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Materialise
3-matic

Version 17.0 – Release notes

materialise.com

Regulatory information

Materialise 3-matic 17.0 is not a medical device. Any reference that is made to the design of medical devices within Materialise 3-matic 17.0 user documentation including user guides or tutorials refers to a research context.

Usage of the software signifies your acceptance of the above.

Contents

General

This Release Notes document is intended for customers who were previously using 3-matic software. All the new features, as well as minor changes and known issues of Materialise 3-matic 17.0 version, are described in this document.

Installation

After installation and license set-up, it is recommended to first choose **Options & Help → Reset Defaults → User Interface** to visualize the new features that have been added.

What's New

Improved usability

Drag and drop objects in the object tree

The object tree can now be re-ordered by drag and drop of root entities and/or groups. Upon dragging an object, a line will appear to indicate the drop location. It is possible to move objects within groups as well as between groups.
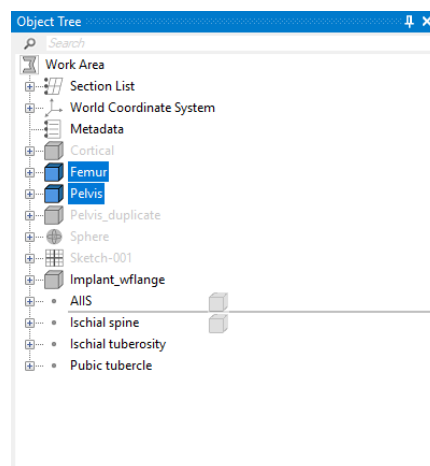
Illustration of the line that indicates the drop location of the dragged objects

The line to indicate the drop location always appears between 2 objects already in place. The line only appears when the mouse hovers over the top/bottom of another object. Hovering the mouse over the middle of an object will highlight this object. A highlighted state indicates that the dropped objects will be merged with the highlighted object.

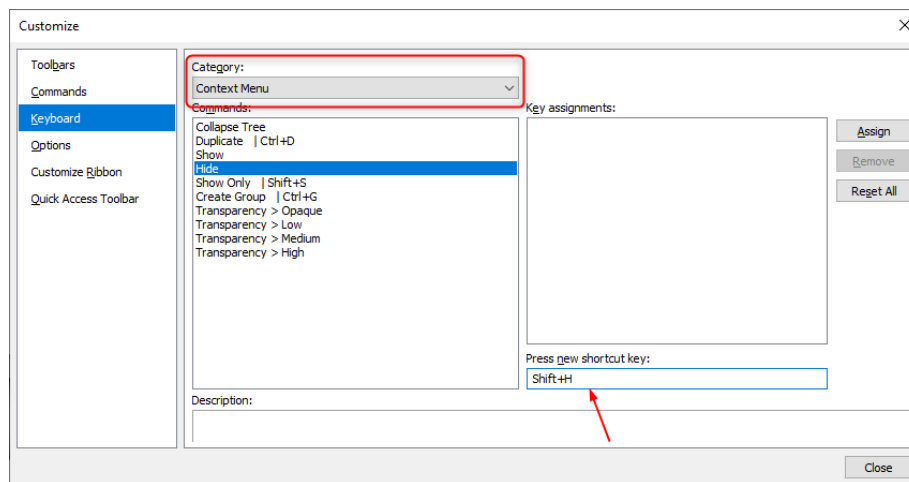### Shortcut key assignment for context menu operations

The customization options are expanded to include the assignment of shortcut keys to a set of frequently used operations in the right-mouse-button context menu. Shortcut keys are supported for the following operations:

- Hide
- Show
- Show Only (Shift +S)
- Duplicate (Ctrl+ D)
- Collapse Tree

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- Create Group (only root-level group - Ctrl +G)
- Transparency - Opaque
- Transparency - High
- Transparency - Medium
- Transparency – Low

Several of the supported operations have a default shortcut key already assigned. This is indicated by the shortcut keys between parentheses in the above list.

Shortcut keys are assigned, modified, and removed via the Customize dialog (Options and Help → Customize User Interface). Browse to the Keyboard section and set the category to Context Menu to access the newly supported functions.

