

The logo features a large white number '9' with a vertical line through its center, set against a dark blue background. To the right of the '9' is the text 'th' in a smaller white font. The entire logo is contained within a dark blue rectangular box that is part of a larger graphic design.

9<sup>th</sup>

**BEFORE  
REALITY**

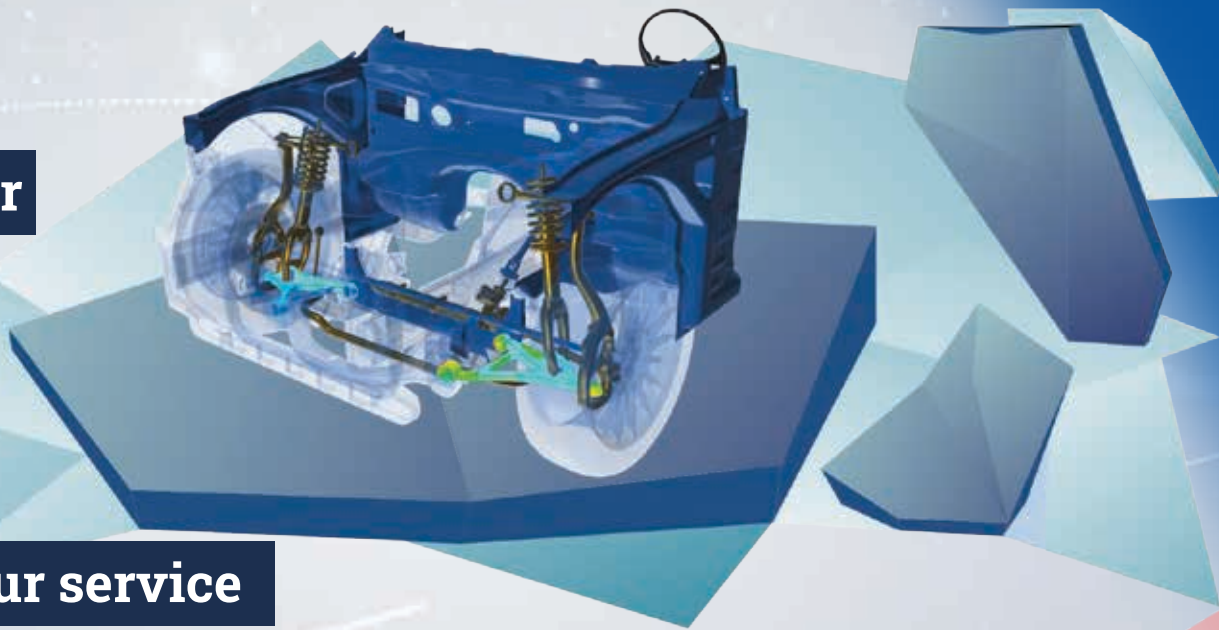
CONFERENCE

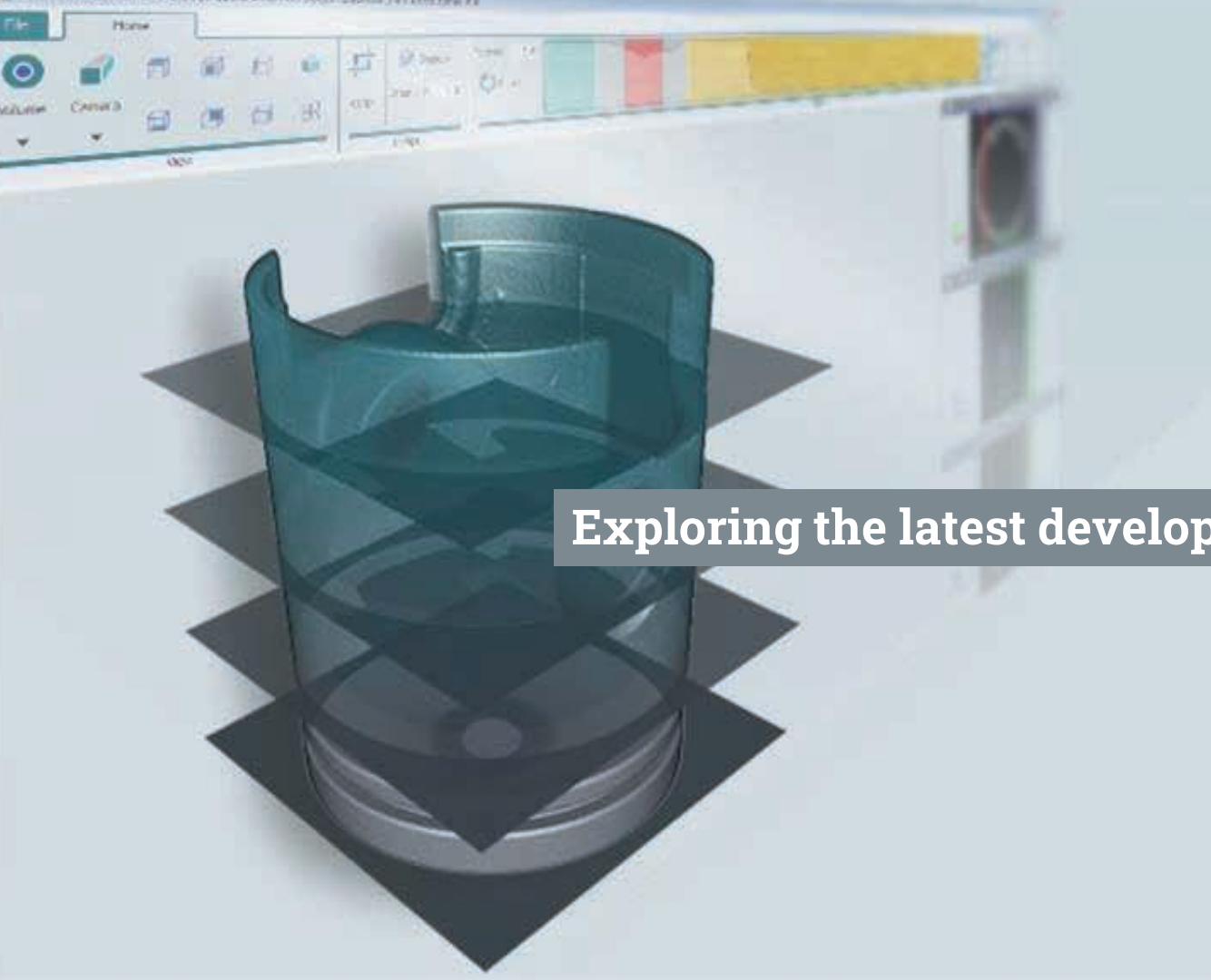
**Born Engineer**

**CAE Legend**

**Humble**

**Always at your service**





Exploring the latest developments of RETOMO

**RETOMO**  
PIXEL TO OBJECT



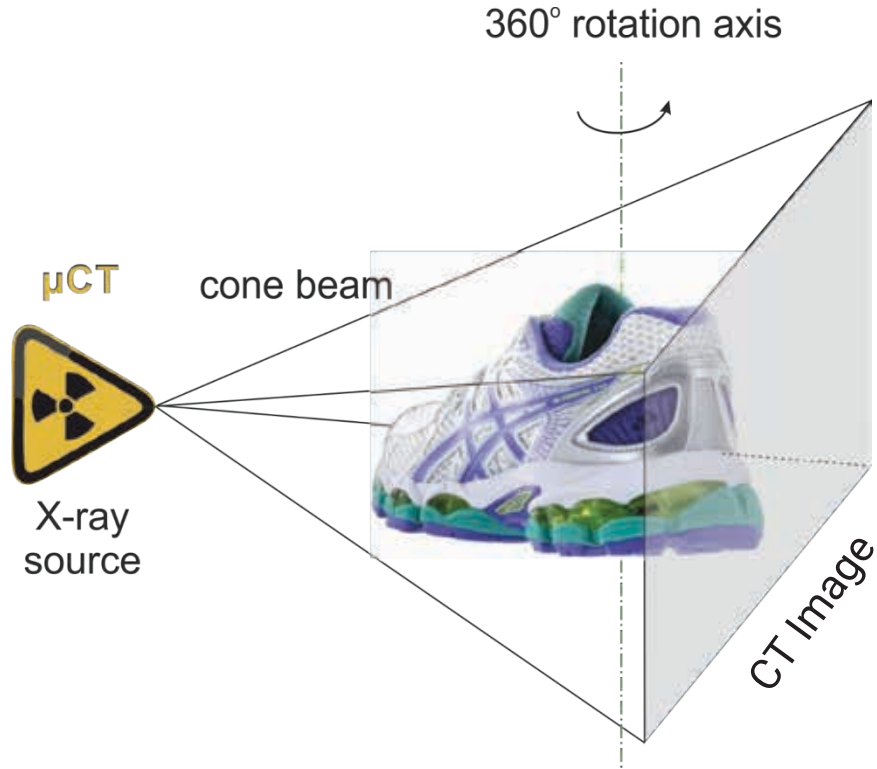
## **Exploring the latest developments of RETOMO**

- 1. Introduction**
- 2. Image processing**
- 3. Productivity**
- 4. Materials**
- 5. Extra Large Scans**
- 6. Future Developments**

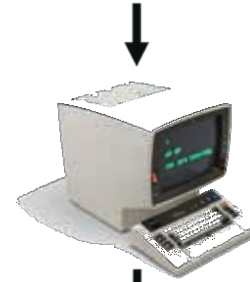


**Introduction to  
CT Scanning and RETOMO**

# Industrial CT Scanning



CT Images

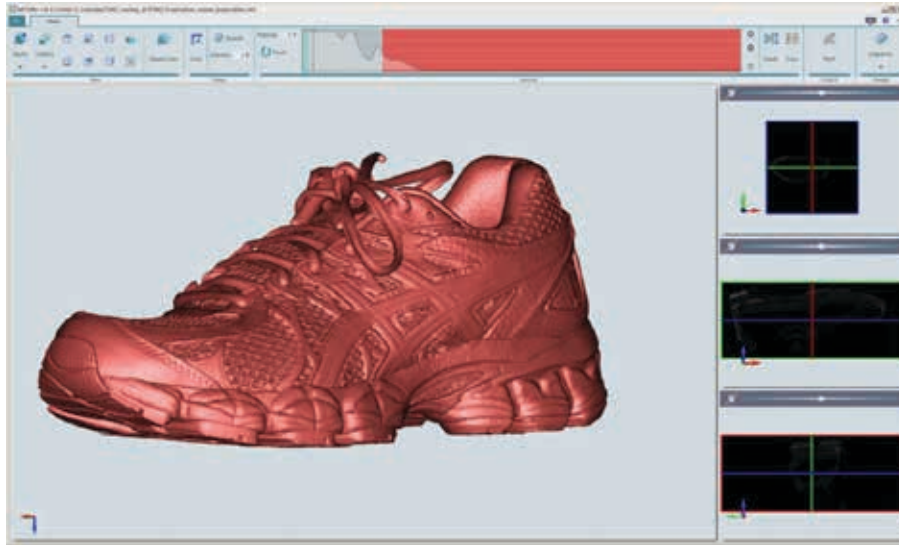


Reconstruction Process

Volume Image



# Industrial CT Scanning



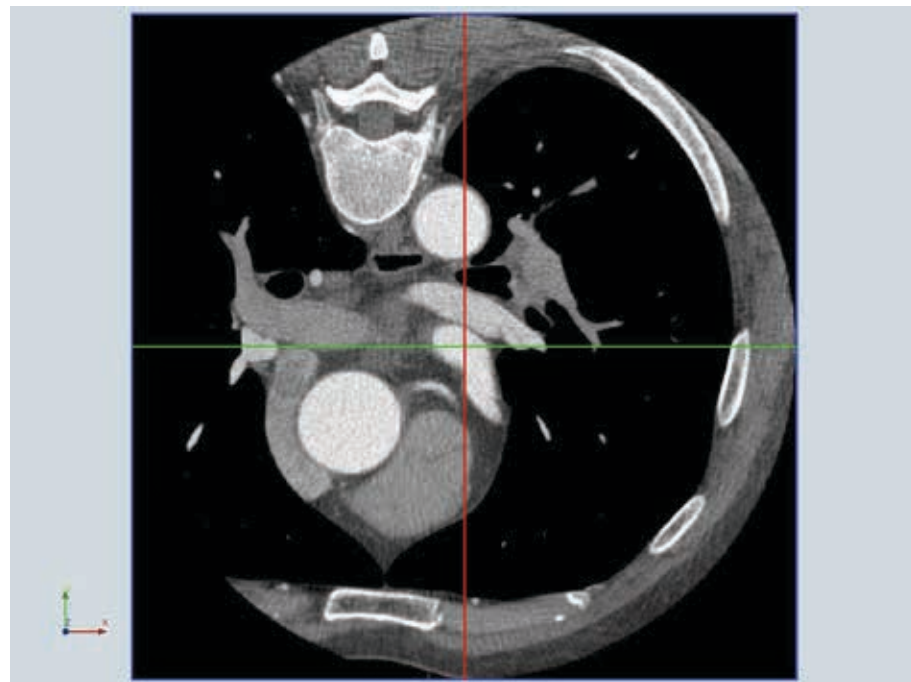
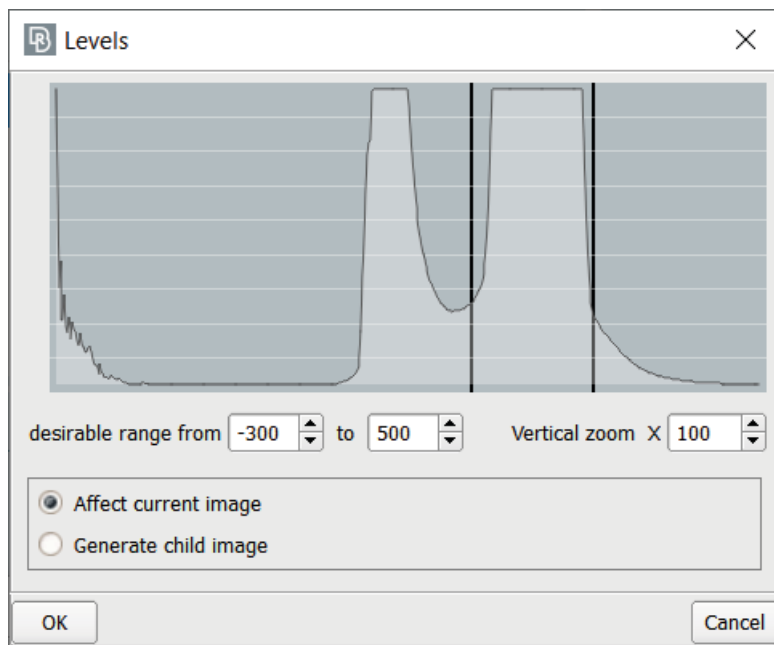


