



**HEXAGON**



**Simufact Additive**

Powered by **Nexus**

Version 2024.2

**What's New?**

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# Highlights



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Enhancements for PDA module



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Enhanced shape comparison



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Greater control on export to CAD



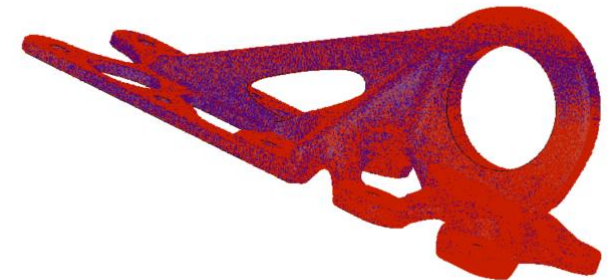
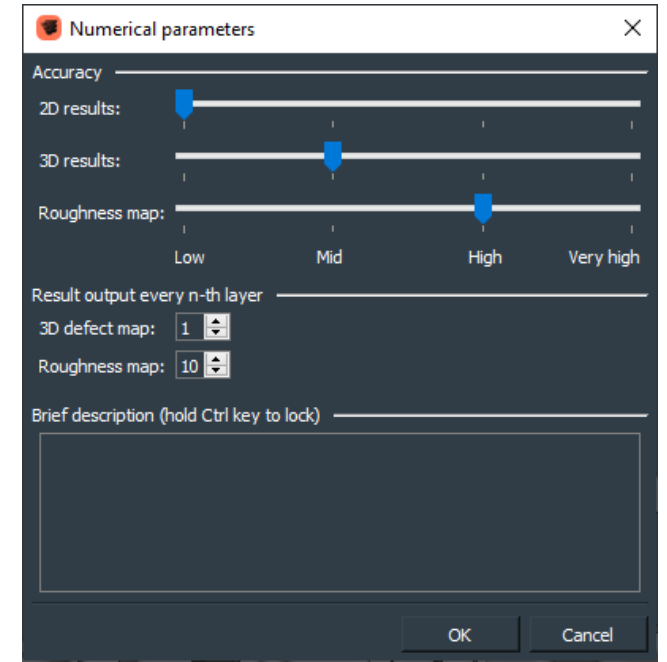
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Miscellaneous

# Enhancements for PDA module

# Enhancements for PDA module

- All PDA numerical settings are now integrated in the GUI (accuracy and output management).
  - The slider maps the accuracy onto following grid point sizes:
    - Low: 150 (Default)
    - Mid: 500
    - High: 1000
    - Very high: 2000
  - Old projects will use the new default values
- 3D defects are activated by default – the test feature flag in PDA has been removed (no need to edit .ini file)
- Improved CPU performance



 Speed up by at least **2X**

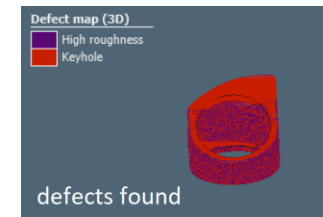
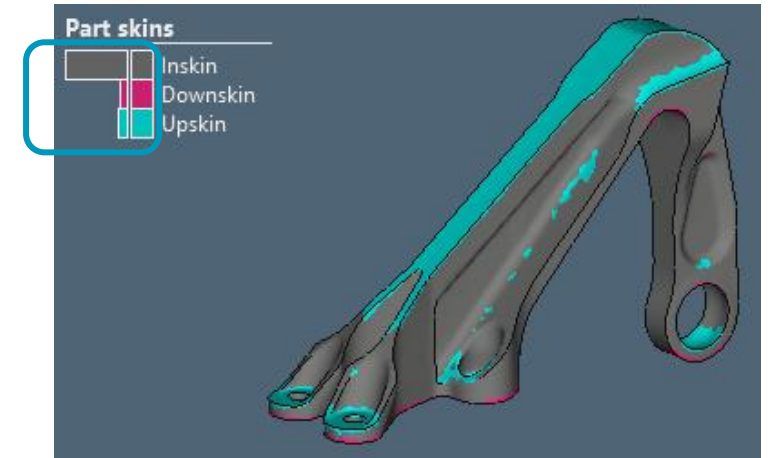
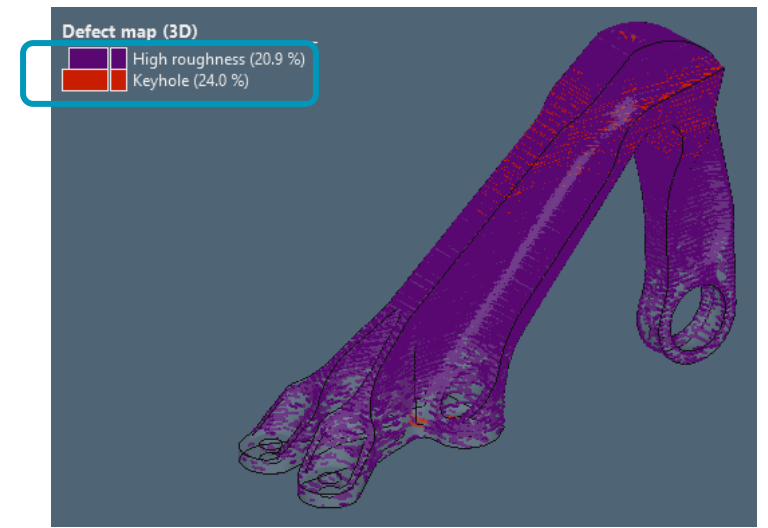
# Enhancements for PDA module

## Defect distribution in the legend

- For all defect maps, the legend now displays the % of defects of the part compared to the number of sampling points.
- Histogram bars illustrates visually the distribution of defects. Note: histograms have been added to all color set based results in Sf Additive (part skins, contact, ...).
- The part is displayed in green if it is defect free.