The customize dialog allows assigning shortcut keys to a set of context menu operations
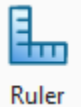
Once a shortcut key is assigned, it appears in the right-mouse-button context menu next to the operation name.
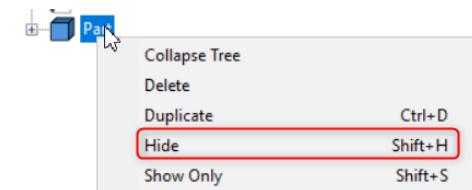
The assigned shortcut keys are displayed in the context menu

New icons for the Ribbon interface
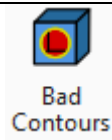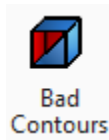
The icons in several Ribbon tabs have been updated. Some of these icons have been updated exclusively to look more modern, whereas others have been redesigned to depict the tool's functionality more appropriately. This is illustrated by two example icons:

	3-matic 16.0	3-matic 17.0	
Toggle Ruler	Ruler	Ruler	Update of icon to fit the general theme and colors

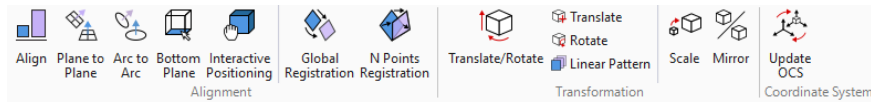| Toggle Bad Contours | [Bad Contours icon - red] | [Bad Contours icon - yellow] | Redesign of icon concept to depict the tool's function more accurately |

The following ribbon tabs have all been updated with a new set of icons:

View tab:

Align tab:

Mark tab:

Fix tab:

Surface tab:
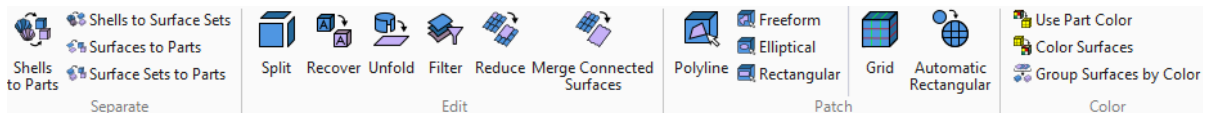
Measure tab:
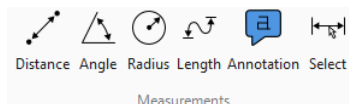
Analyze tab:
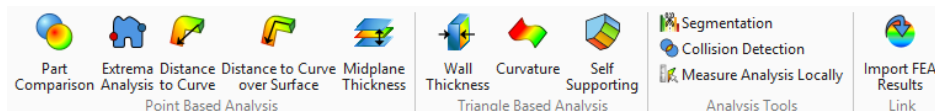
Only the icons for the following tools have been updated:

- *Create extrema analysis*
- *Collision detection*
- *Import FEA results*

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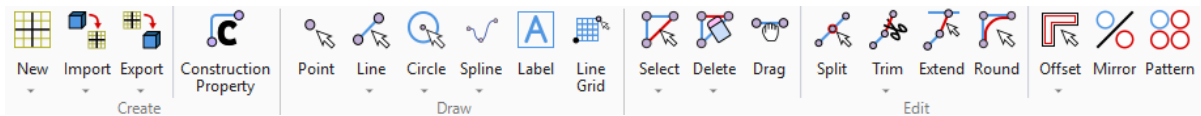
Sketch tab – part 1:

Sketch tab – part 2:
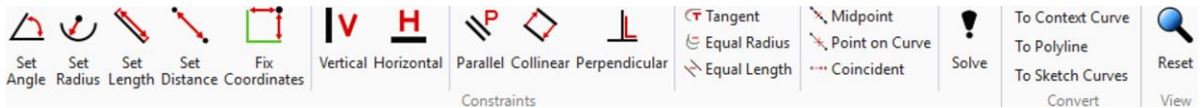
Design tab – part 1:

Design tab – part 2:
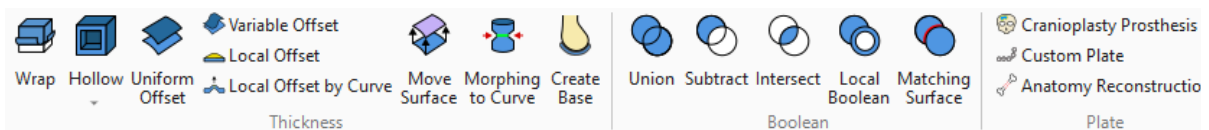
Finish tab:
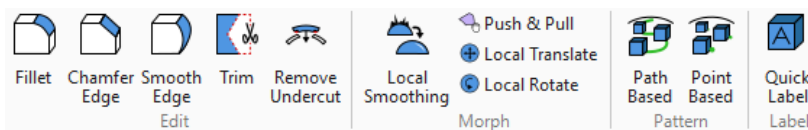
UV Map tab:
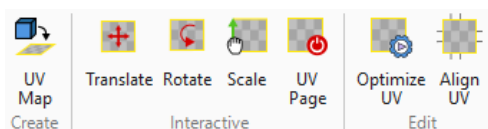
Remesh tab – part 1:

Remesh tab – part 2:
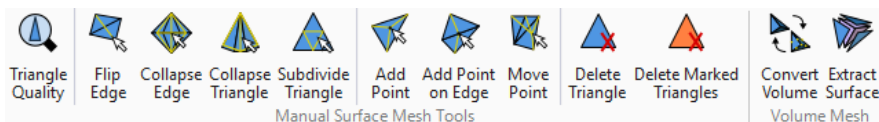
The Script Editor (Script > Python > Editor) has also been updated with a new set of icons:

New icons for the Object Tree

The icons in the Object Tree have also been updated to fit the general theme and colors in 3-matic. When an object is unselected, the icon will be greyed out. Upon selection of one or more objects, the icons turn into their actual colors.
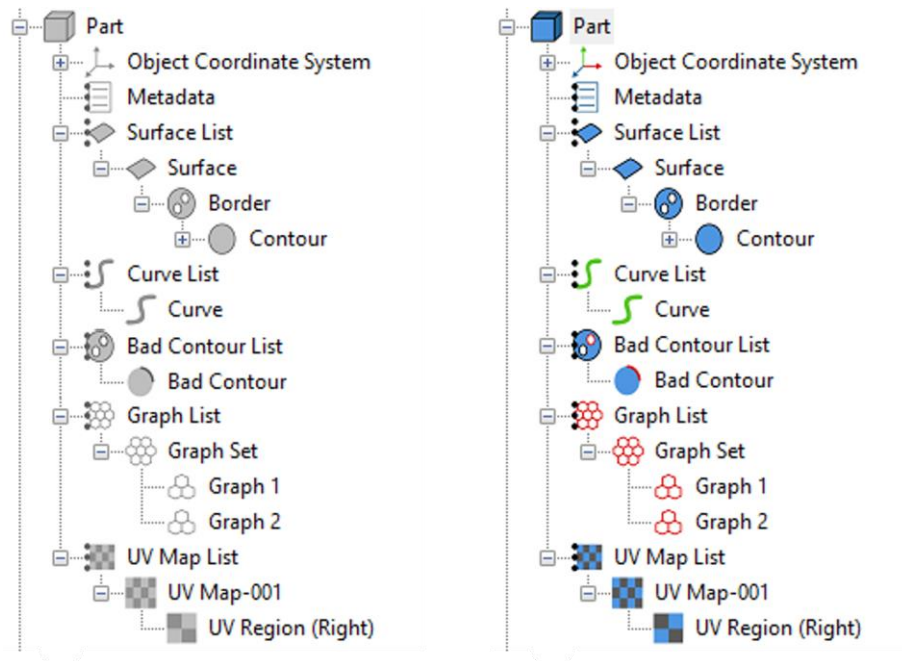
New icons in the object tree. Left: Icons when object is not selected. Right: Icons when object is selected

New icons for the Fix Wizard

The icons in the Fix Wizard have also been updated in similar fashion as the other parts of the user interface.
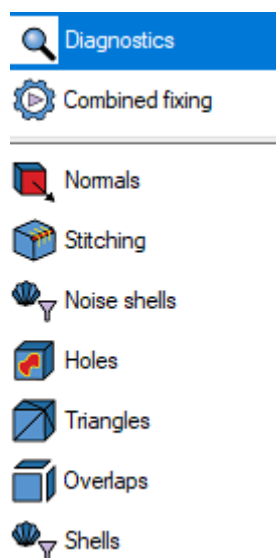
New icons in the object tree.

Unfold Surface

Materialise 3-matic 17.0 introduces a completely new tool to create 2D representations of 3D surfaces. Open the Surface tab and click the *Unfold Surface* button to access the new tool. Additionally, the tool can also be accessed via the Python Scripting API. Depending on the design needs, it is possible to unfold a 3D surface while minimizing the change in surface area or contour length.

For complex surfaces, a curve can be used as a seam to plan the cuts. (In this operation, the terms seam and curve are used interchangeably.) In the case of a closed surface, the surface cannot be unfolded without indicating a seam.

A useable seam has the following characteristics:

- Seam/curve is fully attached to the input surface
- Seam/curve provides a valid boundary for cutting, it intersects with contours of interest
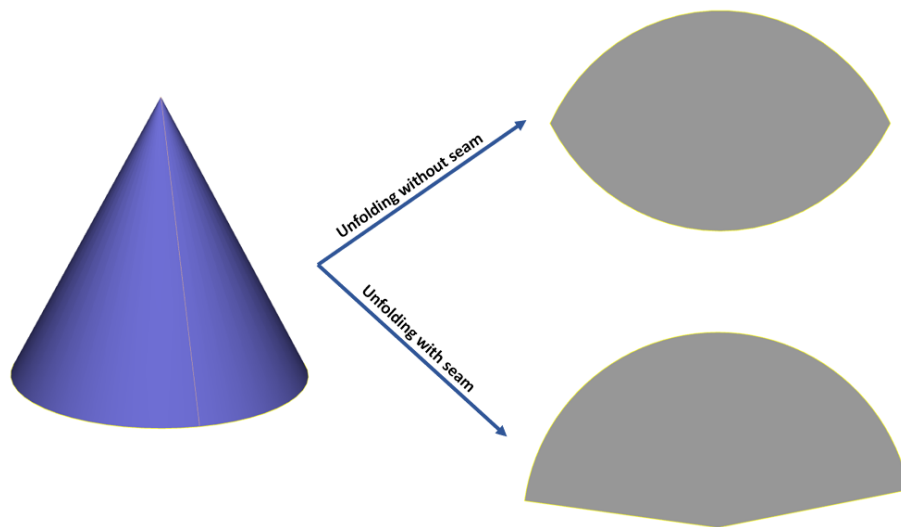
Illustration of unfolding a surface with and without a seam. Left: Cone surface (blue) with a curve/seam (orange). Right top: Result of unfolding the cone without the seam. Right bottom: Result of unfolding the cone with the seam