**Image Processing  
Levels function**

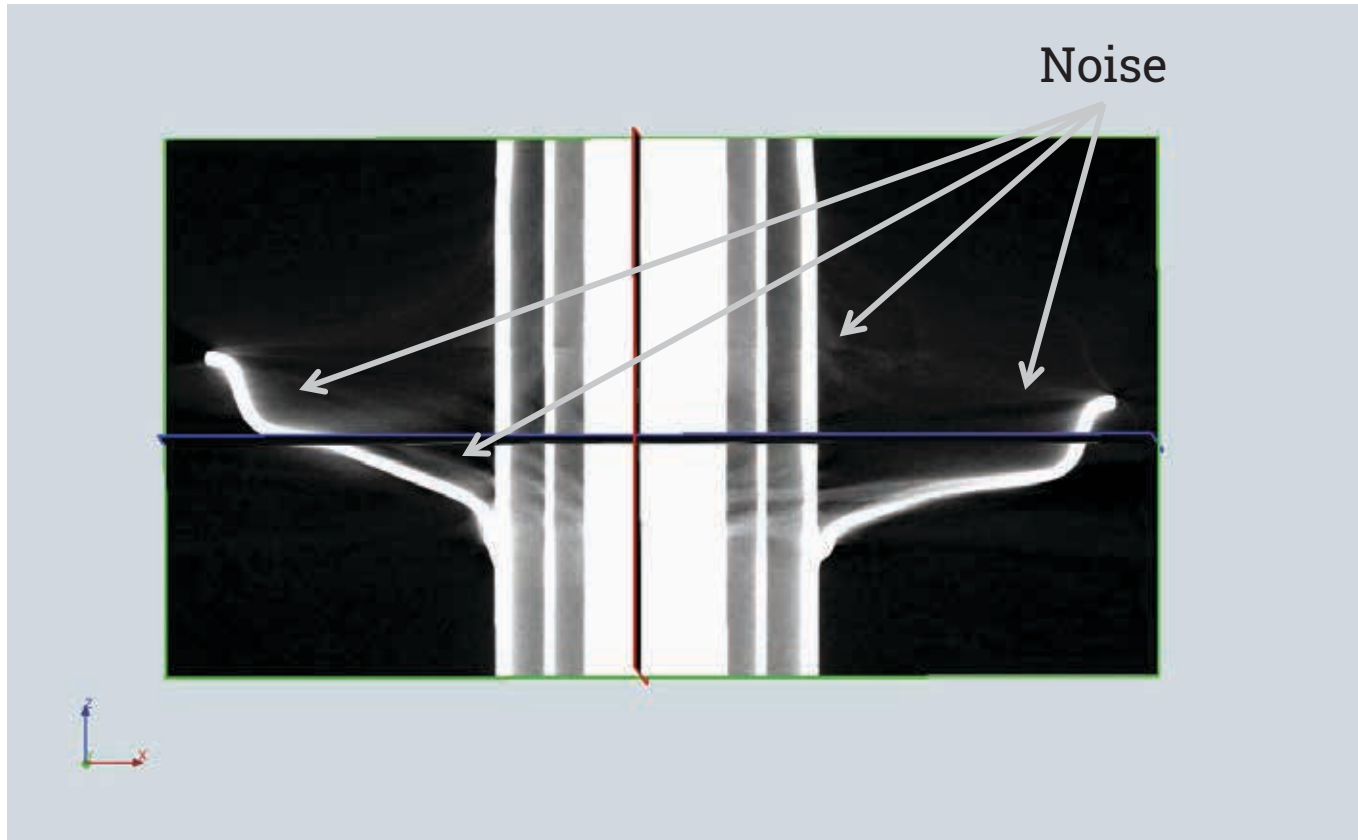


# New Levels function for Contrast/Brightness

v22.1.0

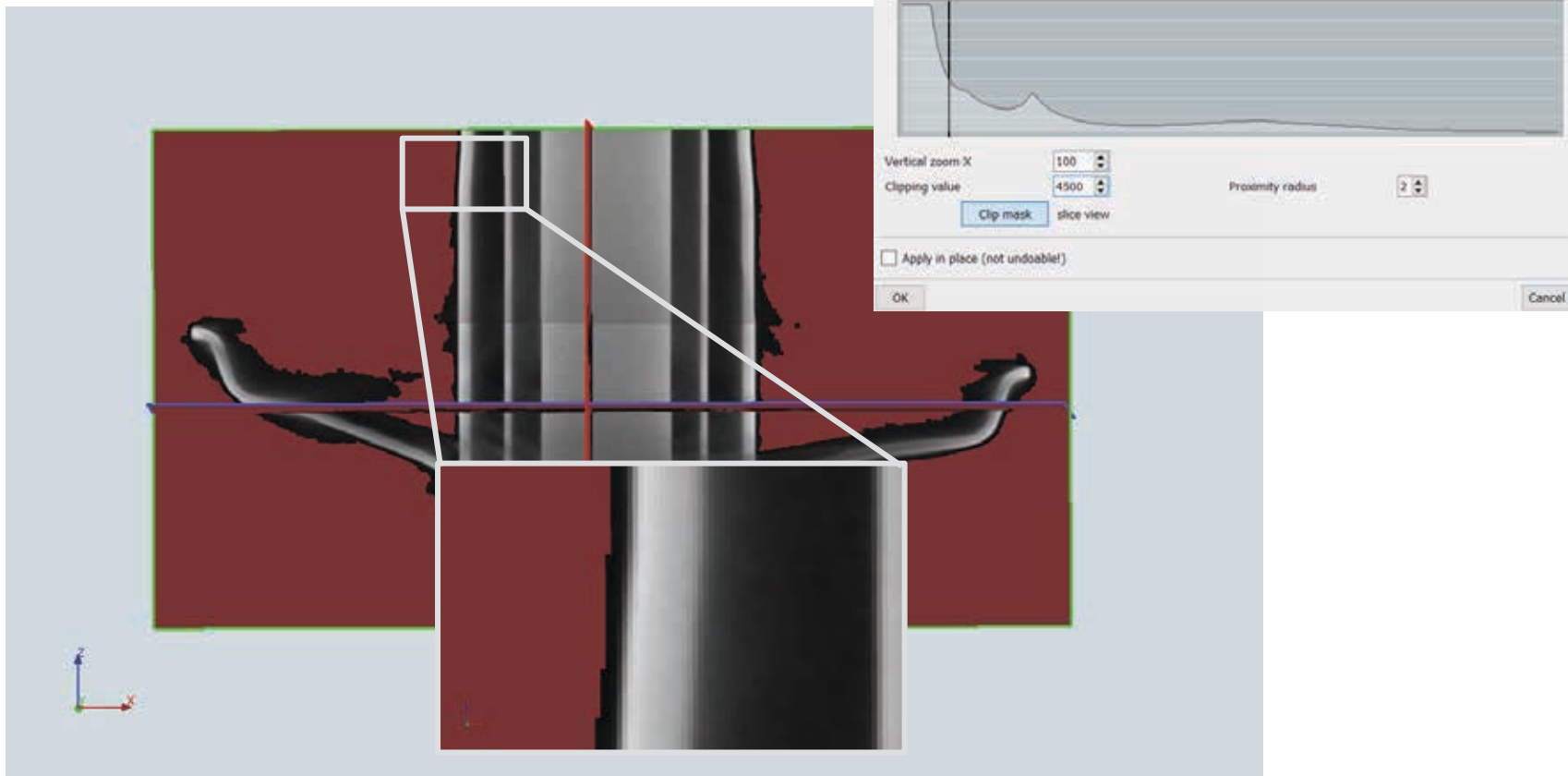


# New Levels function for Low Clipping



# New Levels function for Low Clipping

V24.0.0

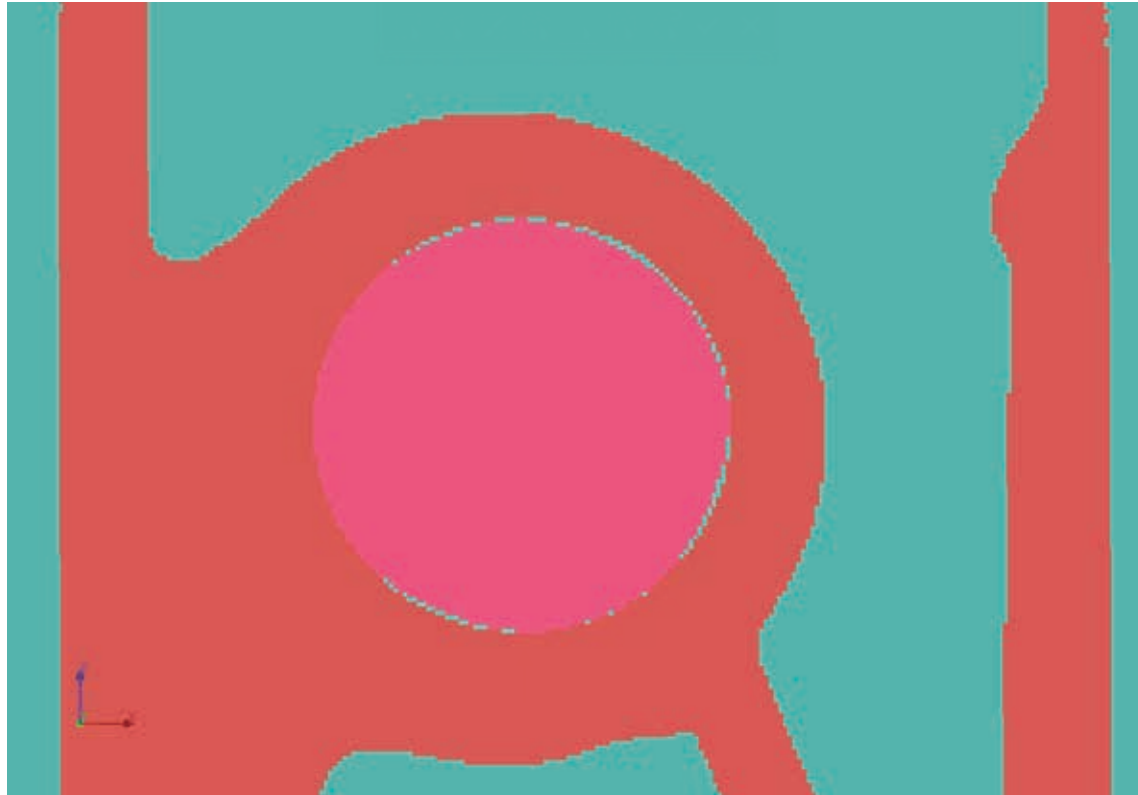




**Productivity  
Segmentation Tools**

# Manual segmentation: New Smooth Polygon selection

v21.1.0



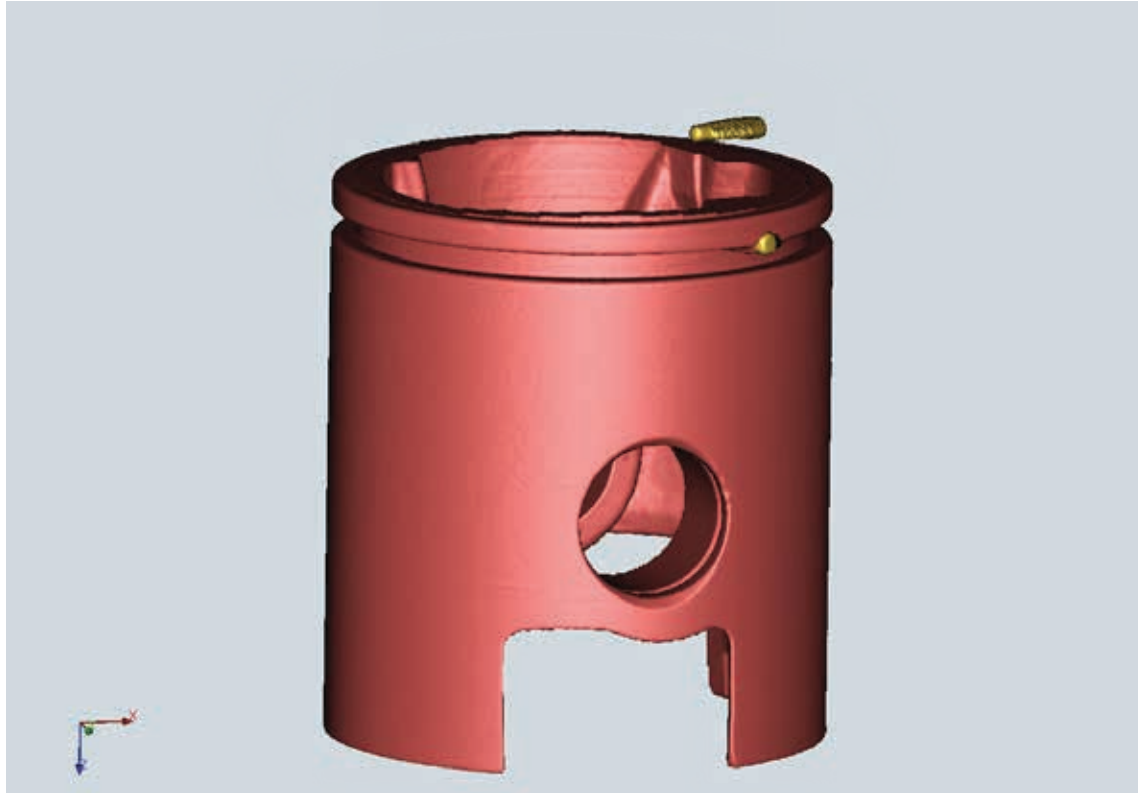
# Manual segmentation: New Snap selection

