



# **Non-destructive inspection of cultural objects**

using X-ray and Computed Tomography (CT)

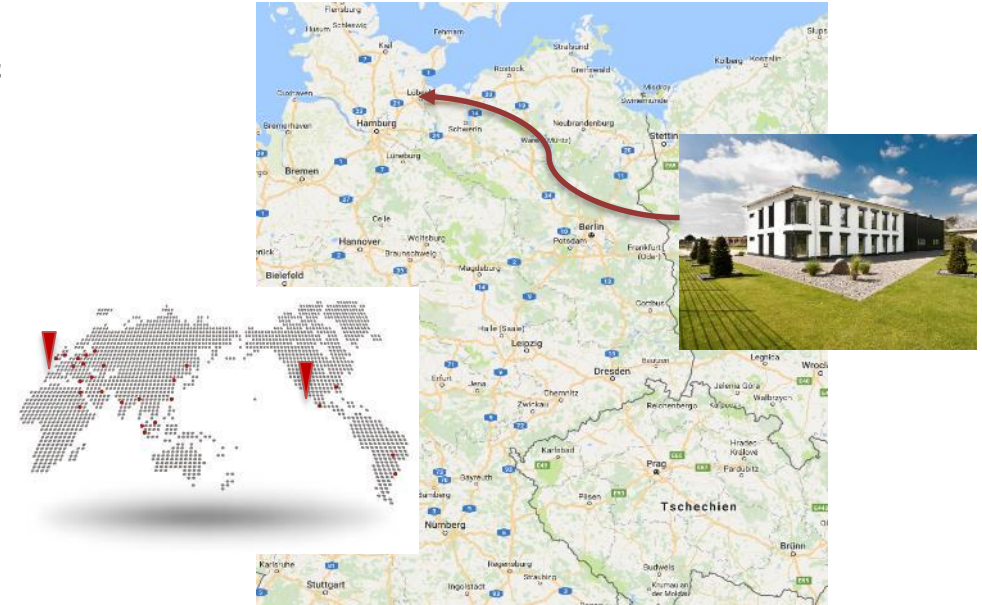
# About VisiConsult

## VC in a nutshell ...

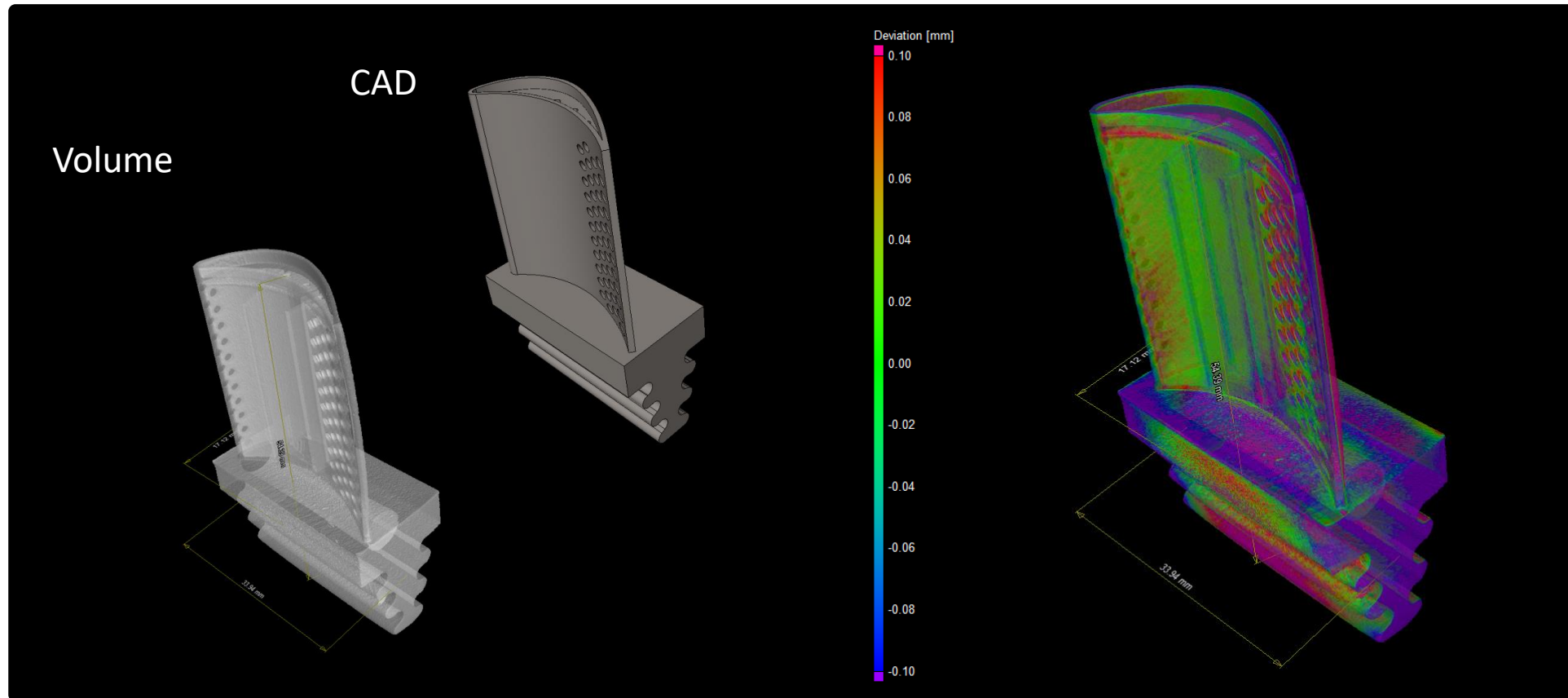
- > 100 employees worldwide
- Founded in 1996
- Headquarter located in Northern Germany - Stockelsdorf
- Family owned company (second generation)
- Development, manufacturing and service
- Production & office area > 2.700 m<sup>2</sup>
- Since 2016 add. location in Atlanta, US