If multiple surfaces are selected, the operation provides an option to retain the surface connections.
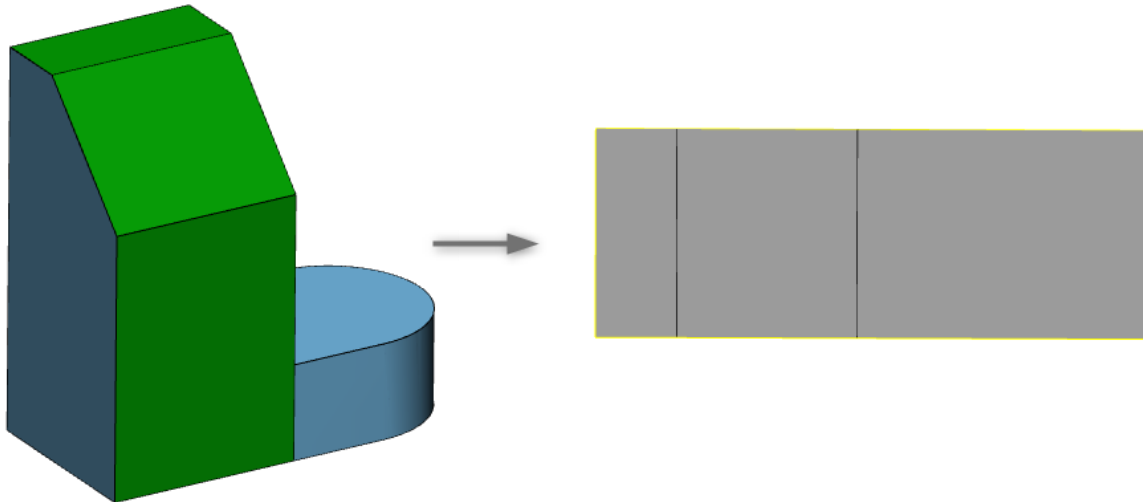
Left: 3 input surfaces (green). Right: the result of unfolding the 3 surfaces with Preserve surface connections checked.

A deformation analysis will be created by default upon clicking Apply. This analysis shows the areas of stretching and compression that may occur if the unfolded surface were to be refolded back to 3D. The measurement is provided in percent of stretch/compression.
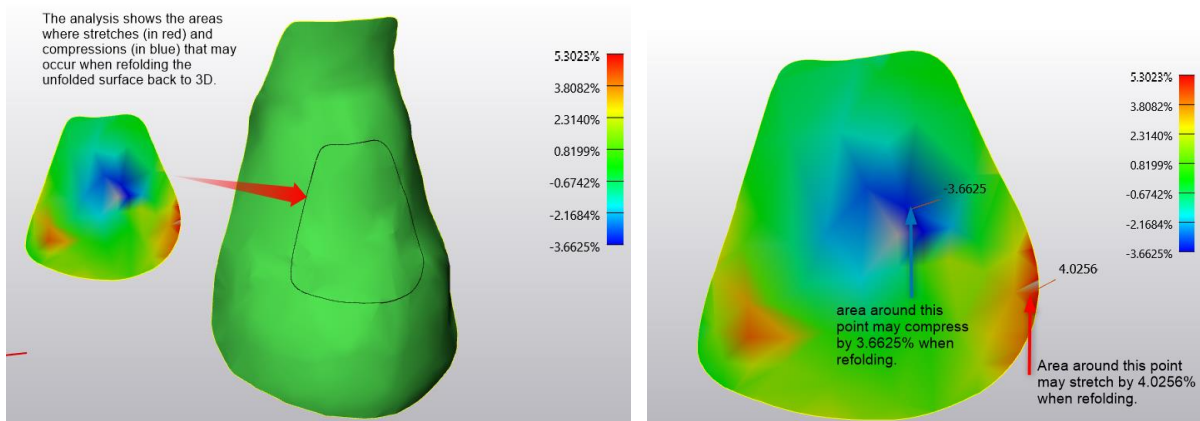
Left: Analysis on the unfolded surface shows the stretches and compressions when refolding. Right: Detailed explanations of the percentage value.