v22.0.0



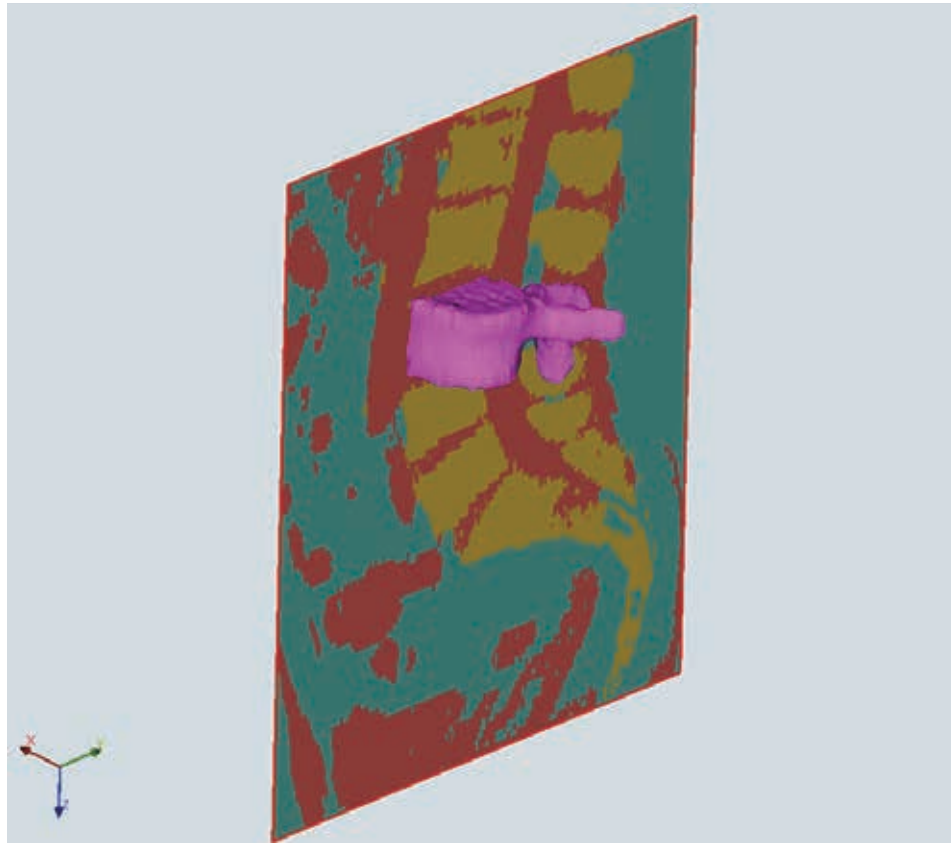
# Manual segmentation: New 3D Screen selection

v22.1.0



# Manual segmentation: New Part Separation tool

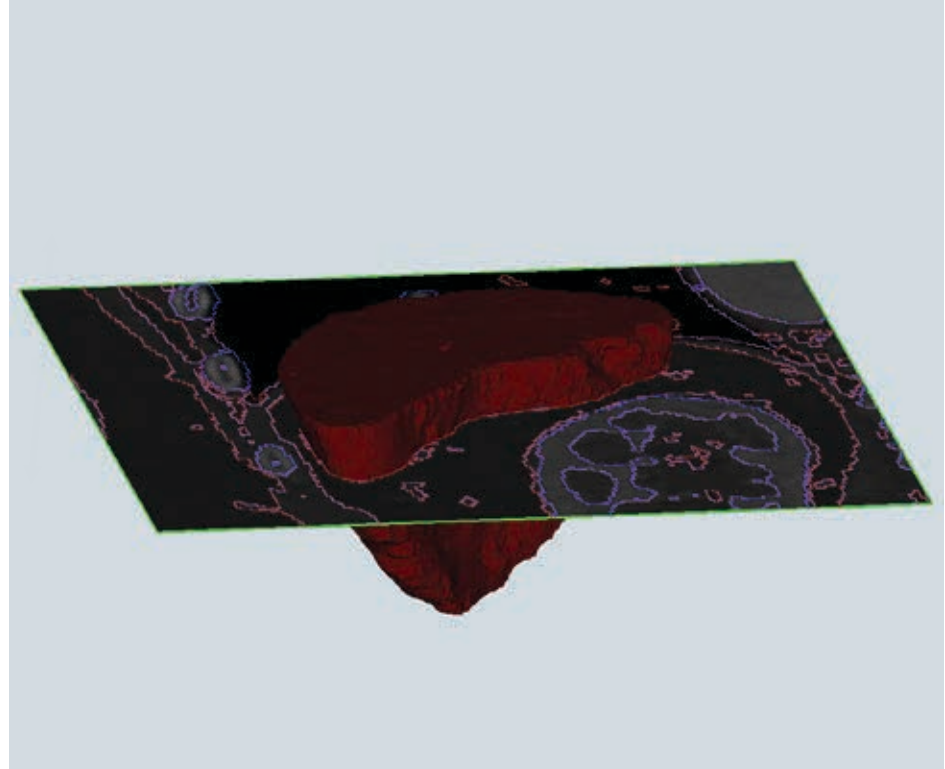
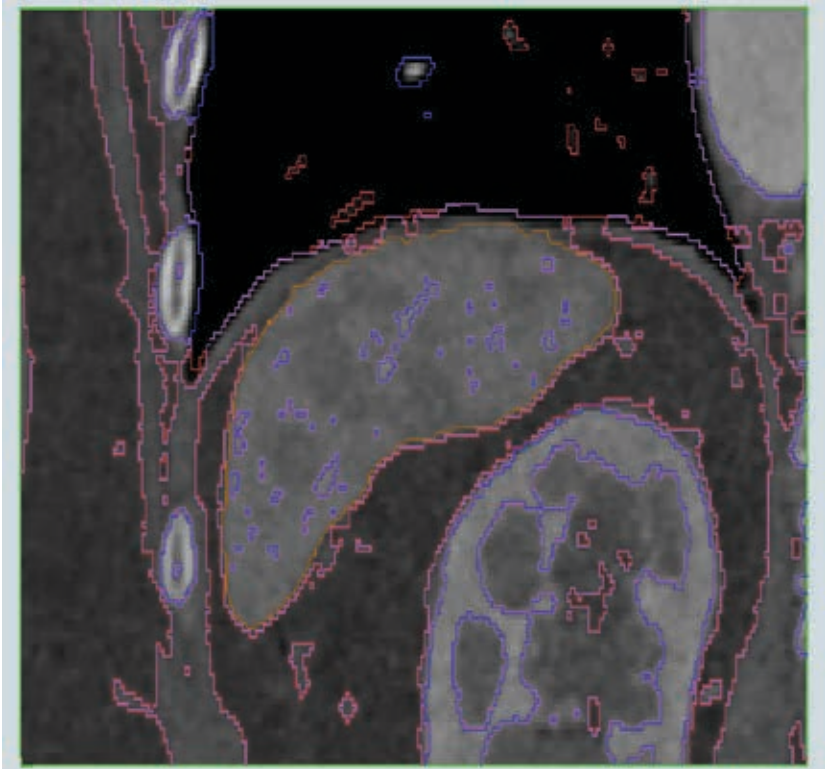
v22.1.0





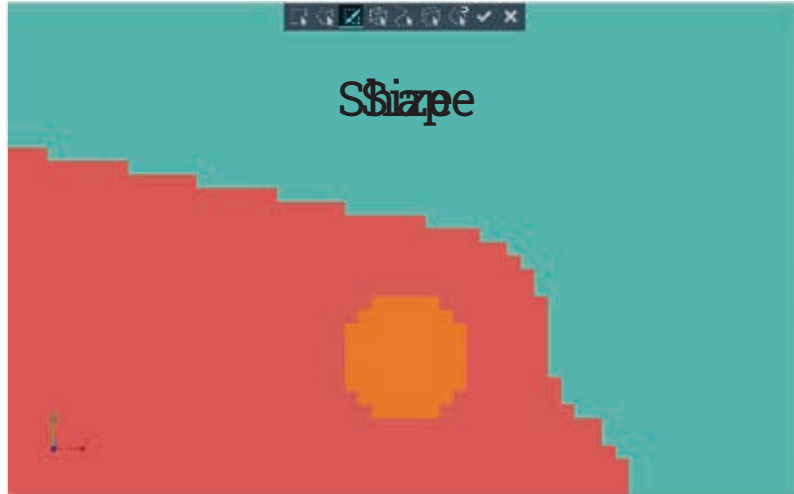
# Manual segmentation: New Trace Segmentation tool

v22.1.0

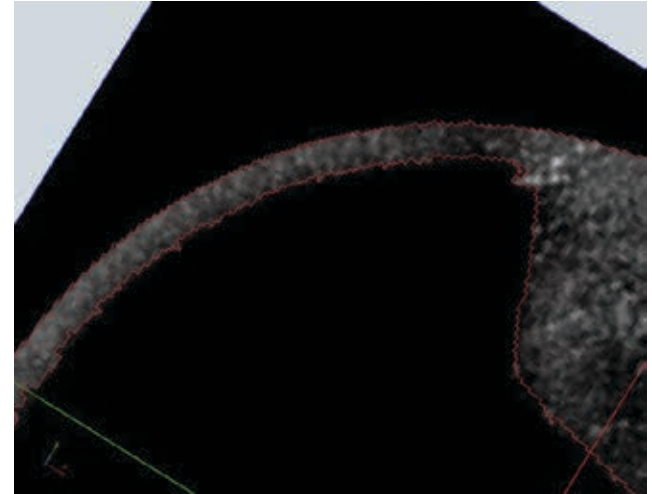


# Manual segmentation: New options and selection mode

V22 & V24



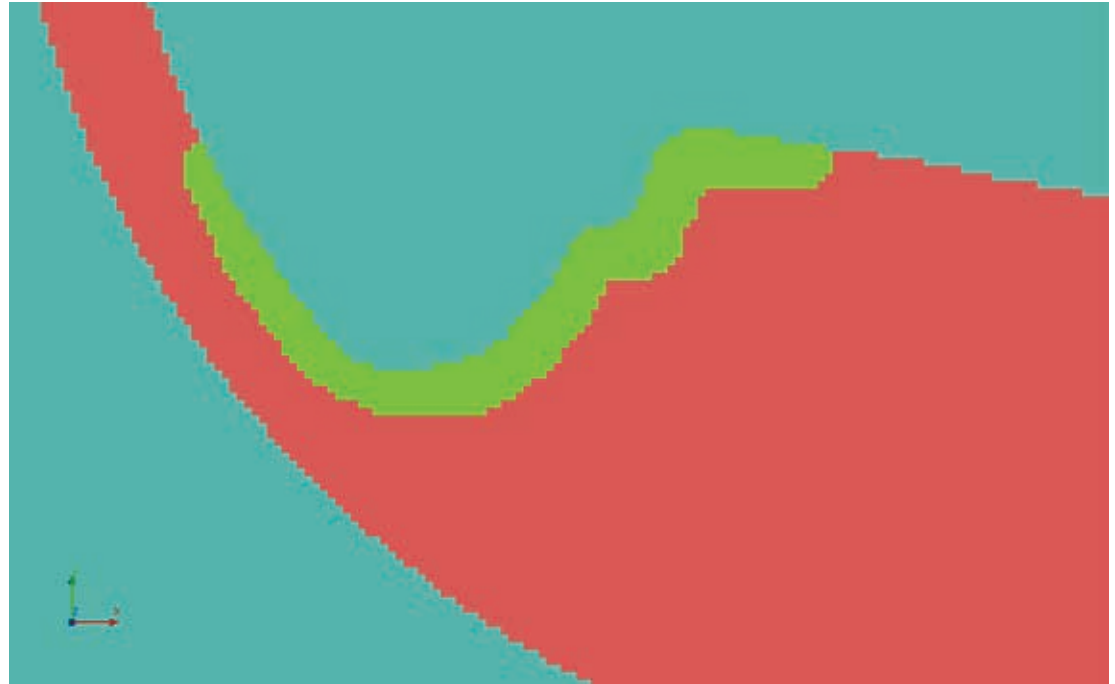
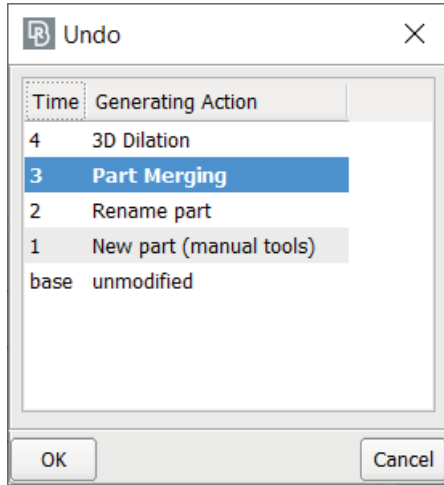
Brush Selection