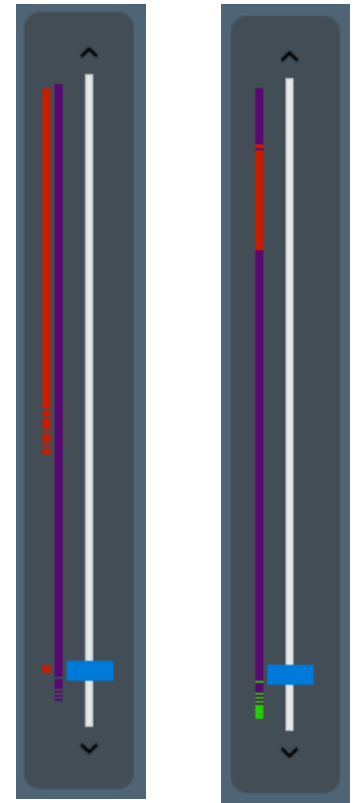
Defect statistics to evaluate part quality



# Enhancements for PDA module

## Defect distribution (2D maps)

- A defect distribution is displayed along the 2D slider to guide the user towards problematic layers. One pixel of the line typically represents several layers and, by default, the largest defected area among these layers will be considered for that pixel.
- The user can also **average** defects considering the contribution of all layers that are mapped onto a single pixel.
- The statistics can be shown either as **multiple lines** or by a **single line**, where the defect with the highest defected area is taken per pixel.
- Filtering out the defects removes the corresponding defect distribution.



Multi-lines

Single line

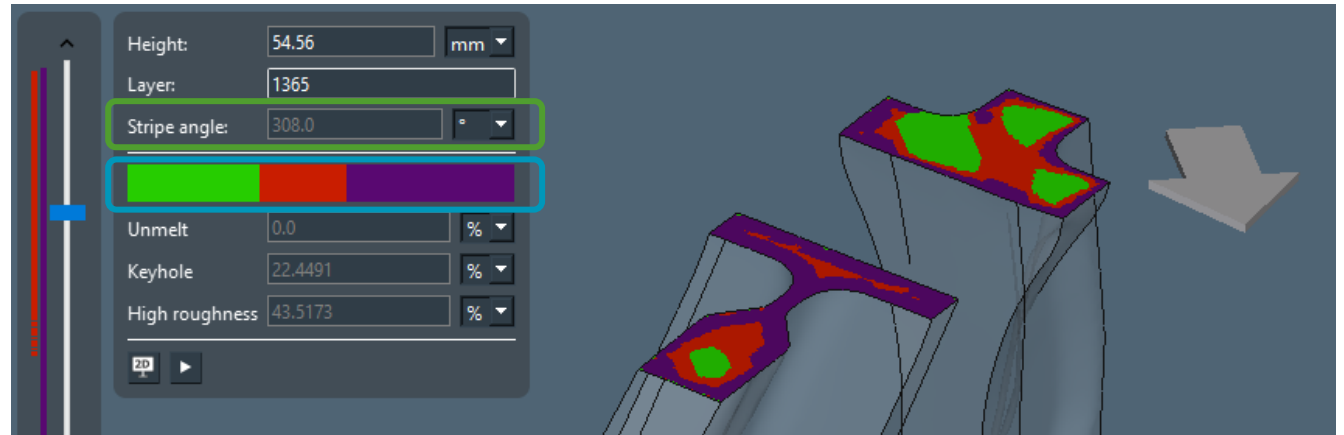
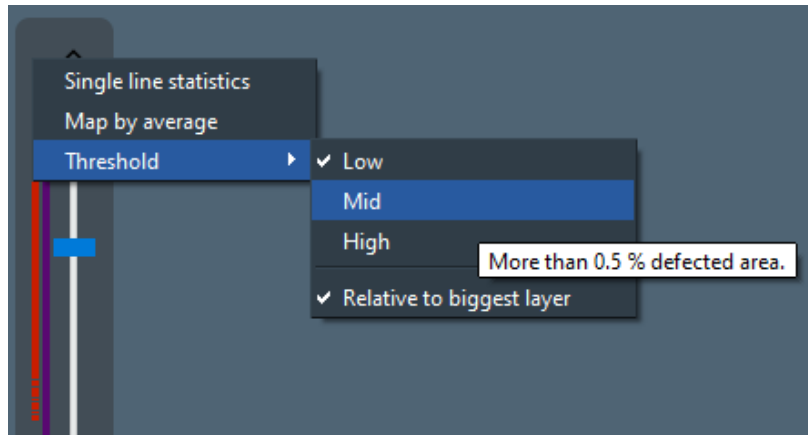