## Principles

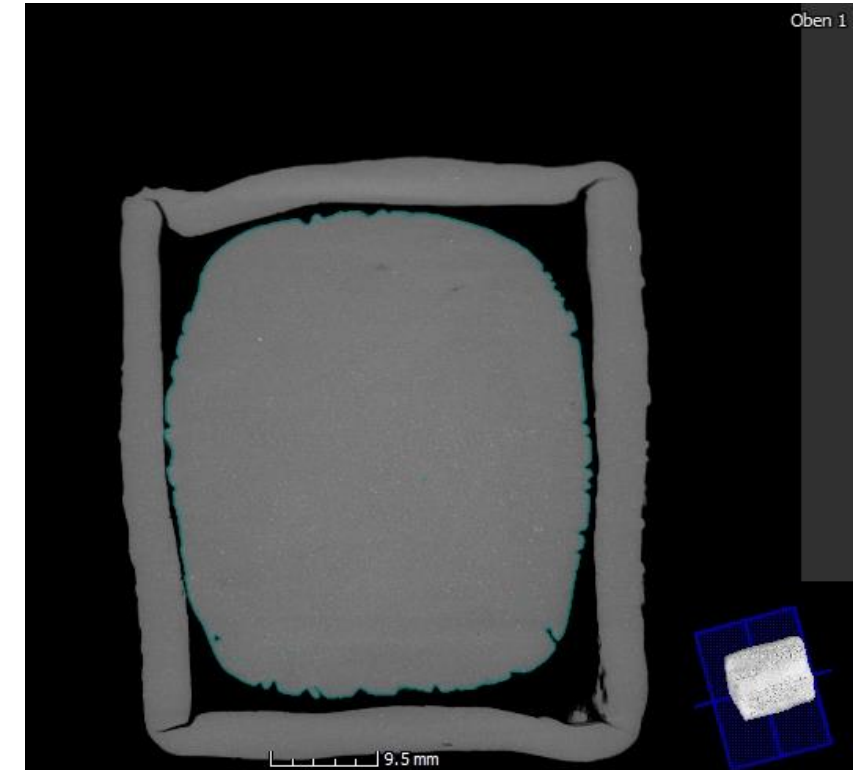
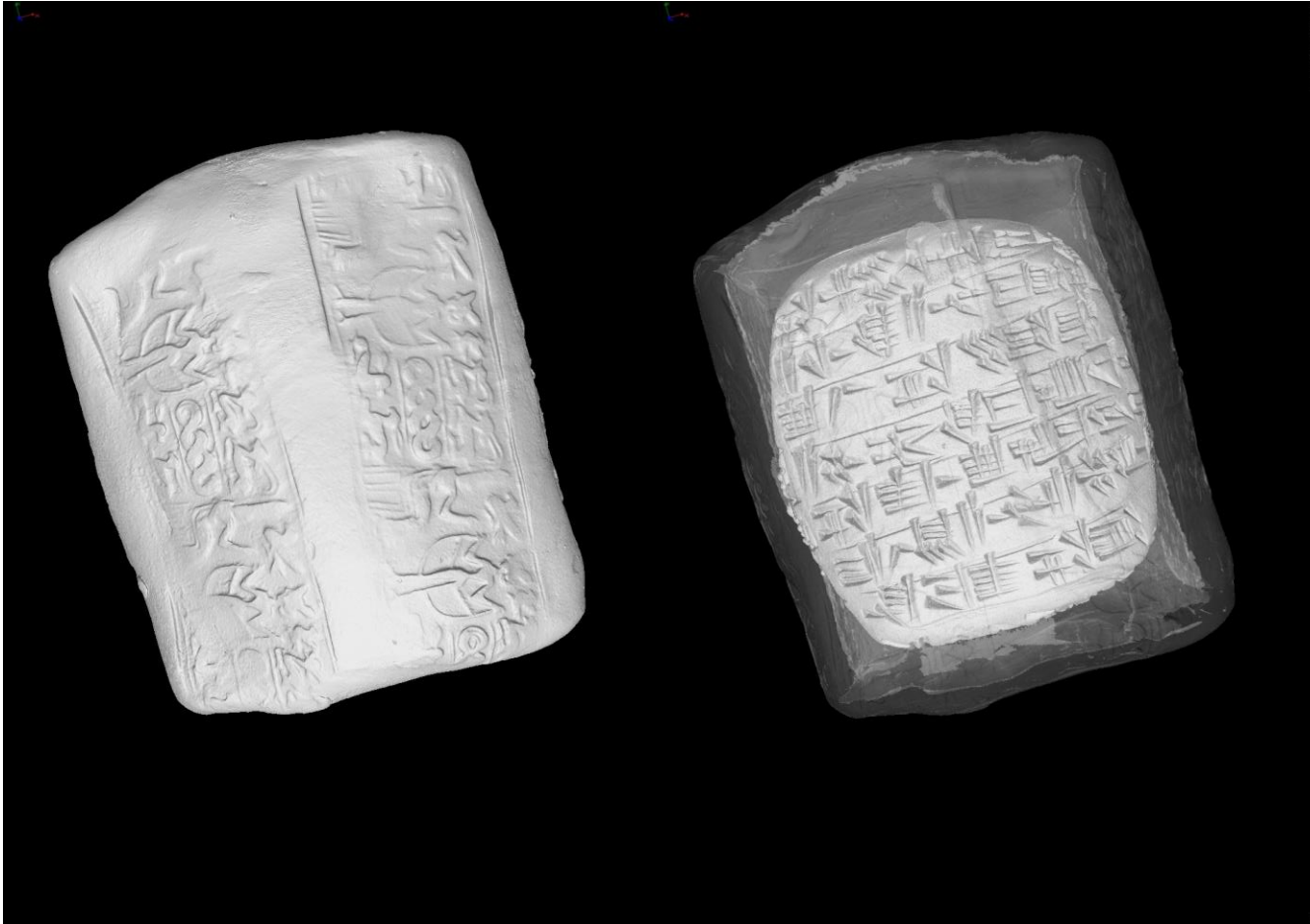
- Independent of component suppliers
- Tailored and customized solutions
- Global network of trained representatives
- Local 24/7 first line support
- Warranty and maintenance packages
- Sales and service partners global wide