Corridor Selection

# Undo/Redo functionality

v21.1.0

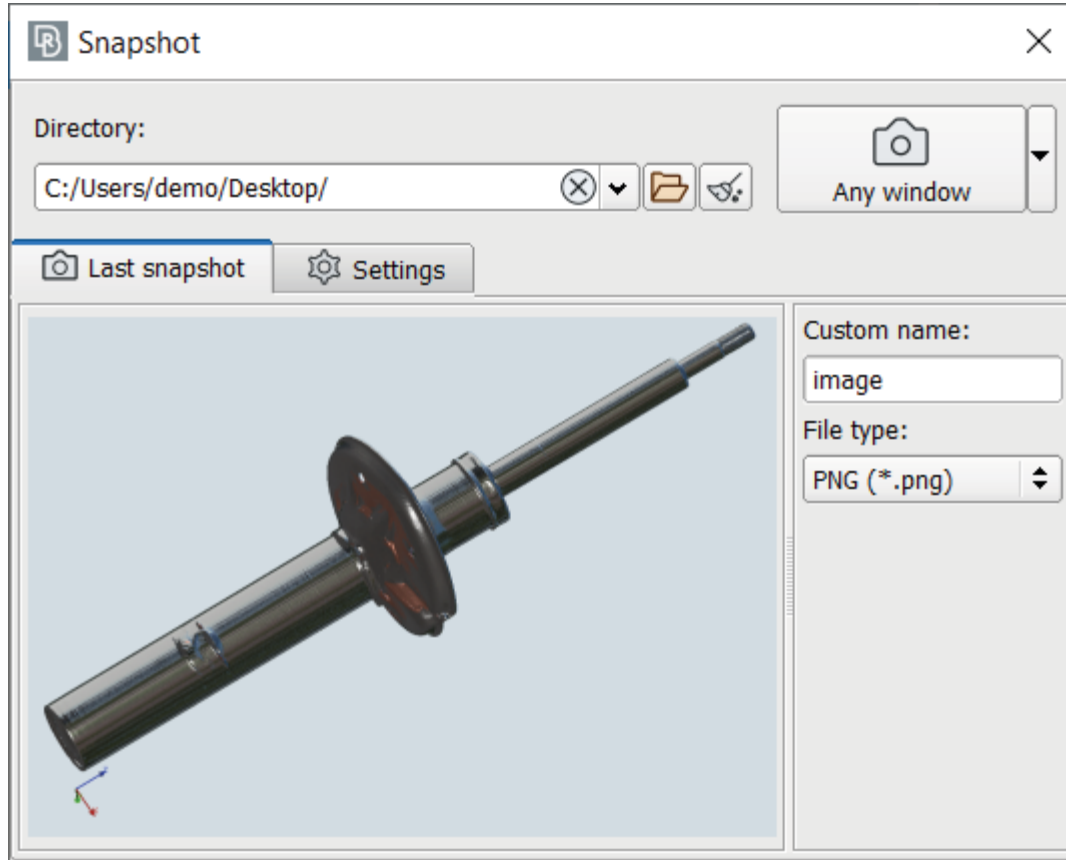




**Productivity  
Snapshot Tool**

# New Snapshot Tool

v21.1.0

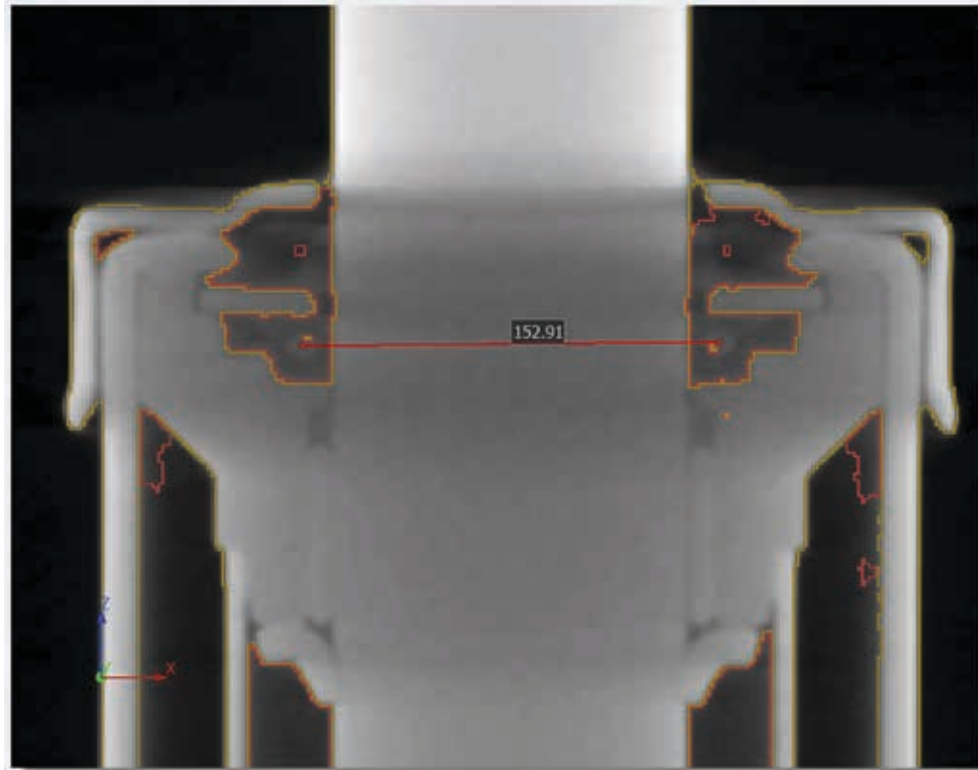




**Productivity  
Measurements Tool**

# New Measure Tool

v23.0.0



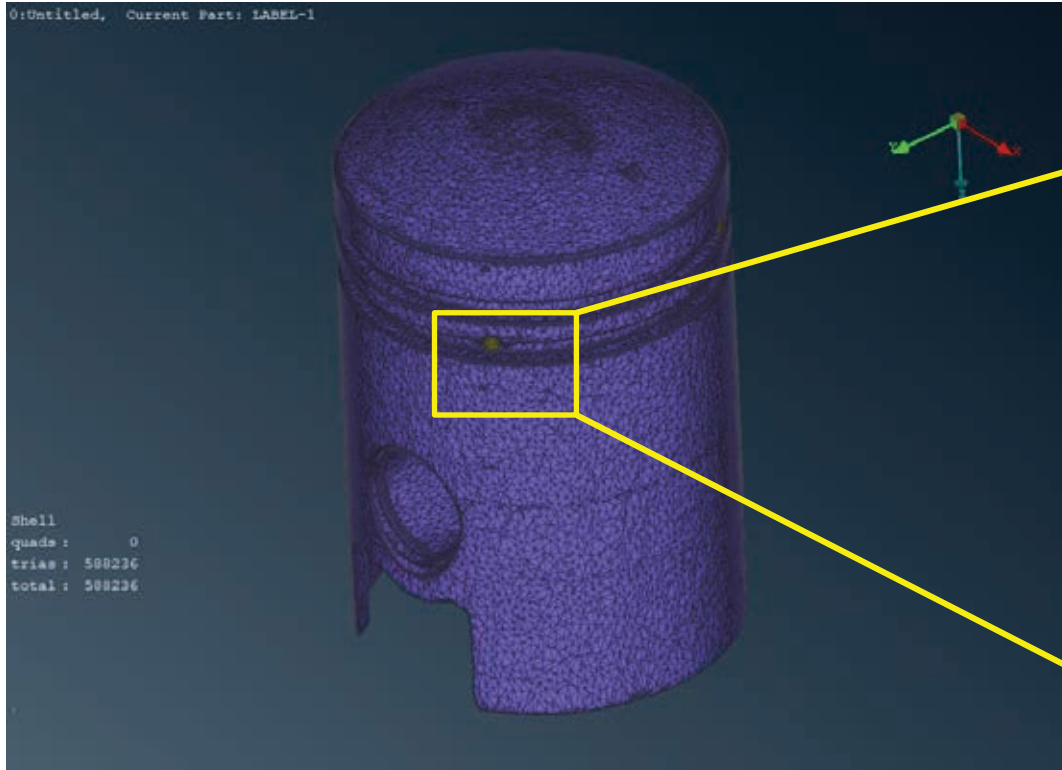


**Productivity  
Compatible Mesh**

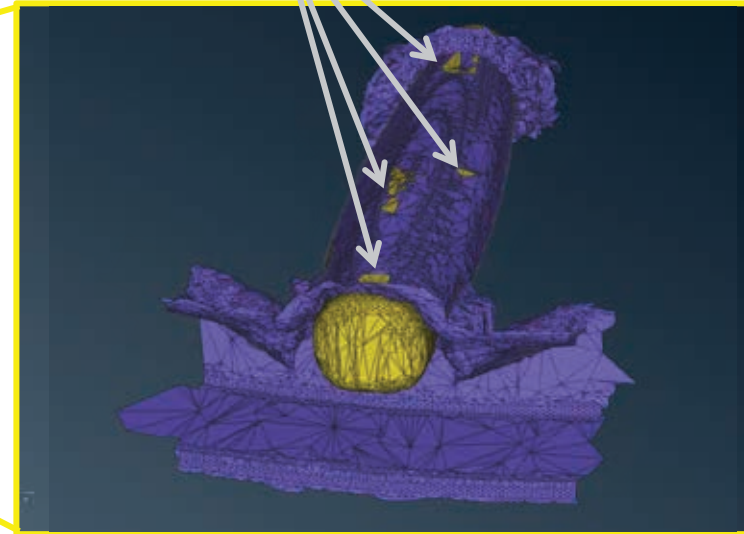


# Compatible interface meshes generation

v22.0.0



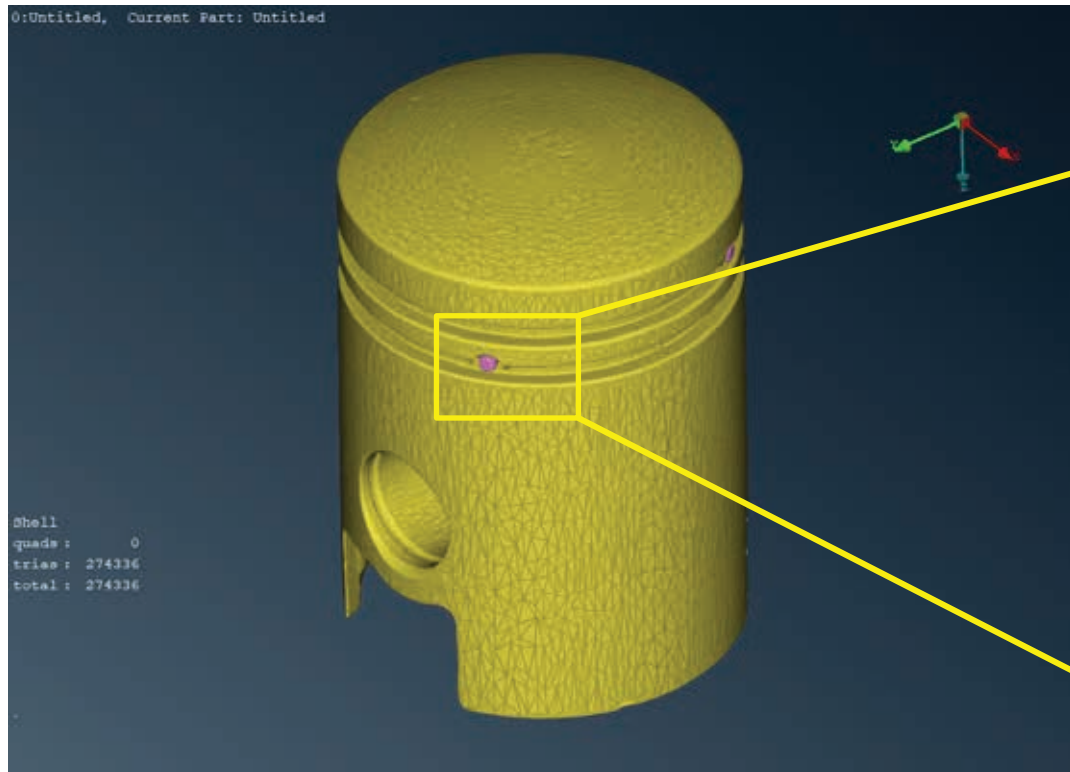
## Penetrations



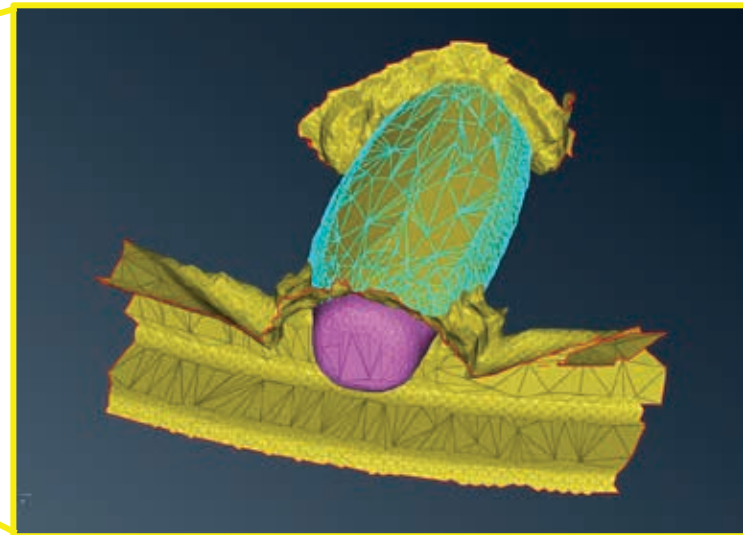
- Geometric Inaccuracy
- Errors in the solution
- Correction is time-consuming