Highlight the problematic layers to ease defect inspection

# Enhancements for PDA module

## Defect threshold (2D maps)

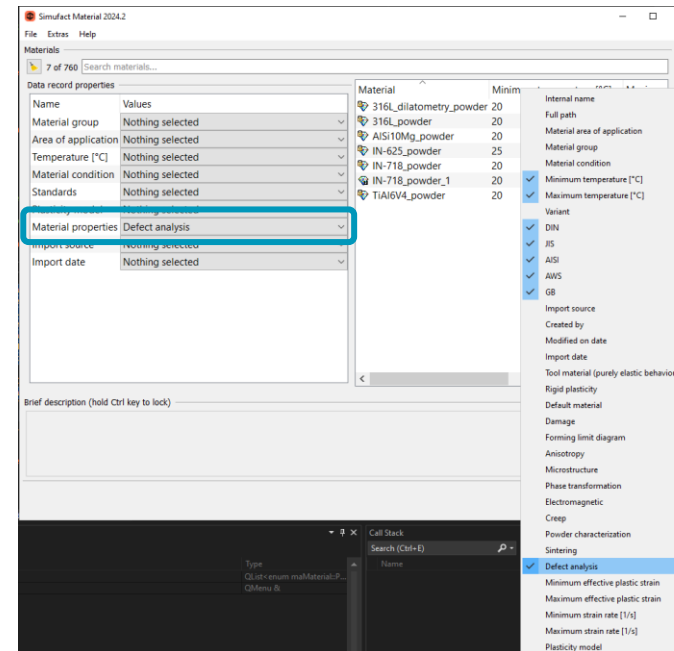
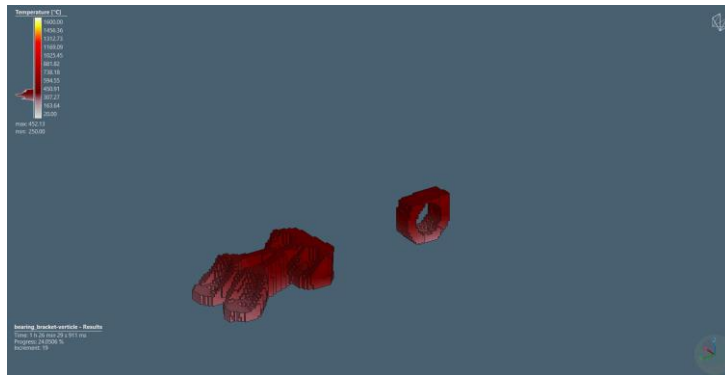
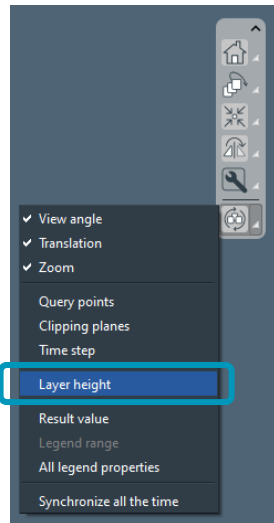
- A **threshold** is available to define the minimal defected area a layer should contain to be considered by the statistics. This allows the user to focus on heavily defected layers over small-sized or nearly defect-free layers.
- ☑ Display the layer **stripe angle** in the info box and visualize the orientation with an arrow.
- ☑ Display **defect statistics** of the current layer to ease the inspection (i.e. discard defects affecting a very small area).



# Enhancements for PDA module

## Miscellaneous

- Results **synchronization** of defect or temperature map in terms of layer height.
- Display temperature results on the voxel mesh during the build to analyze the part **thermal history**.
- Add a **filter** “Defect analysis” in Simufact Material to quickly find grades that can be used in PDA.

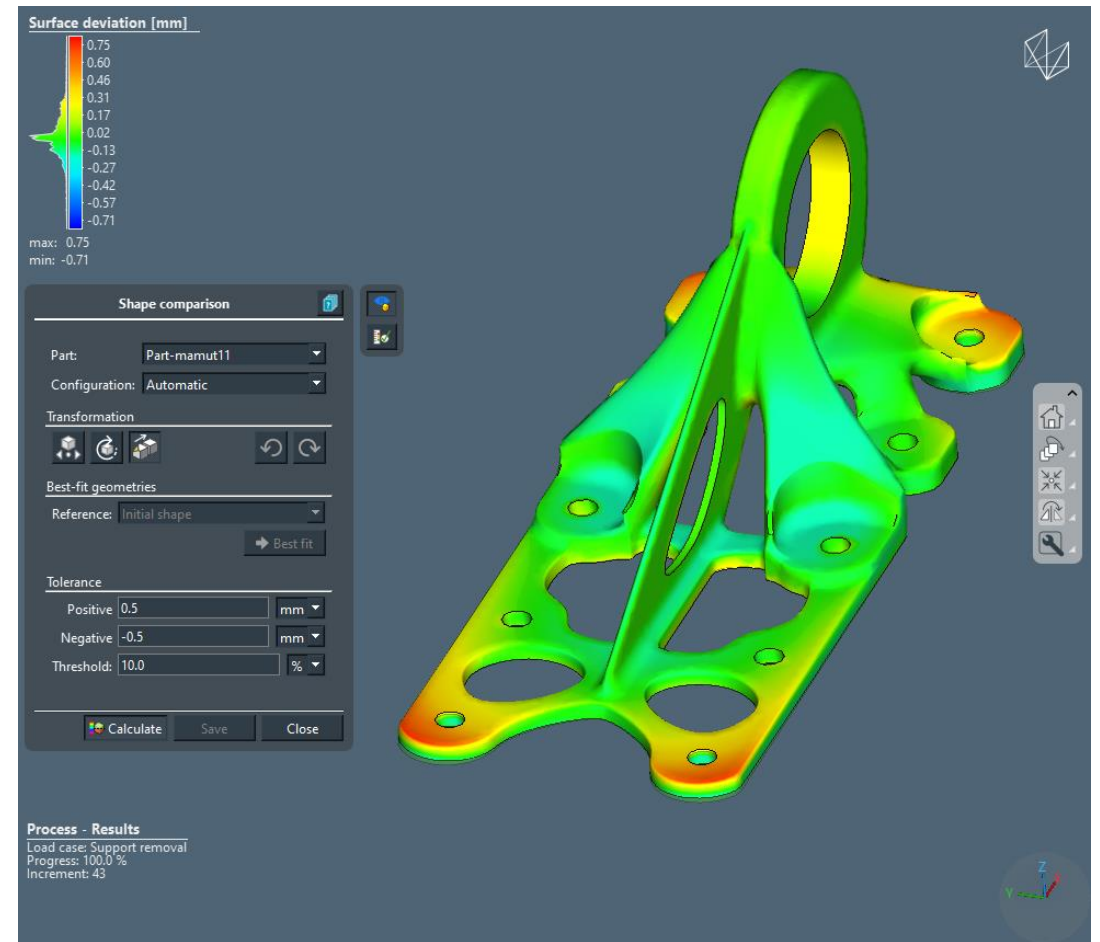




# Enhanced shape comparison

# Enhanced shape comparison

- The best approach to analyze distortion is generally “shape comparison” as it allows to align the part after plate removal (as opposed to displacements). It also provides a result closer to metrology & scan measurements.
- In 2024.2, we have improved the user experience for shape comparison:
  - “**Surface deviation**” is now automatically computed and is persisted during the result import, i.e. without the need to open the shape comparison dialog and re-calculate the result value.
  - **New design of Shape comparison**: it is now an embedded dialog
  - “**Tolerance check**” identifies part regions within or out of tolerance based on surface deviation results