# What we normally do...

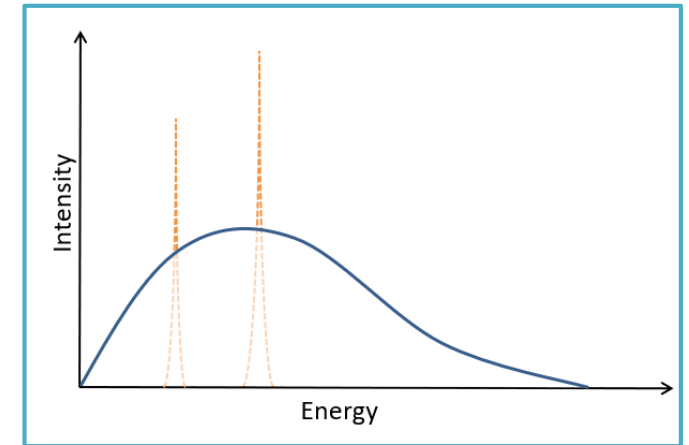
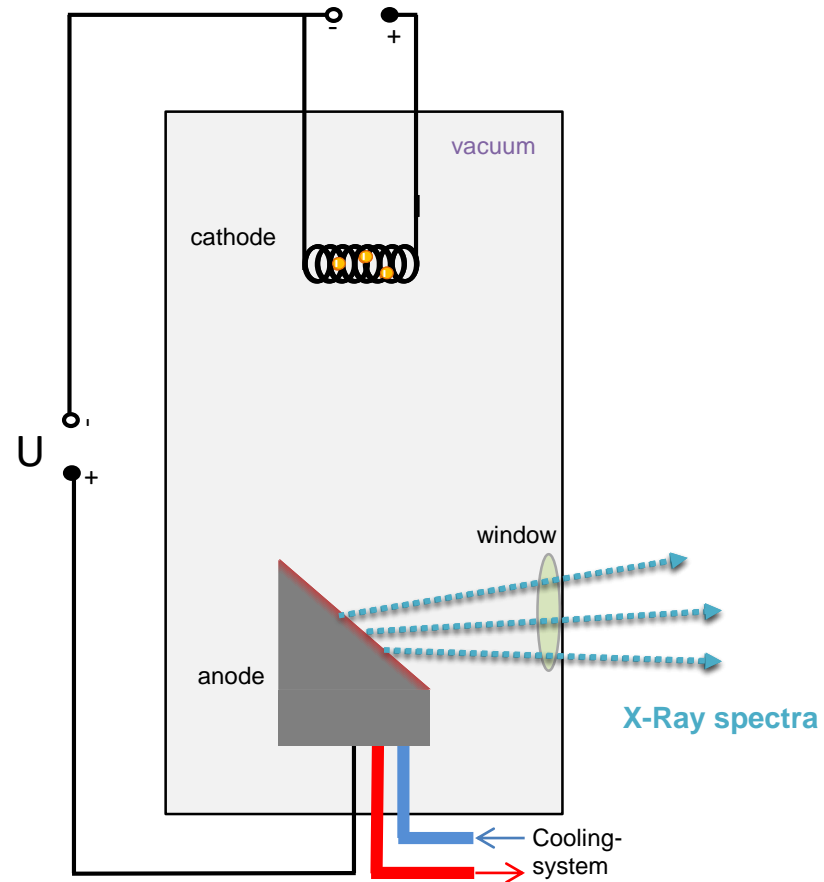
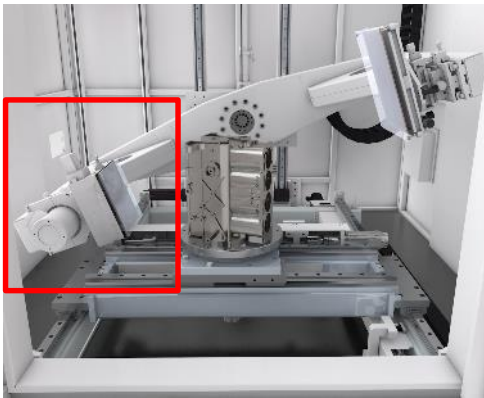


... but today ist different.

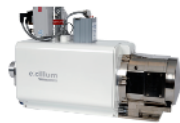
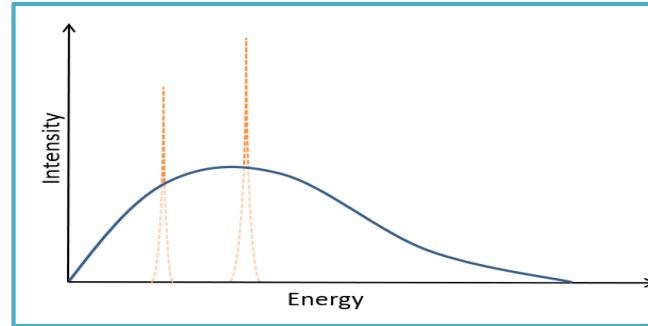
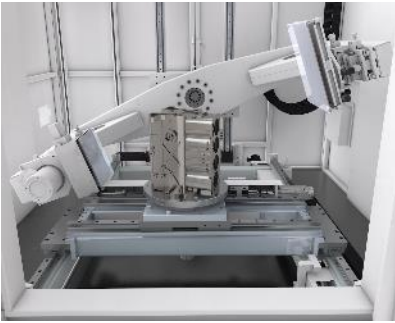


