analysis cont.

- Particle visualization cont.:
 - Flatness
 - Elongation
 - Shape factor
 - Sphericity
 - Orientation angle to x/y/z axis
 - Orientation to mean
 - Export as *.csv or *.txt files
- Map to mesh:
 - Export (or assign using FE Module) pore volume fraction information per mesh cell

Surface Mesh Generation

- Topology and volume preserving smoothing
- Triangle smoothing