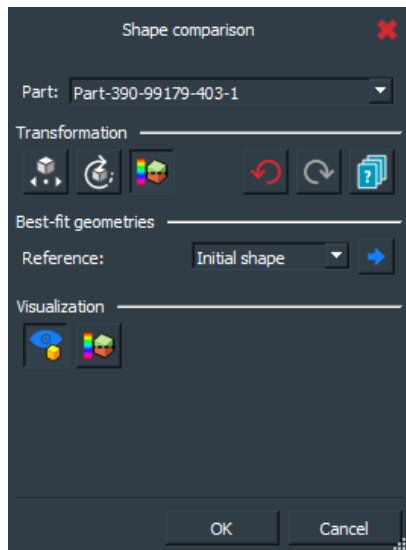


Improved analysis of distortion and quick identification of the surfaces which are out of tolerance

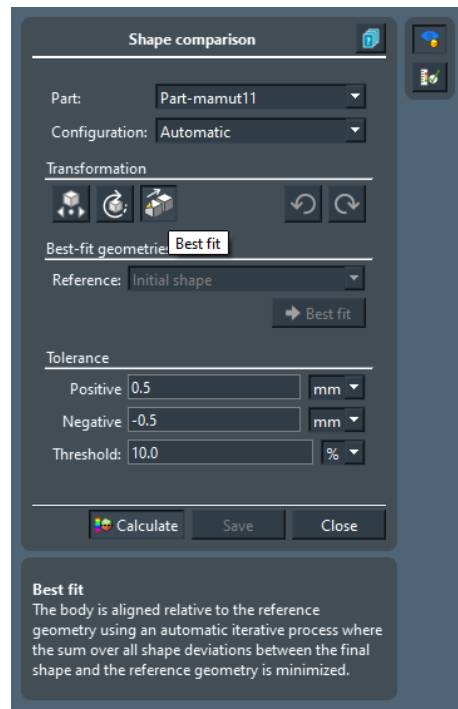
# Enhanced shape comparison

## Shape comparison re-design

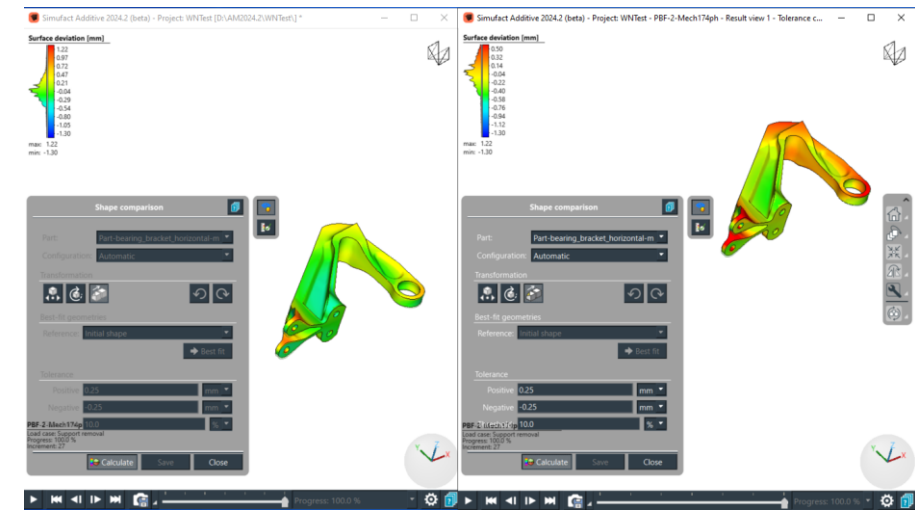
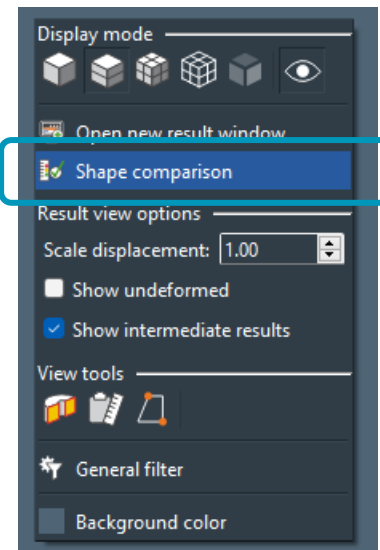
- Shape comparison is now accessible in every result view, visualization buttons have been moved to the side, icon & tooltip updated.
- User can save up to 3 **custom** shape deviation configurations. It allows to compare efficiently different alignment strategies.
- Shape comparison can be performed on multiple windows to compare results between processes.