Best practices:

1. In case of using a seam(s), plan the seam(s) in locations that will lead to the best possible unfolded result. The most optimal location for a seam(s) will vary depending on the shape of the surface. The more optimally the seam(s) are placed, the higher the correlation between the original 3D surface and its corresponding flattened surface will be (i.e. lower overall deformation).

2. When working with a complex 3D surface, you can try to split the surface into smaller patches and unfold the set of surfaces with the Preserve Surface Connection checkbox checked. This may lead to a better (i.e. lower overall deformation) result as opposed to working with that surface as a single entity.

2D Print

It is now possible to print your objects on paper or to a PDF file with the new 2D Print tool. Open the File backstage and click 2D Print to launch the tool. Simply move your parts to the rectangular preview box in the Work Area view which defines the print area. Set your printer settings and click Apply to print the parts of interest. Use the shortcut key Ctrl + P to easily access this new tool.

Example of a skull with measurements printed to a PDF file:
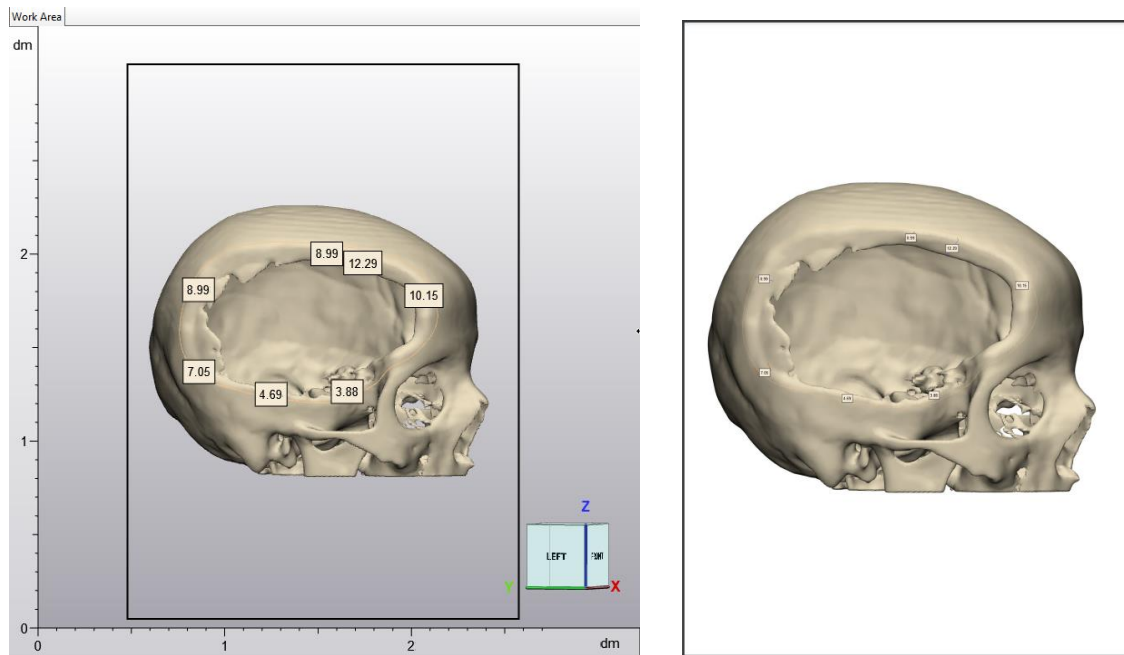
Quick label improvements

The quick label tool has been improved to provide a better user experience. The real-time preview has been significantly sped-up. The tool now allows easy and smooth repositioning of the view while showing the label preview on top of the part of interest, including on parts with multiple surfaces.