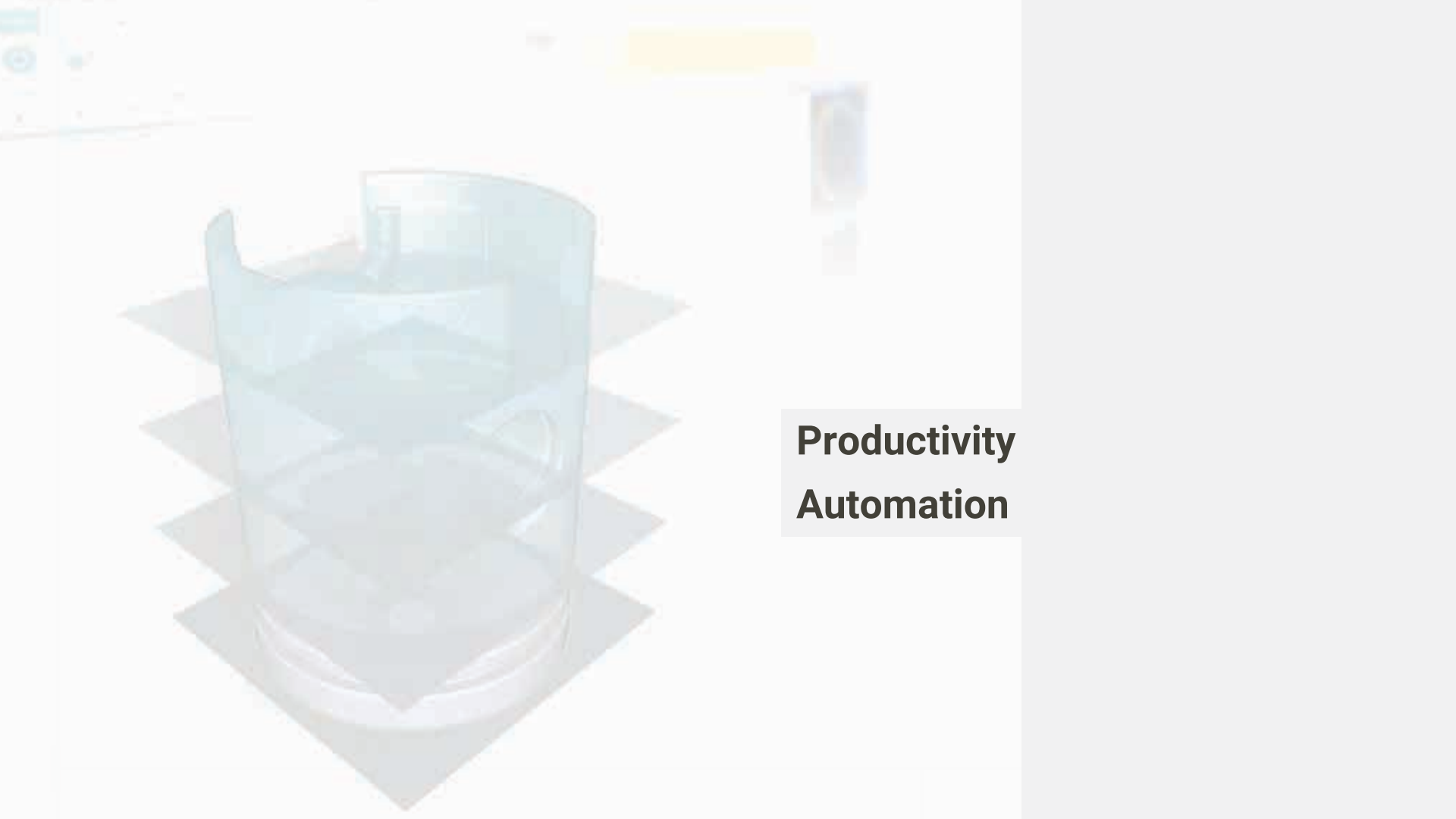
# Compatible interface meshes generation

v22.0.0



Penetration-free by default

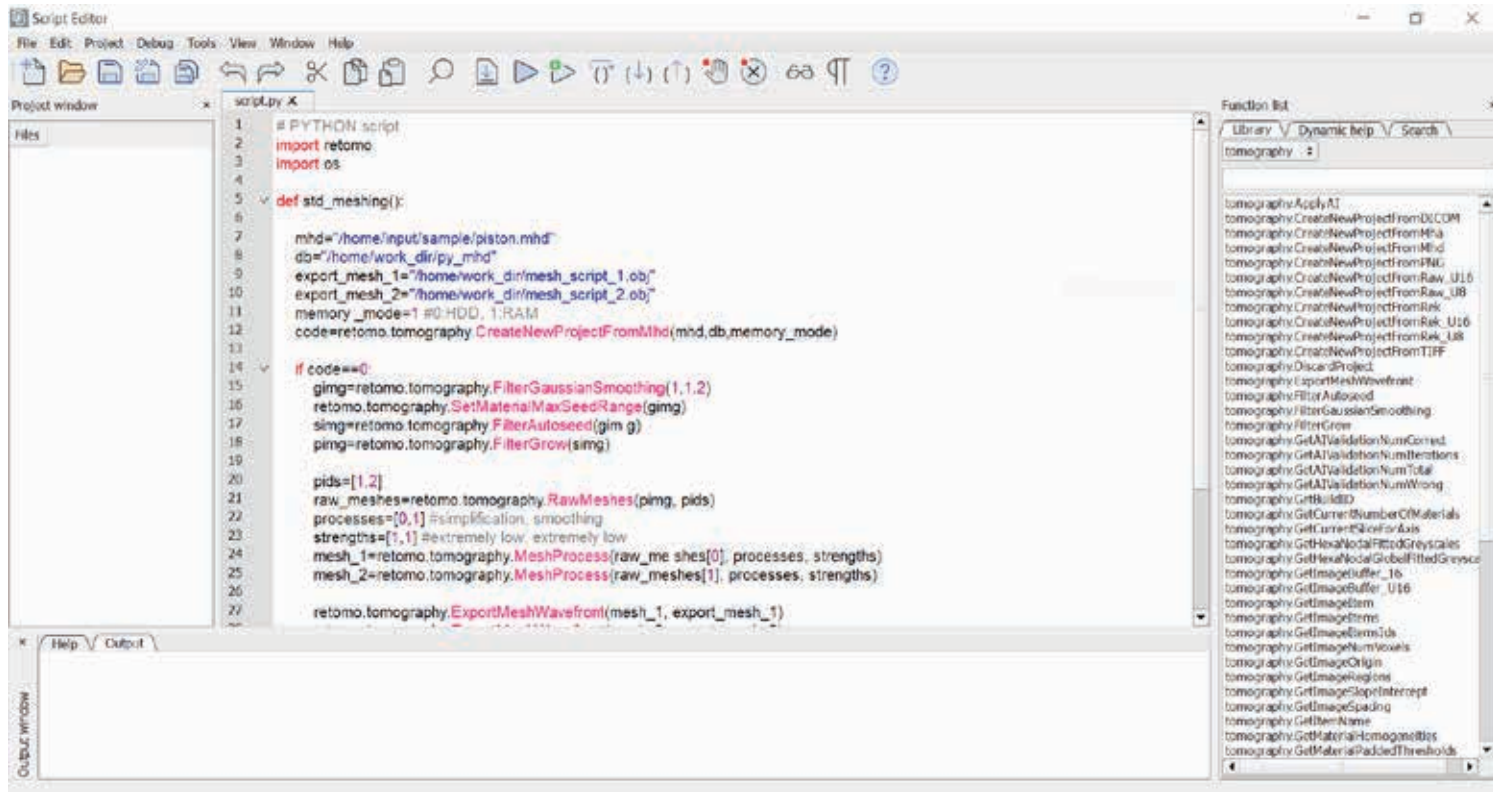


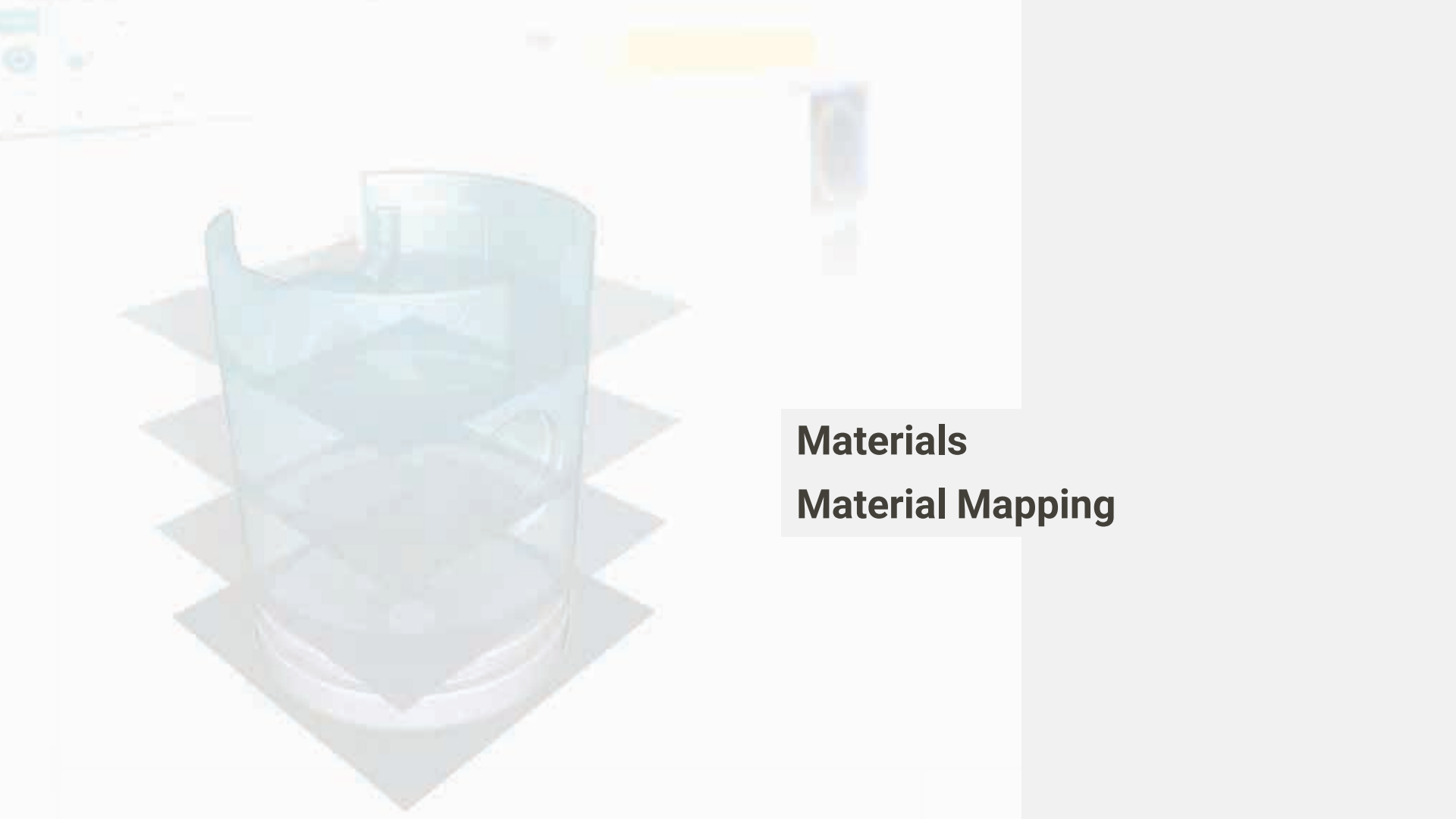


## **Productivity Automation**

# Export session based on python scripting

v23.0.0

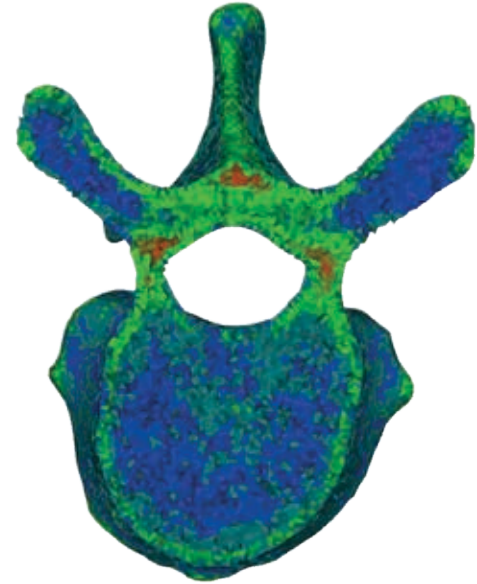




**Materials**  
**Material Mapping**

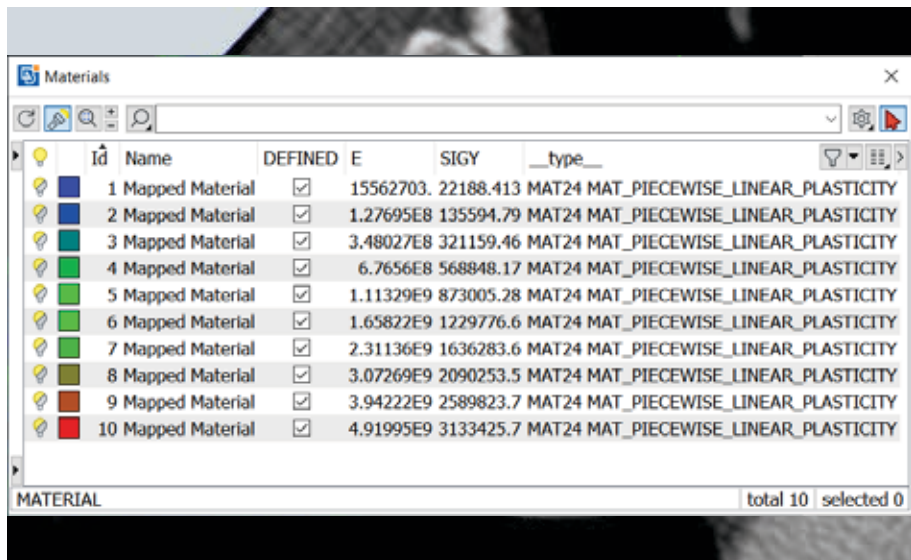
# Map plastic material properties for \*MAT\_024 of LS-DYNA