2024.1



2024.2

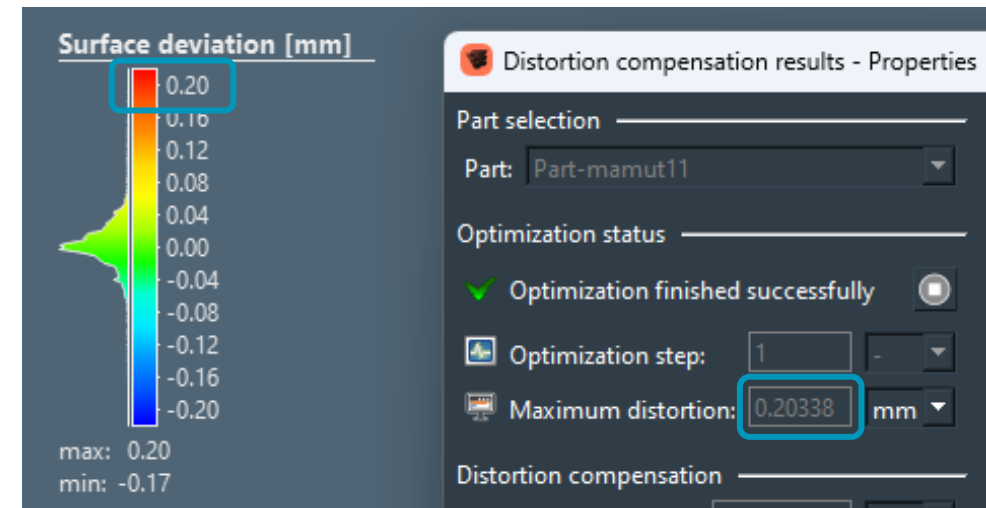
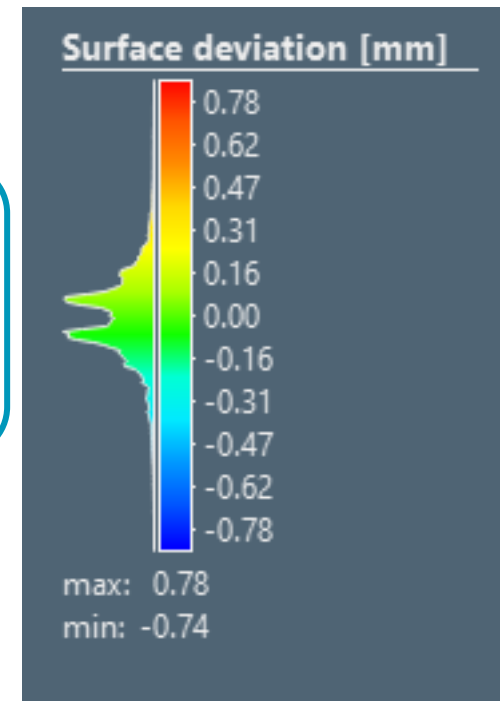
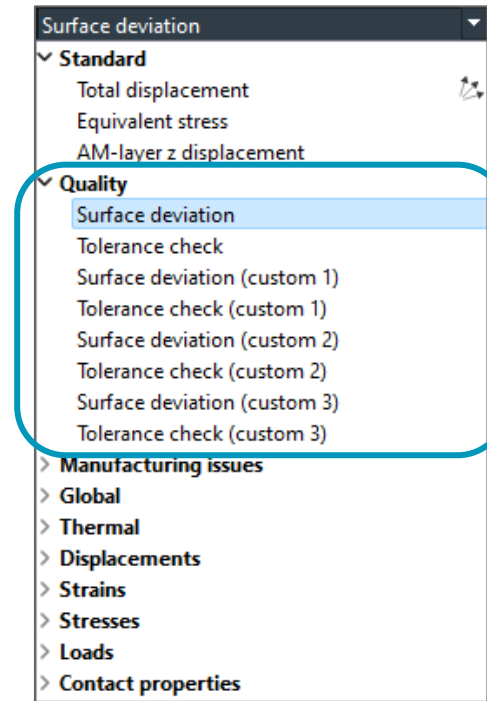


Better usability

# Enhanced shape comparison

## Surface deviation deep-dive

- Surface deviation is calculated automatically for every completed analysis without performing Shape comparison and is saved under the new **Quality** group. It cannot be modified and cannot be overwritten. By default, it uses:
  - best fit
  - comparison with the initial geometry.
- The legend limits of surface deviation are based on the absolute max value calculated so that the parts is green when deviation is 0 (note: this is not the case when shape comparison dialog is open).
- The surface deviation data might be generated by the distortion compensation and will be used in this case. This aligns the surface deviation with the distortion value in the MPBF optimization result.



# Enhanced shape comparison

## Tolerance check

- Compare the distorted geometry with the initial shape so that user can check the dimensional accuracy and identify the surfaces which are out of defined tolerance.
- The tolerances are defined in the Shape comparison dialog.
- If the tolerance input is changed, the results are adapted to the new input.
- The **threshold** defines the range outside the defined tolerance, but very close to being in-tolerance.
- Surface deviation and tolerance check are only available for the last increment of the simulation.

### Hinge Sintering - Results

Load case: Sintering  
Time: 14 min 24 s 000 ms  
Progress: 4.0 %  
Increment: 4

⚠ Surface deviation only available for final increment

The screenshot shows the 'Shape comparison' dialog box on the left and a 3D model of a part on the right. The dialog box has the following sections:

- Tolerance check**: A legend showing three categories: 'Out of tolerance (40.4 %)' in red, 'Almost within tolerance (7.1 %)' in yellow, and 'In tolerance (52.5 %)' in green.
- Shape comparison**: Fields for 'Part: Part-mamut11', 'Configuration: Automatic', and 'Transformation' (with rotation and translation icons).
- Best-fit geometries**: 'Reference: Initial shape' and a 'Best fit' button.
- Tolerance**: Input fields for 'Positive: 0.5 mm', 'Negative: -0.5 mm', and 'Threshold: 10.0 %'. A 'Calculate' button is below these fields.
- Tolerance check**: A description: 'Identifies part regions within or out of tolerance based on surface deviations results.'
- Process - Results**: 'Load case: Support removal', 'Progress: 100.0 %', 'Increment: 43'.

Annotations on the right side of the image:

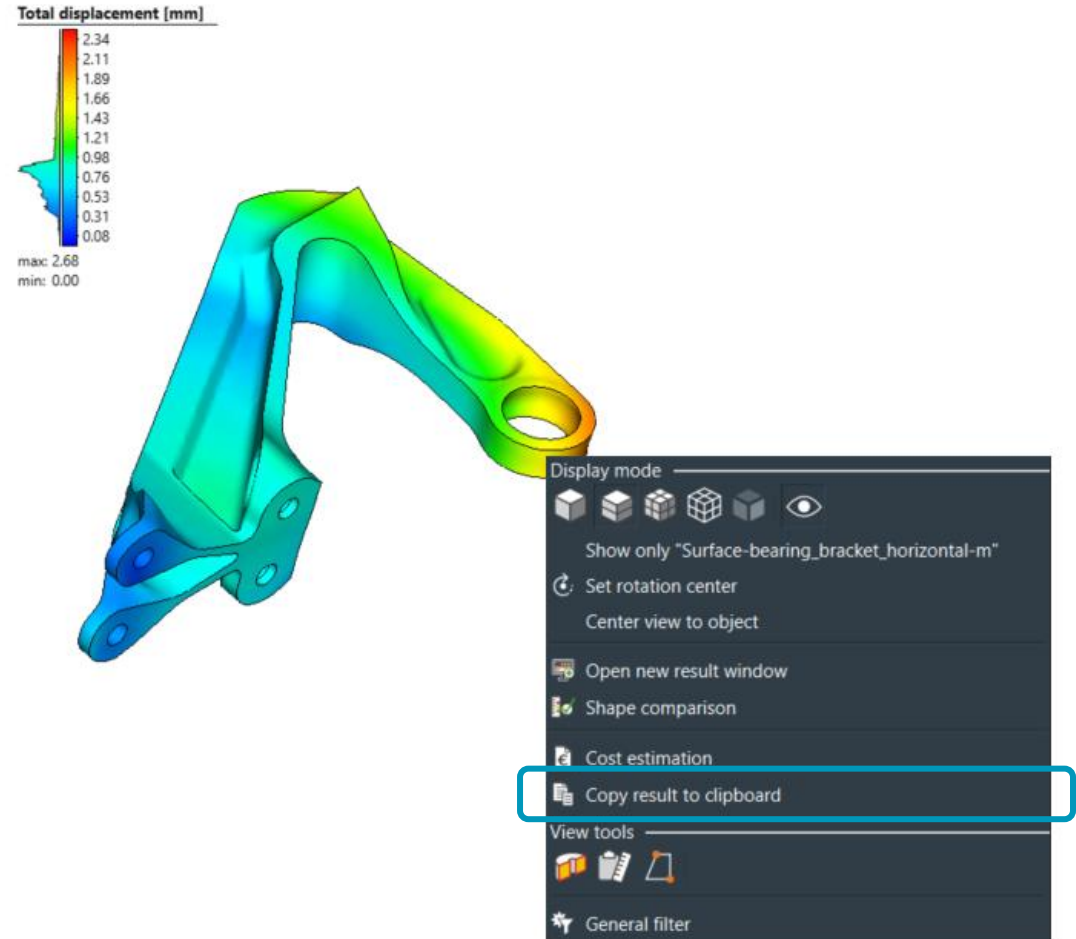
- 'Improved legend:' with a list: '• bar chart', '• % of surface'.
- 'Display tolerance check' with an icon of a camera.
- 'Inputs:' with a list: '• tolerances', '• threshold'.

The 3D model shows the part with a color-coded overlay: red for areas out of tolerance, yellow for areas almost within tolerance, and green for areas in tolerance. The part is a complex, multi-ported structure with a central vertical support.

# Enhanced shape comparison

## Export results (copy to clipboard)

- Any active result value can be copied to the clipboard for further analysis (statistics, scripts, ...).
- The quantities exported are the mesh nodes coordinates and the nodal values.

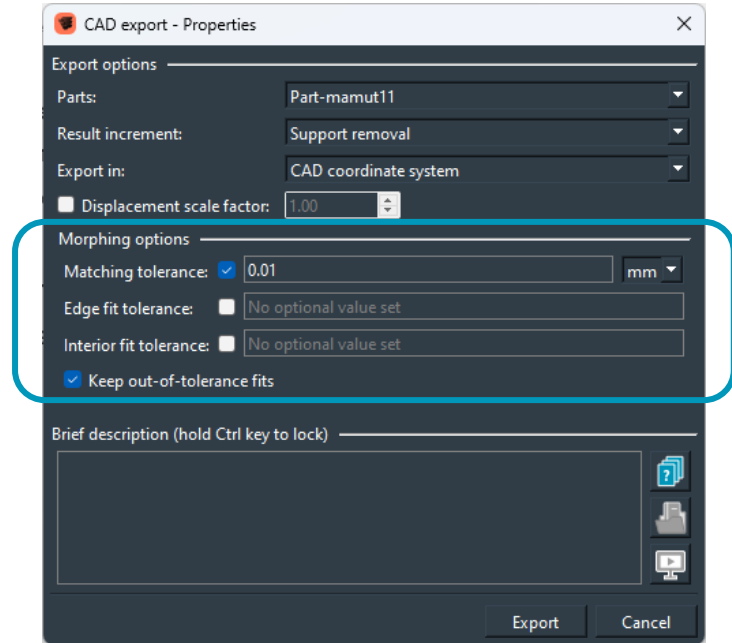


**Export your results for further analysis!**

**Greater control on export to CAD**

# Greater control on export to CAD

- To increase the usability of the 'Export to CAD' functionality, Sf Additive now exposes more settings in the GUI. These settings control the balance between accuracy and surface smoothness:
  - **Matching tolerance:** target tolerance when matching undeformed mesh & CAD
  - **Edge fit tolerance:** target tolerance when fitting new NURBS to deformed edges
  - **Interior fit tolerance:** target tolerance for fitting the interior of a deformed face.
  - **Keep out-of-tolerance fits:** keep fits that do not meet the target tolerances (a warning will be displayed). If disabled then the deformed surface will not be embedded in a NURBS surface.
- Increasing some of these tolerances can help to produce smoother geometries or fix CAD export issues (out of tolerance edges, ...).
- As the simulation is very sensitive to the inputs, the CAD **import** has been extended by a warning to activate healing if any of the imported CAD bodies is non-solid. Additional capabilities to better handle non-manifold geometries will be introduced in 2024.3.