Furthermore, it is now possible to assign a color upon the creation of the label. The color of interest can be defined on the operation page.
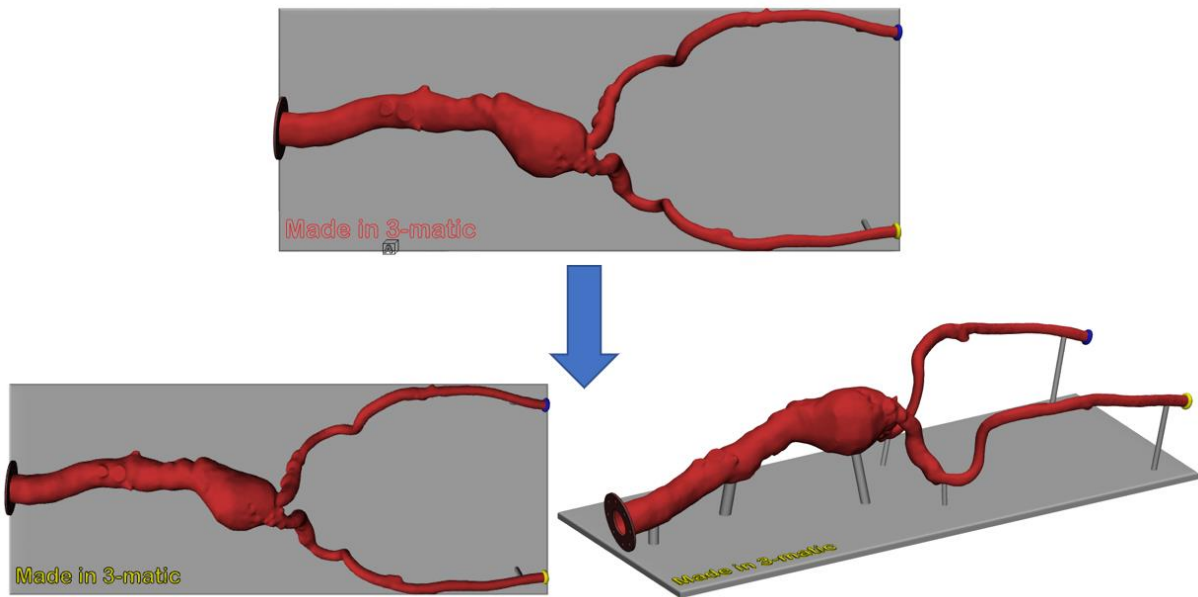
Assign a label color upon creation of the label. The color in the Quick Label parameters is set to yellow.

Scripting

Python scripts written for previous versions of Materialise 3-matic (version 16.0 and before) should be re-validated by the user before being run with Materialise 3-matic 17.0. Small updates have taken place in several API's (see below), and these can break a script in several ways. Further, when adding extra packages to python, make sure jedi 0.9.0 and RPyC 4.0.2 are used. For other versions, the compatibility has not been tested on Materialise 3-matic 17.0.

Full list of API improvements

For 3-matic 17.0, the API has been extended with several functions to allow further automation of workflows via scripting. The 3-matic Python API is extended in these primary areas:

Curve module

The following table lists the added API functions:

`trimatic.create_geometry_curve_angle_based`	`trimatic.create_geometry_curve_draft_based`
`trimatic.create_geometry_curve_curvature_based`	`trimatic.reduce_curve`

Other modules

The API has been extended with a few functions in other modules as well. The following table lists the added API functions:

`trimatic.activate_trim`	`trimatic.unfold_surface`

Other changes

- The `trimatic.smooth` API function now has the smooth method parameter available.

Remesh

Export to Abaqus

The export to Abaqus functionality has been improved to enable smooth data exchange between 3-matic and Abaqus. There are several labeling restrictions that *.inp files in Abaqus need to meet. It is now assured that those restrictions are followed upon export to Abaqus from 3-matic.

As a first improvement, the auto-rename function has been expanded. It will replace invalid/non-printable characters with an underscore, and it will add unique numbers upon export when identical part/surface (set)/volume names are detected. The following table shows an overview of invalid characters for export to Abaqus:

$	&	*	~			;	'	,
!	(	)	{	}	[	]	=
"	`	<	>	?	/	\	.

Secondly, the logger has been updated to include information and error messages concerning invalid export names. This will avoid the loss of data because of invalid naming conventions.

Lastly, it is now possible to export points from 3-matic to Abaqus. Analytical points can be selected along with meshed parts when exporting to a single *inp file. Upon import in Abaqus, the points will appear as reference points.
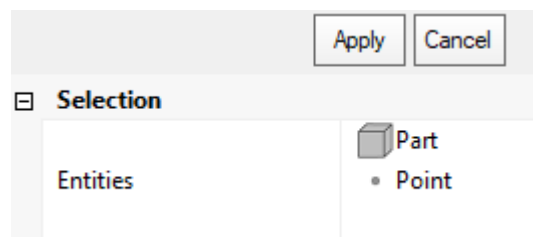
Illustration of analytical points as export entities to Abaqus

Create volume mesh

The Create Volume Mesh operation has been updated to generate a higher quality of volume elements. An overall improvement of approximately 10% has been observed.