# Basics of X-ray inspection

X-RAY TUBE

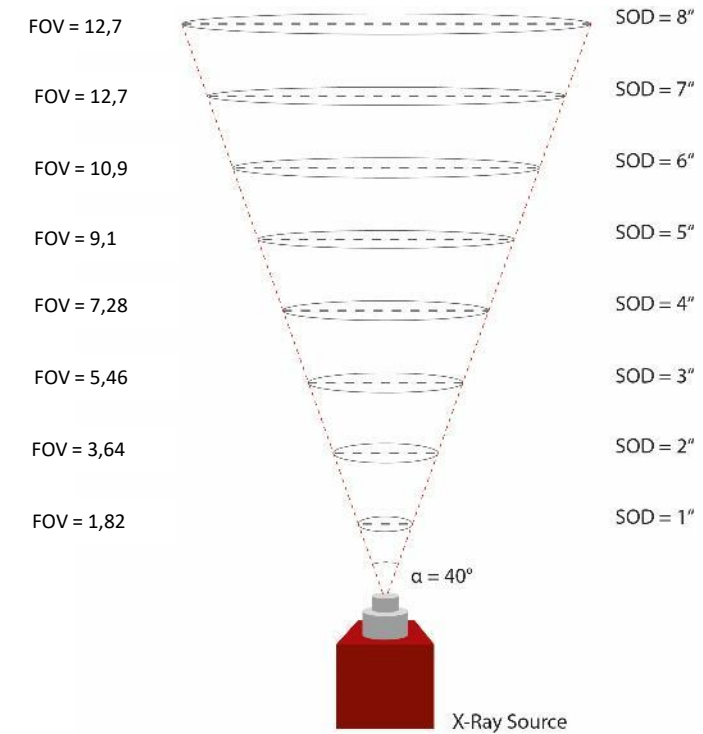
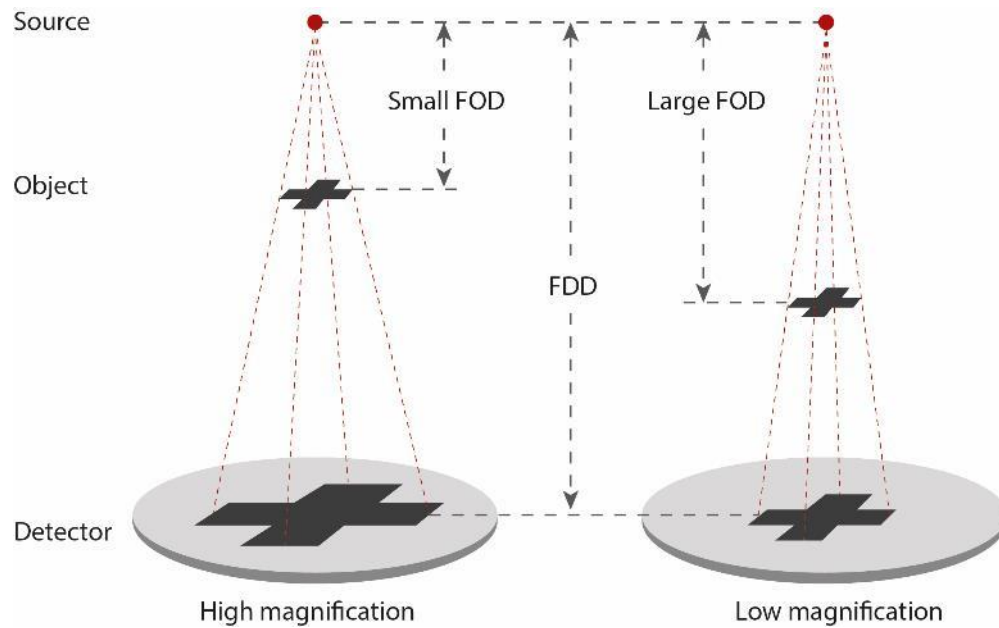