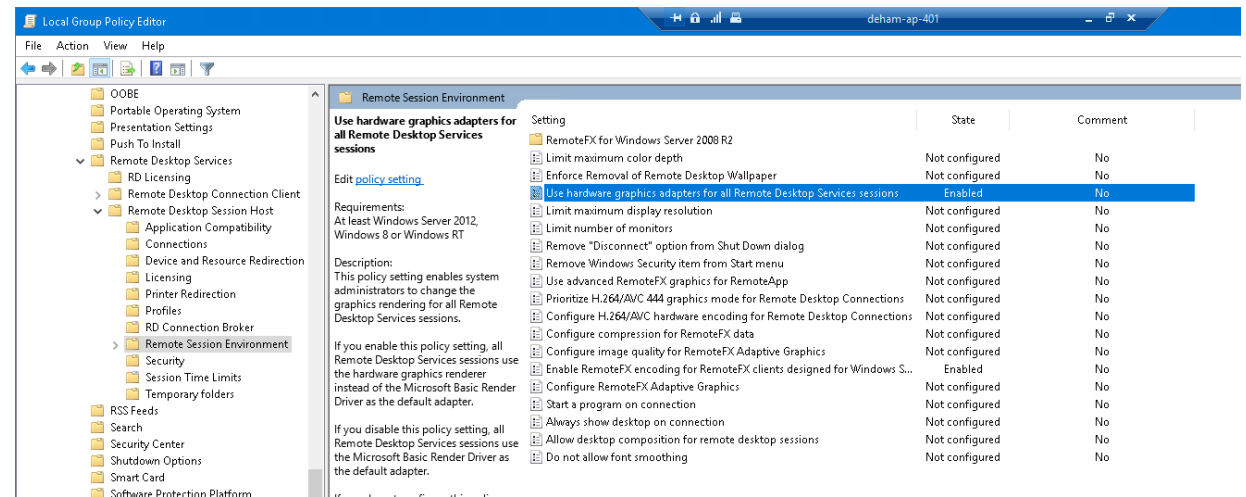




# Miscellaneous

# About Windows Remote Desktop connection

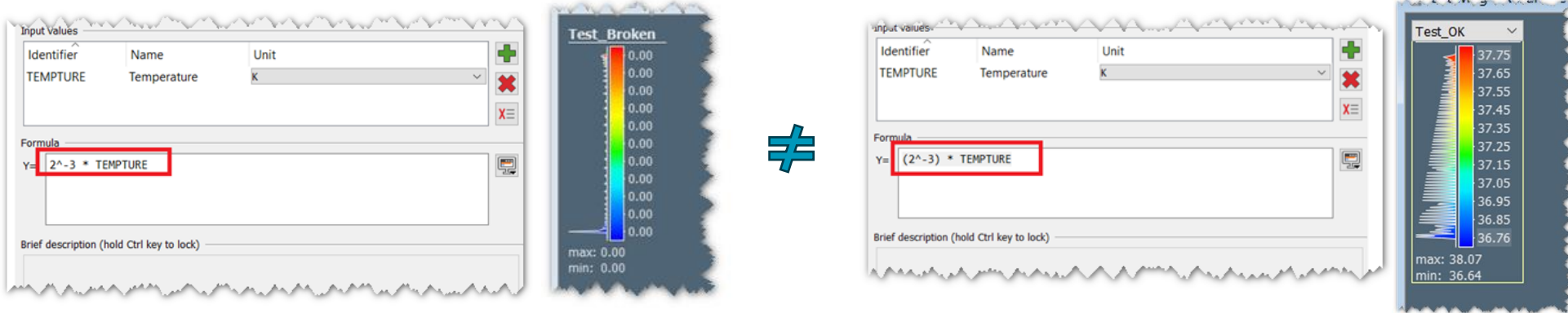
- We have updated underlying QT libraries to their latest versions, which do not support any more a very old fallback mechanism if no 3D acceleration for graphics is available. Therefore, if you are using Windows Remote Desktop connection, it is possible that Simufact Additive crashes during the start or when opening a project. The main reason is Windows 10 and 11 do not enable the GPU for rendering over remote desktop by default, but this can be changed by editing the Local Group Policy.
- Steps for Windows 10 and 11 are described below (these operations need to be performed on the remote computer):
  - Open the *Local Group Policy Editor* from Control Panel or use the Windows Search dialog (Windows Key + R, then type in gpedit.msc)
  - Browse to:  
Local Computer Policy\Computer Configuration\Administrative Templates\Windows Components\ Remote Desktop Services\Remote Desktop Session Host\Remote Session Environment
  - Then enable “*Use hardware graphics adapters for all Remote Desktop Services sessions*”
  - Update the Group policy



# About arithmetic formulas evaluation

- Some arithmetic formulas (e.g. user-defined result, joining optimizer, GCode import) were not correctly evaluated in previous versions
- Every expression of the following type is affected was affected: OPERATION - NUMBER OPERATION NUMBER, where
  - OPERATION = \*, /, +, -, ^, ...
  - NUMBER = variable or constant number

e.g.:

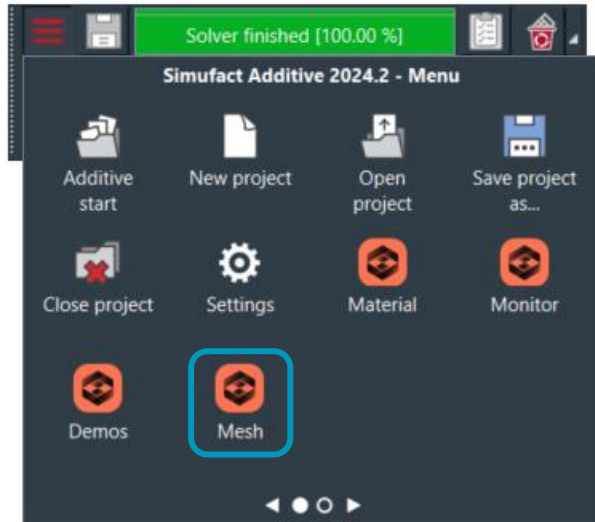


- Formulas are now always interpreted as follows (old vs. new):