Texturing

UV Based Rectangular Pattern

The UV Based Rectangular Pattern tool has been improved to ensure a more robust outcome. Enabling the *Stitch* parameter significantly reduces the risk of missing pattern entities in the UV based rectangular pattern result. Furthermore, enabling the S*titch* parameter also results in a simplified output where the pattern entity surfaces are merged to reduce the post-processing time.
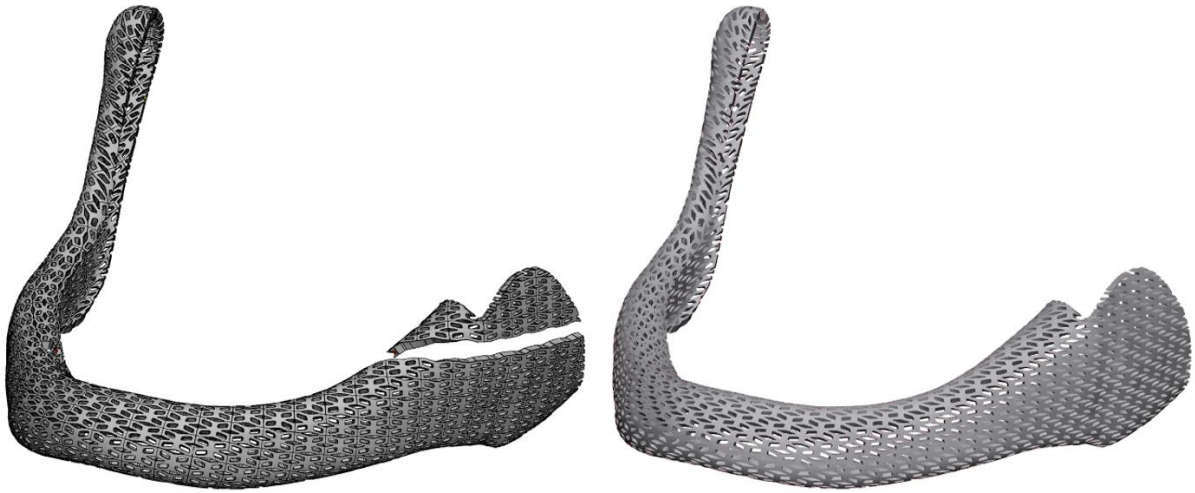
Left: Result of the UV Based rectangular pattern in 3-matic 16.0 with missing pattern entities.
Right: Result of the UV Based Rectangular Pattern in 3-matic 17.0 with a single surface output.

Minor changes

General

- The **About Box** has been improved in several areas:
  - Links to websites are now clickable
  - Sections and parameter names are aligned with Mimics
  - Sections and parameters are re-ordered to be aligned with Mimics
- **Groups** created in Mimics are retained upon import of an *.mcs file

File

- The **Export to Ansys** tool has been updated to be aligned with mimics
- **Import of Catia 6** is now supported.
- The **Catia 4** file format is no longer supported.

View

- The **Show Only** tool now works on all root level entities:
  - Part
  - Group and subgroup
  - Sketch
  - Analytical primitive (point, arc, line, datum plane, cylinder, cone, and sphere)
  - Measurement
  - Point Cloud
  - SSM

  It is possible to select multiple, different root-level entity types.

Align

- The **Translate/Rotate** tool now allows free 3D rotation of parts around a point in the inner circle/sphere of the translate/rotate widget.

Fix

- The Full analysis checkbox in the **Fix Wizard** is now on by default.

Design

- The logic upon creation of a datum plane/sketch with the **Fit Method** is improved. When selecting a mesh-based input, the average triangle normal will define the orientation of the output datum plane/sketch's Z-axis. This holds for the operation in the user interface, as well as the API.
- Metadata is now preserved when executing a **Cut** operation.
- It is now possible to ignore color preservation when executing a **Boolean operation**. Activate the expert mode and disable the *preserve colors* parameter to overwrite the input colors and get a single-colored output.

Known Issues

General

- Visualization of menu icons may blur in certain cases, depending on the Windows display resolution. It is advised to set the Windows display settings i.e. scaling factor and resolution to the settings recommended by Windows.
- Depending on your resolution settings, pop-up dialogs in 3-matic (e.g.: preferences, fix wizard, …) can be too small to fit all available buttons. In this case, enlarge the window to assure all buttons can be accessed. The same issue appears for the filter options panel.
- For specific monitors, if scaling is set to 125% in display settings, the progress bars might be cut off for certain operations.
- The color scale bar generated for analysis objects can show a partially blurry font.
- Under very specific conditions, there might be an incompatibility between 3-matic and Windows-specific add-ons that cause the file explorer window to malfunction, making it impossible to select files for import. A workaround is to drag and drop files into 3-matic. Do contact our support team in case you face this issue.
- The status bar on the left bottom does not show the status when (auto)-saving.
- In some very specific customization scenarios, the command cache file to store customization settings may get corrupted. This may result in a crash upon the launch of 3-matic. A workaround is to delete the temp file in AppData\Roaming\Materialise\3-matic. This work-around will also delete any customization done in 3-matic.
- When registering a new local license, it is possible that the new ribbons related to the new license are not immediately shown in 3-matic. If this happens, it is advised to reset the user interface via Options & Help → Reset Defaults → Reset user Interface.
- Connecting to certain floating license servers may cause performance issues. Connecting through a different port (e.g. 7010 instead of 7000) might help in specific cases.
- For users with multiple graphic cards (e.g. integrated graphic card and dedicated graphic card), 3-matic will use the high-performance graphic card. If this dedicated card is not properly installed, it can give rise to rendering issues. If this happens, it is advised to run 3-matic with the integrated graphic card.