v21.1.0



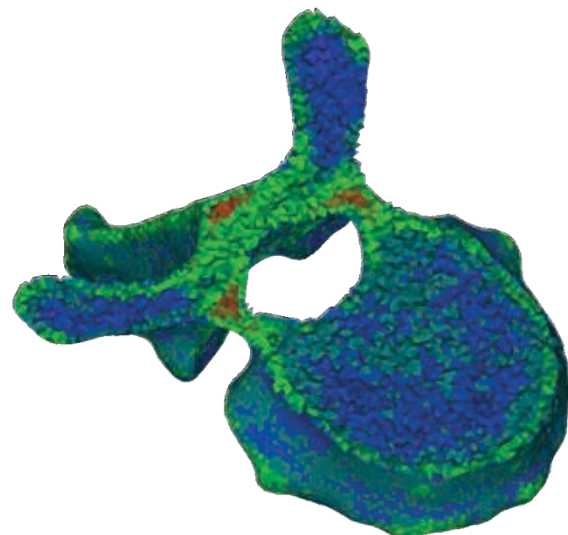
# Map plastic material properties for \*MAT\_024 of LS-DYNA

v21.1.0



The screenshot shows the 'Materials' dialog box in LS-DYNA. It contains a table with 10 rows, each representing a mapped material. The columns are: Id, Name, DEFINED, E, SIGY, and \_\_type\_\_. All materials are of type MAT24 MAT\_PIECEWISE\_LINEAR\_PLASTICITY. The status bar at the bottom indicates 'total 10 selected 0'.

Id	Name	DEFINED	E	SIGY	__type__
1	Mapped Material	<input checked="" type="checkbox"/>	15562703.	22188.413	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
2	Mapped Material	<input checked="" type="checkbox"/>	1.27695E8	135594.79	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
3	Mapped Material	<input checked="" type="checkbox"/>	3.48027E8	321159.46	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
4	Mapped Material	<input checked="" type="checkbox"/>	6.7656E8	568848.17	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
5	Mapped Material	<input checked="" type="checkbox"/>	1.11329E9	873005.28	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
6	Mapped Material	<input checked="" type="checkbox"/>	1.65822E9	1229776.6	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
7	Mapped Material	<input checked="" type="checkbox"/>	2.31136E9	1636283.6	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
8	Mapped Material	<input checked="" type="checkbox"/>	3.07269E9	2090253.5	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
9	Mapped Material	<input checked="" type="checkbox"/>	3.94222E9	2589823.7	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY
10	Mapped Material	<input checked="" type="checkbox"/>	4.91995E9	3133425.7	MAT24 MAT_PIECEWISE_LINEAR_PLASTICITY

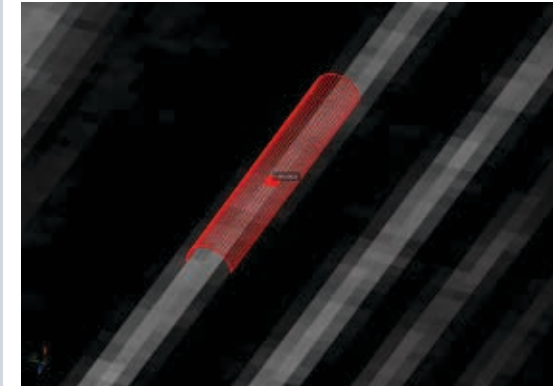
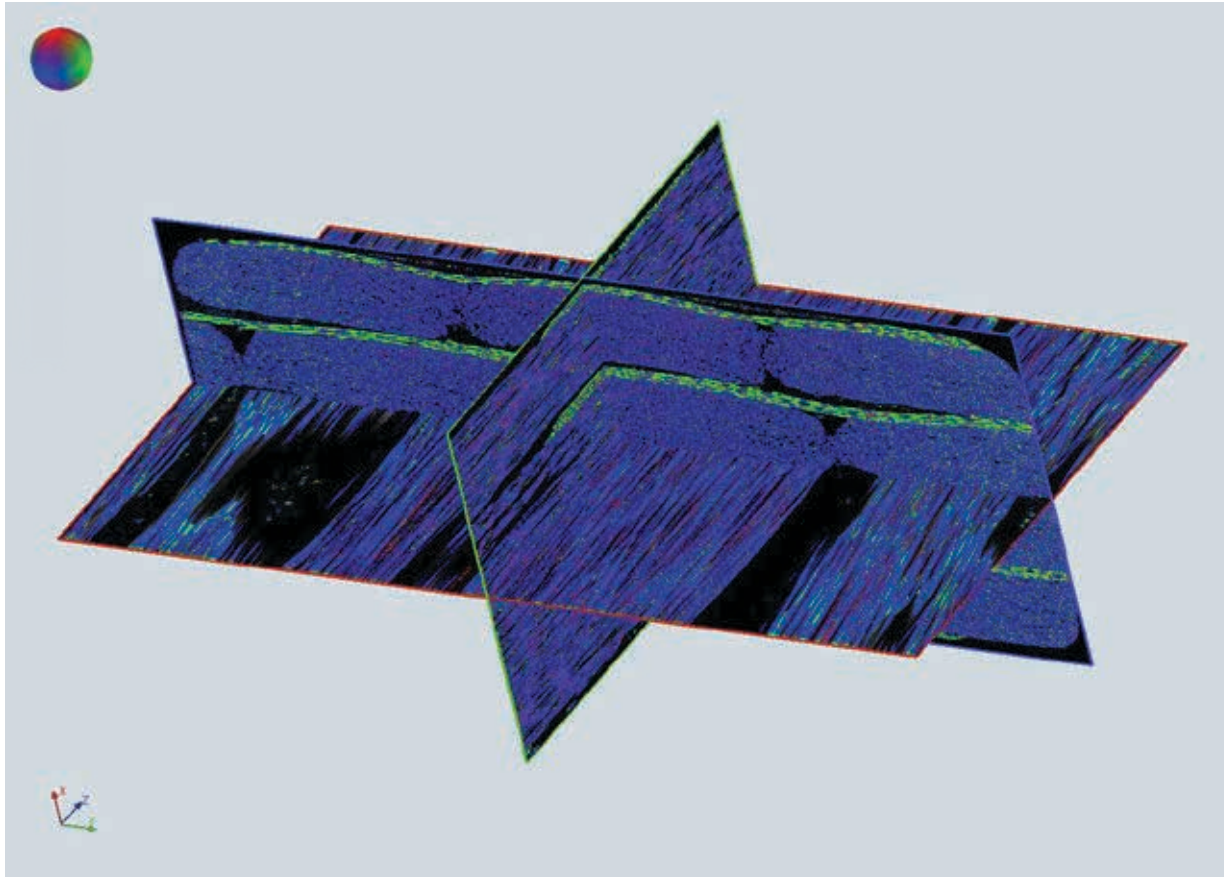




**Materials  
Composites**



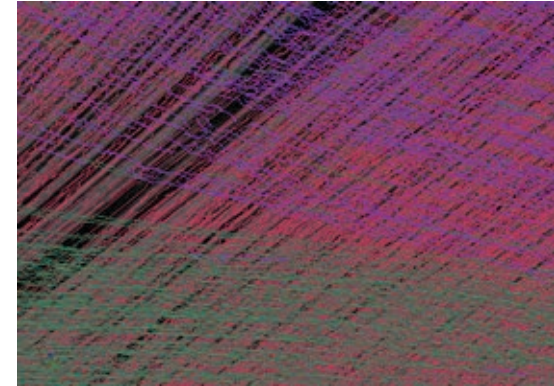
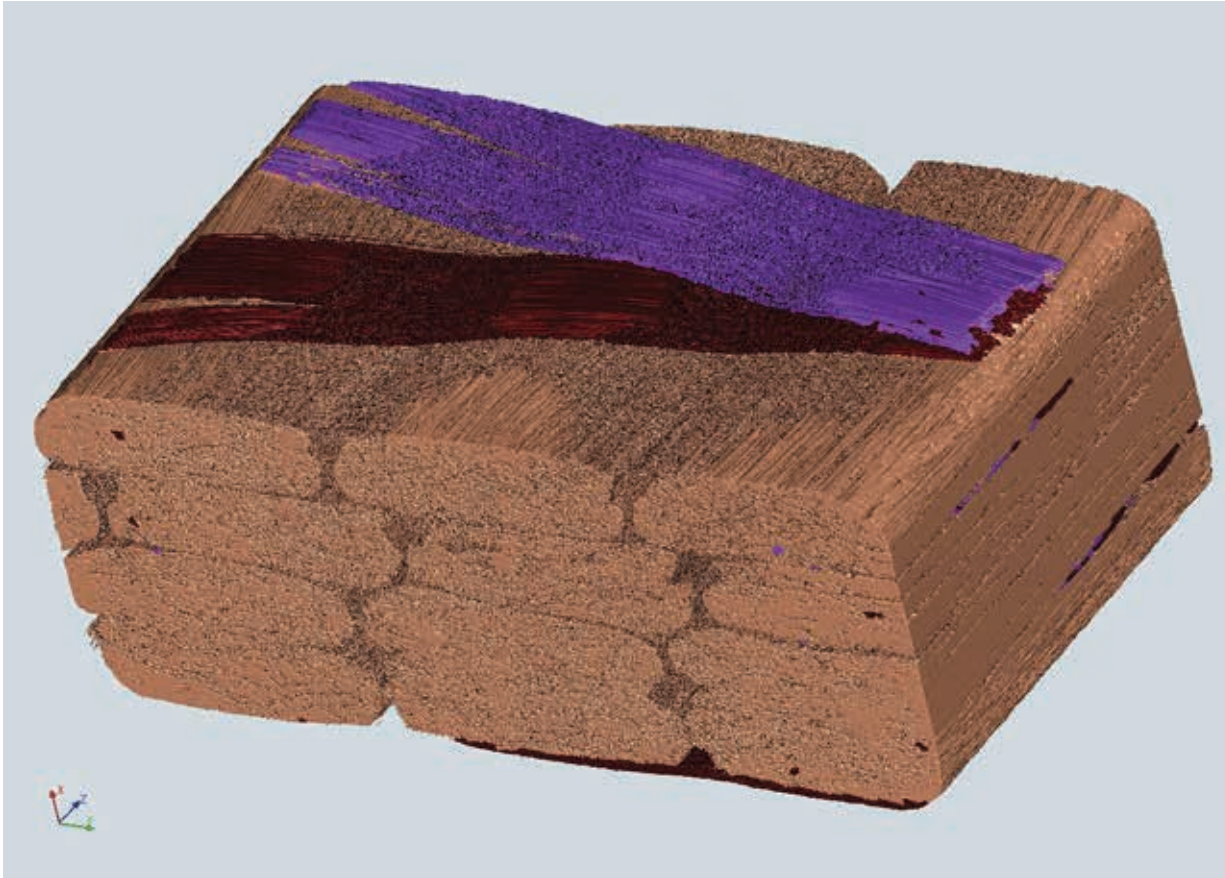
# Template Matching



**Data source:** Auenhammer, Robert M., Mikkelsen, Lars P., Asp, Leif E., & Blinzler, Brina, J. (2020). Automated X-ray computer tomography segmentation method for finite element analysis of non-crimp fabrics reinforced composites [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.3830790>