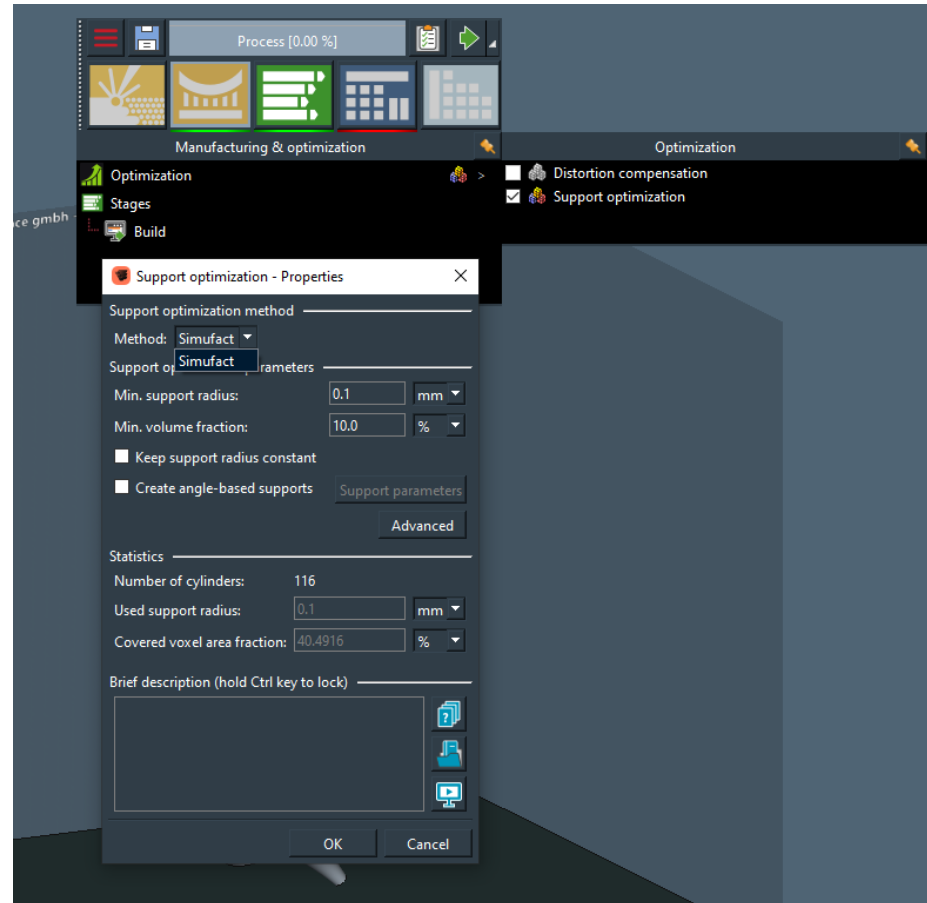
Formula	Result (old)	Result (new)
$2^2 \cdot 2$	$= 4 \cdot 2 = 8$	$= 4 \cdot 2 = 8$
$2^{(-2)} \cdot 2$	$= 0.25 \cdot 2 = 0.5$	$= 0.25 \cdot 2 = 0.5$
$2^{-2} \cdot 2$	$= 2^{-(4)} = 1/16$	$= 0.25 \cdot 2 = 0.5$
$1/-1 \cdot 2$	$= 1/-2 = -0.5$	$= -1 \cdot 2 = -1 \cdot 2 = -2$
$1/-1+2$	$= -1+2 = 1$	$= -1+2=1$

# Miscellaneous

## Sf Mesh in Setup

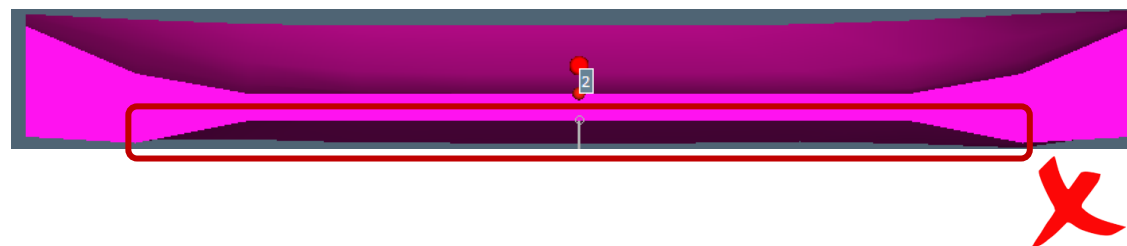
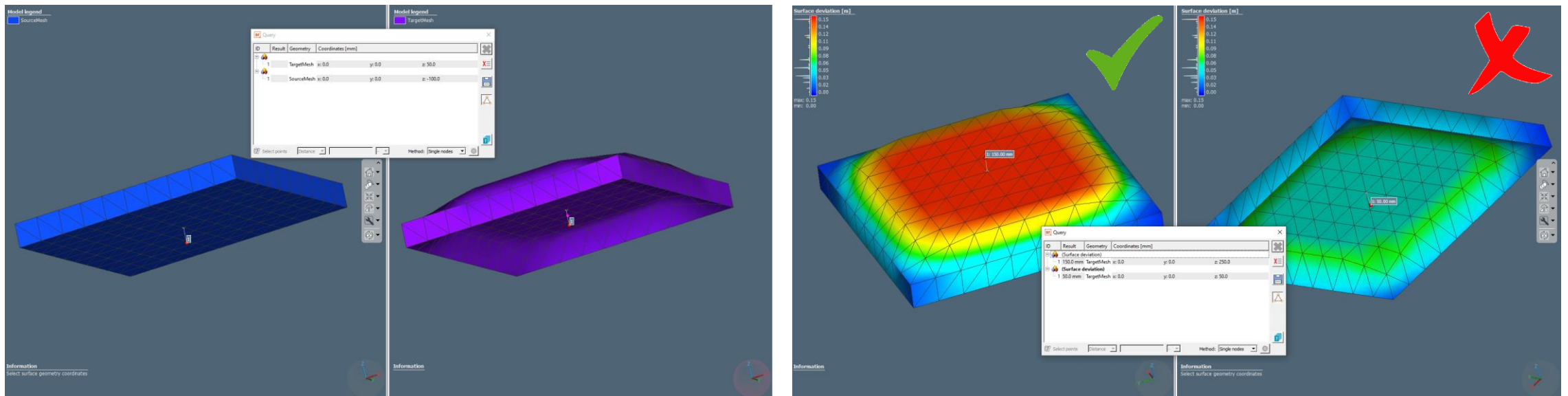


## Generative support optimization with Emendate discontinued



# Important fixes

- Improved support of (very) large models
  - Surface results cannot be created in Sf Additive for projects with arc result files larger than 4 GB
  - The GUI crashes when importing result arc files greater than 2 GB
- For thin wall structures, the calculation of the surface deviation driving the next variant was sometimes incorrect in previous versions







**HEXAGON**

# Where Simulation Gets Real



Presenter:

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