Import/Export

- Import *.X3D does not have the "Import as one part" parameter. By default, the geometries are always imported as one part.
- Upon importing Fluent files, (sur)face names are not retained but renamed to surface-1, surface-2, …
- Exported analyses to 3D pdf appear too bright in Adobe.

View

- When zooming in to the maximum amount in the Work area, the Orientation box changes its original position.

Measure

- Length measurements can give a different value when saving and reopening a project if the coordinate system of the original parts has been updated after the measurement was already executed.

Curve

- In specific cases, the 'Create Spiral Curve' does not take the user-defined center point correctly into account.
- While the preview of the 'Create Isocurves' operation is not always correct or even missing, the actual resulting curves after applying are correct.

Design

- The 'Anatomy Reconstruction' might fail/crash on specific (less realistic) input data.
- When applying the Interactive Plane Cut with the "Finite cut" parameter checked, the clearance parameter is not properly considered when working with graphs/graph sets. The clearance is not reflected in the clipped preview and will only be applied on 1 side of the cutting plane.

UV Map

- Providing conflicting alignment constraints in the UV alignment operation may lead to an invalid UV Map.

Texturing

- When applying a square texture on a UV map that has (or had) a non-square texture initially, the aspect ratio of the square texture will be distorted.

Lattice

- A result of the 'Convert Lattice to Mesh' operation with organic effect is not always smooth for graphs with different thicknesses if they have shared nodes.
- For certain interactive operations (e.g. Interactively Translate Graph Edges) the selection filter might get disabled, preventing you from making a graph selection in the 3D view. As a workaround, the entity selection box should get focused again on the operation page.
- In very specific cases, picking and rotating a part with graphs in the Work area might result in 3-matic freezing for a short time.

Remesh

- The 'Analyze Mesh Quality' operation is marking only bad volume elements, instead of also marking the corresponding triangles of the surface.
- When applying the Uniform Remesh operation on parts containing invisible surfaces, it will make the invisible surfaces visible again. The output result is not influenced.
- Using the Local volume mesh parameters upon generation of a volume mesh can result in the wrong location of the local refinement. This issue is triggered when the input entities that define the local refinement location are transformed before applying the Create Volume Mesh operation.

CAD Link

- The CAD Link operation might crash on specific input data. It is recommended to fix parts upfront and assign realistic parameters.

Script

- Using the Procrustes analysis upon creating a subregion SSM with trimatic.create_subregion_ssm might result in inverted modes compared to the input SSM. It might help to assure good initial alignment before creating the full SSM (input SSM).

Compatibility

- 3-matic does not support triangle color information when loading *.magics files.
- Parts imported with *.magics file extension can have different orientations in 3-matic and Magics.
- Splines and Thin Structures present in a group in Mimics are moved out of the group when opening the Mimics project in 3-matic. The Splines and Thin Structures will appear on root level after opening in 3-matic and must be re-grouped.

System Requirements

Minimum Requirements

Software	Hardware
Windows® 10 – 64bit Version 1909	Fourth generation Intel® Core™ i7 or equivalent
Microsoft Edge® or equivalent	16 GB RAM
PDF viewer	DirectX® 12.0 compliant AMD Radeon/NVIDIA® GeForce® graphics card with 2 GB RAM
.NET framework 4.6.1 (or higher)	40 GB free hard disk space
	Resolution of 1920x1080 or higher

Note: Mac® uses can install the Mimics Innovation Suite using Boot Camp® in combination with a supported Windows OS.

It is recommended to use our software within a hardware and/or network environment in which cyber security controls have been implemented including anti-virus and use of firewall.

The following operating system versions were used to test Materialise 3-matic 17.0:

- Windows 10 Enterprise version 21H1 and 20H2 64-bit

Materialise 3-matic 17.0 is software and does not degrade in performance. Its lifetime is determined by commercial requirements, obsolescence of its techniques or obsolescence caused by changes in its host environment (refer to above requirements). Support can in any case not be guaranteed beyond seven years after the release of this version of the software.

Contact Information

For technical support, please contact our Customer Support team: mimics@materialise.be.

For scripting related support, the MIS Scripting Forum can be consulted as well: https://community.materialise.com/

For more information, please check our website: https://medical.materialise.com/ or the Materialise Academy https://www.materialise.com/en/academy/medical/mimics-innovation-suite.