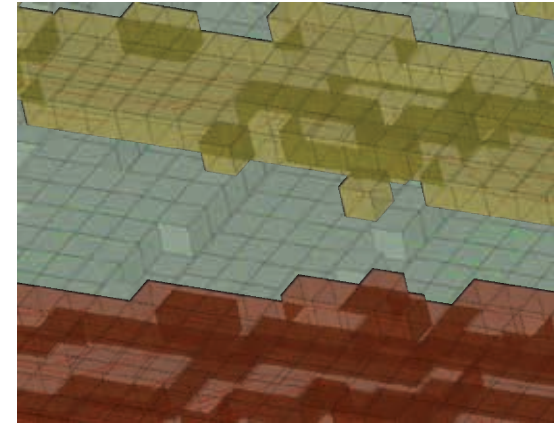
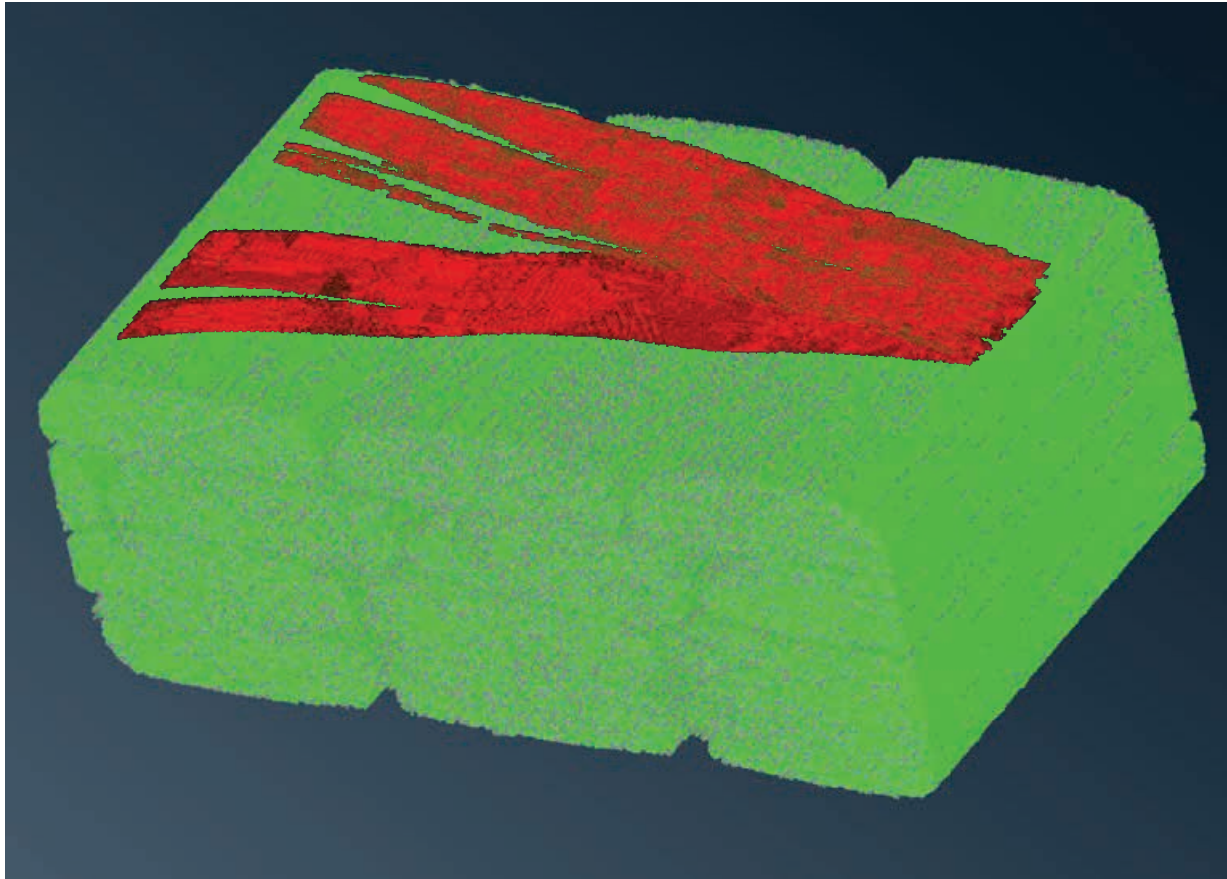
# Fiber Tracking

v23.0.0



# Fiber orientation mapping

v23.1.0





**Extra Large Scans**  
**Volume Rendering**

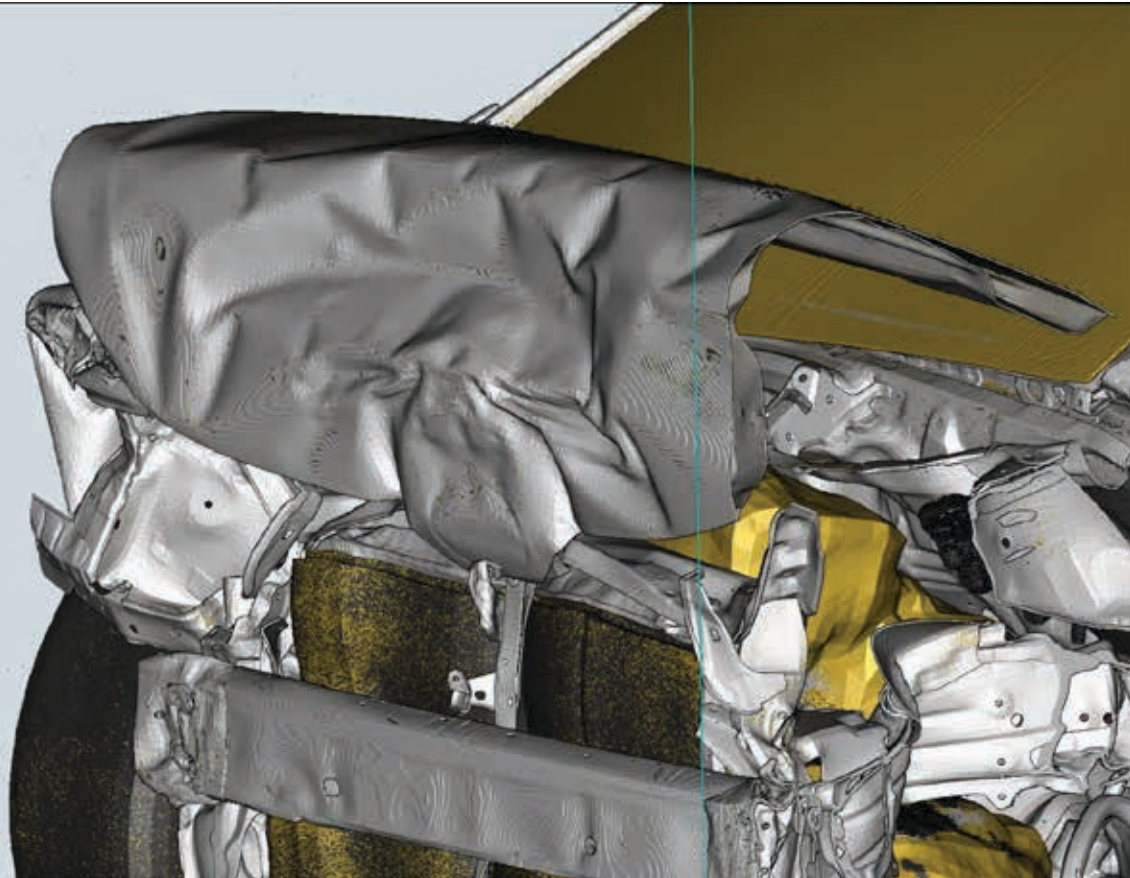
# Full resolution volume rendering

v23.1.0

Simulated CT Scan  
size: ~100 GB



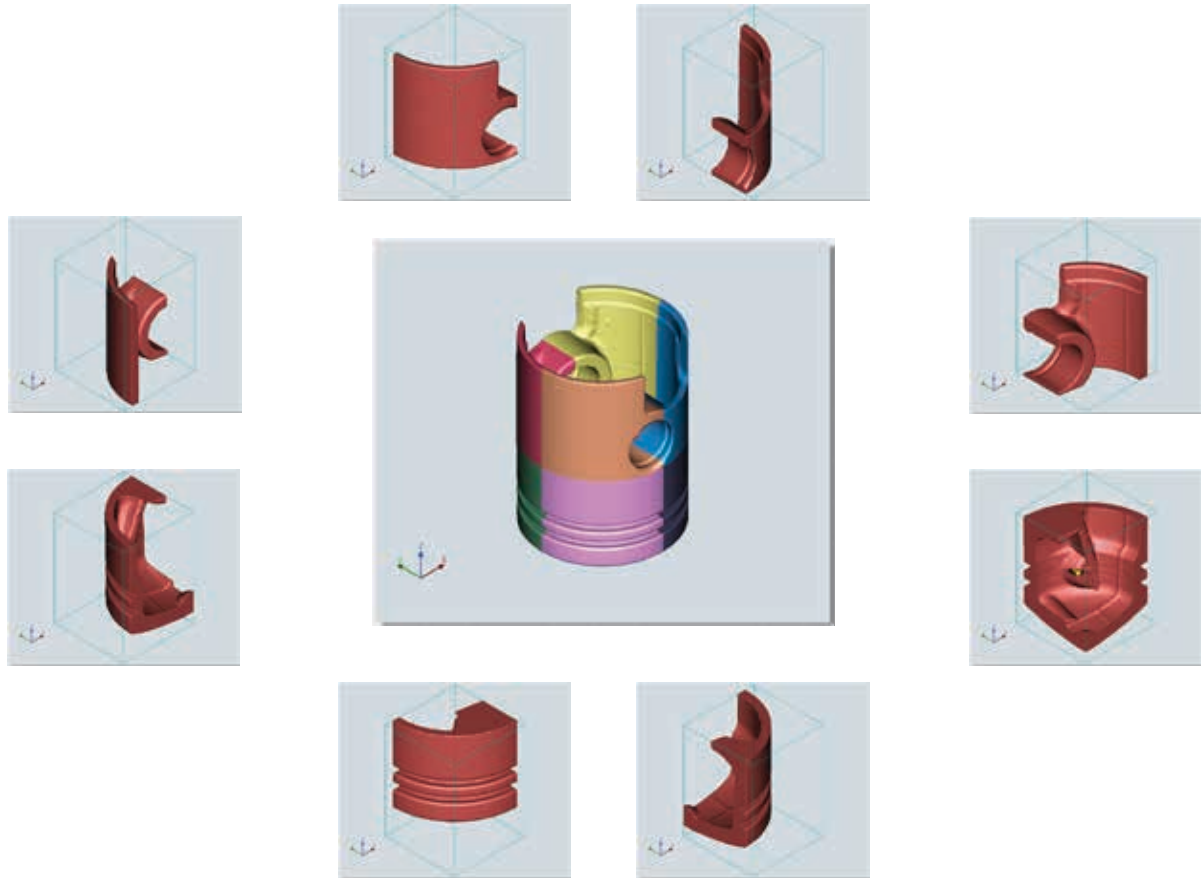
2960.2365.6415 77.7(CBI)



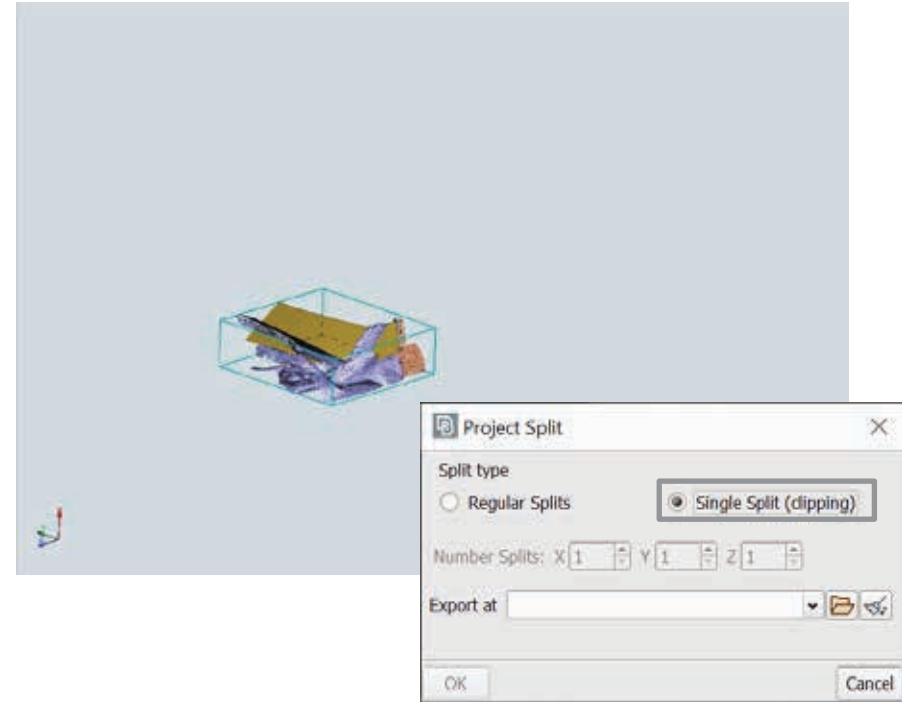
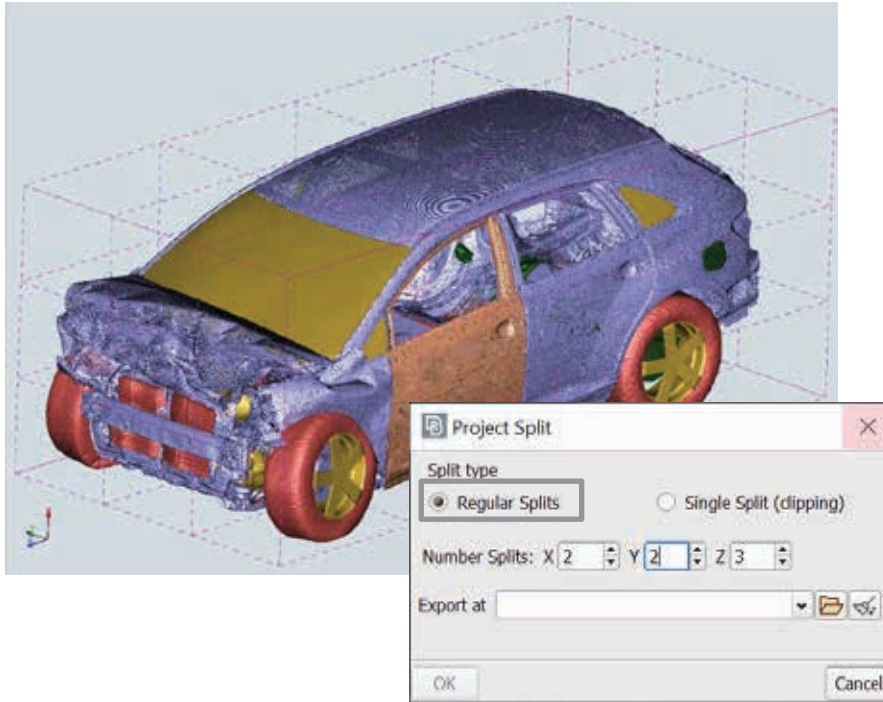


**Extra Large Scans**  
**Split & Merge**

# Split to sub-projects and merge back functionality

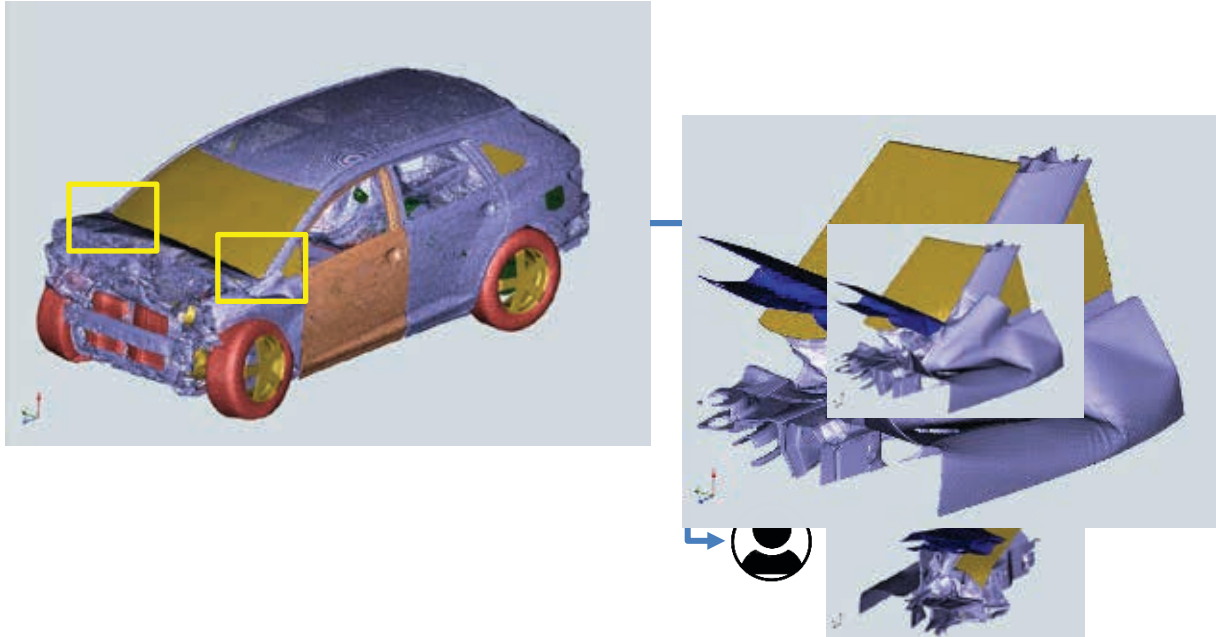


# Split to sub-projects and merge back functionality

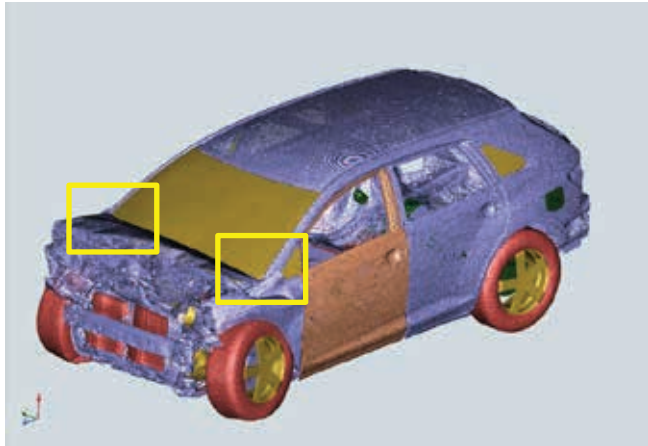




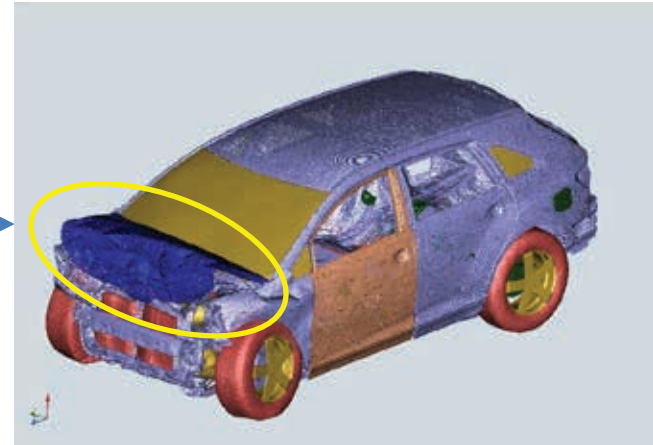
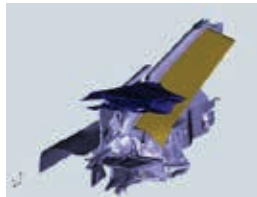
# Split to sub-projects and merge back functionality



# Split to sub-projects and merge back functionality



- Easier Handling of XL CT-Scans
- Improved efficiency
- Better resources management

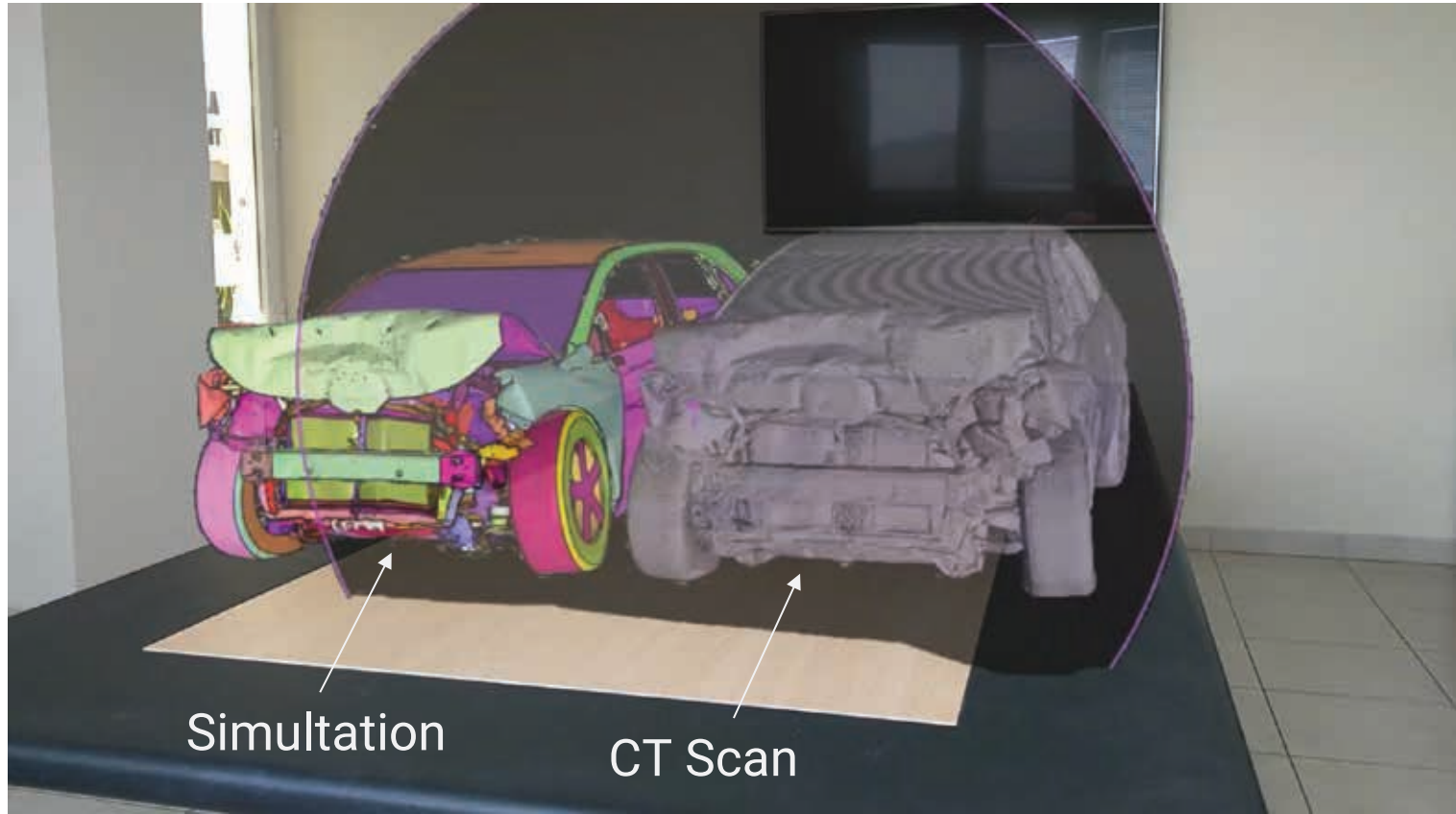




**Extra Large Scans**  
**Augmented reality**

# Augmented Reality

v23.1.0



Simulation

CT Scan

# Augmented Reality

v23.1.0



**Future Developments**  
**Flange detection & separation**

# Flange detection & separation



## Reverse Engineering Applications

- Geometrical accuracy for exterior and interior structures
- Working Principle
- Mechanical behavior of individual components
- Fast

How is it assembled?

How to disassemble it?

# Flange detection & separation



Similar Materials



Similar Gray Values

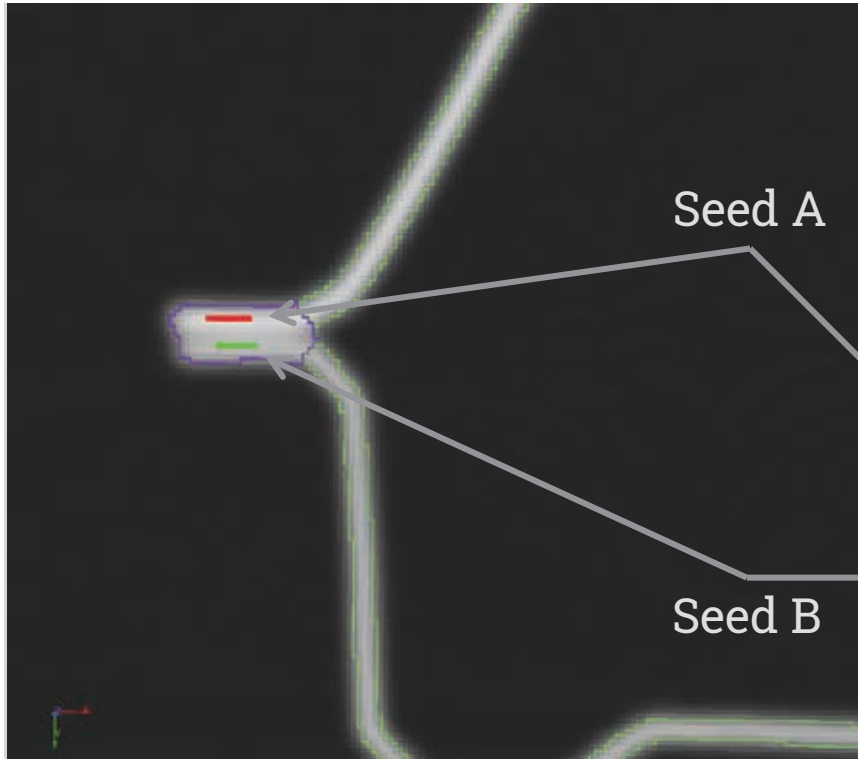


Unified components  
into a single volume

Our Solution :  
The Flange tool



# Flange detection & separation



Select pid to process:

ID	name
0	part_0
1	part_1_m
2	single thickness
3	double thickness

Single sheet thickness 5 [voxels]

Add/remove seeds

ID	Seed	
0	Seed A	add/remove
0	Seed B	add/remove

OK Cancel

# Flange detection & separation

V24.0.0

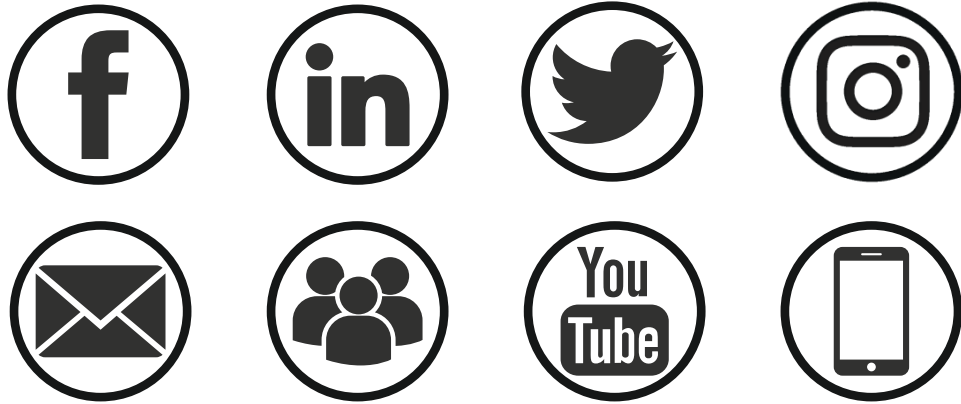


# Flange detection & separation



**Fiber reinforced material CT Scan processing with RETOMO**

*Friday, June 16, 12:00 – 12:30, Demo Session 9E | Venus I*



**Stay connected**