# Basics of X-ray inspection



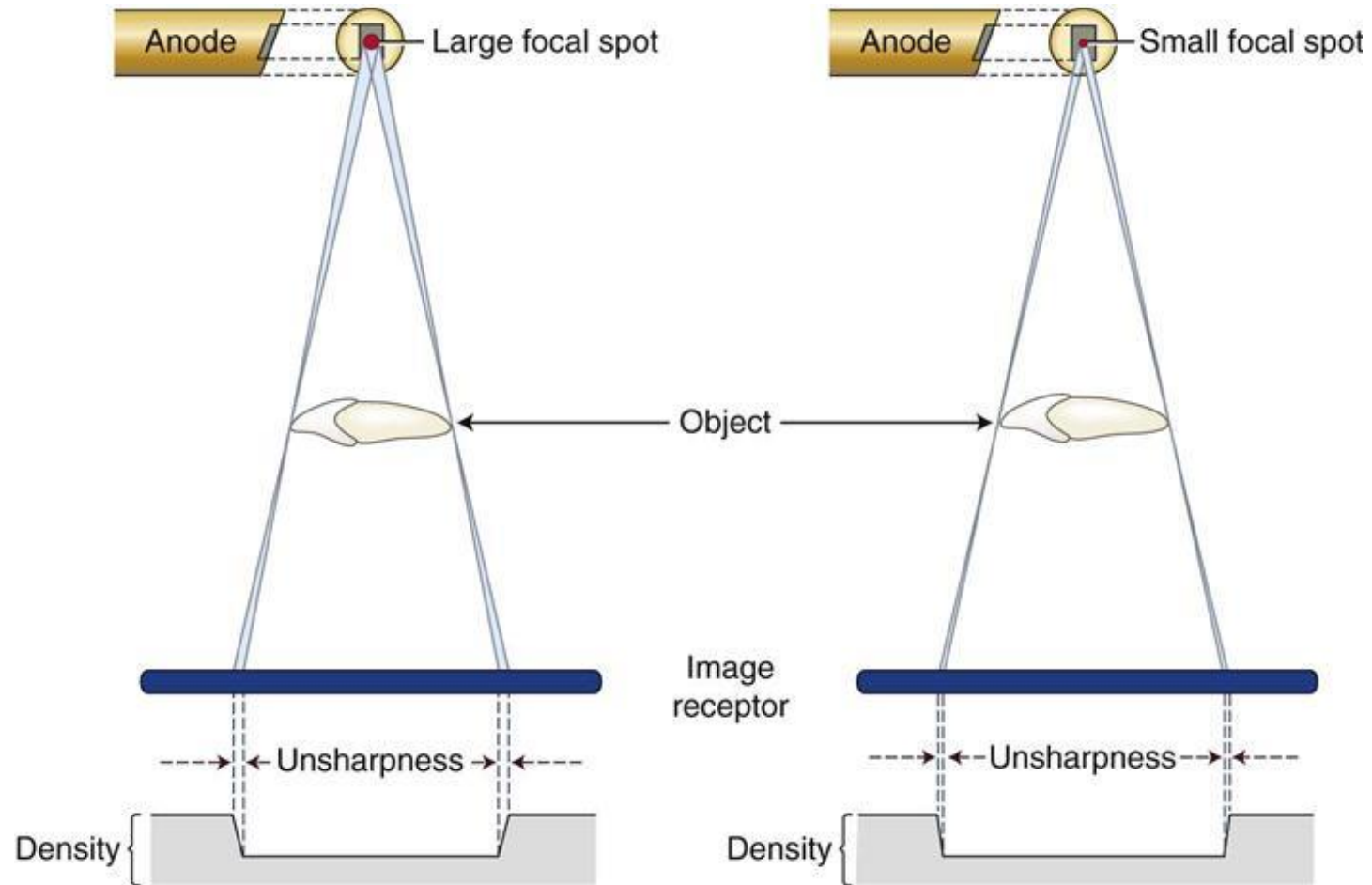
	Nanofocus-Tube	Microfocus-Tube	Minifocus-Tube
Focal spot size d	150 nm	2 $\mu\text{m}$ – 300 $\mu\text{m}$	0,3 – 1 mm
Voltage U	Up to 150 kV	Up to 300 kV	Up to 600 kV

# Magnification and field of view



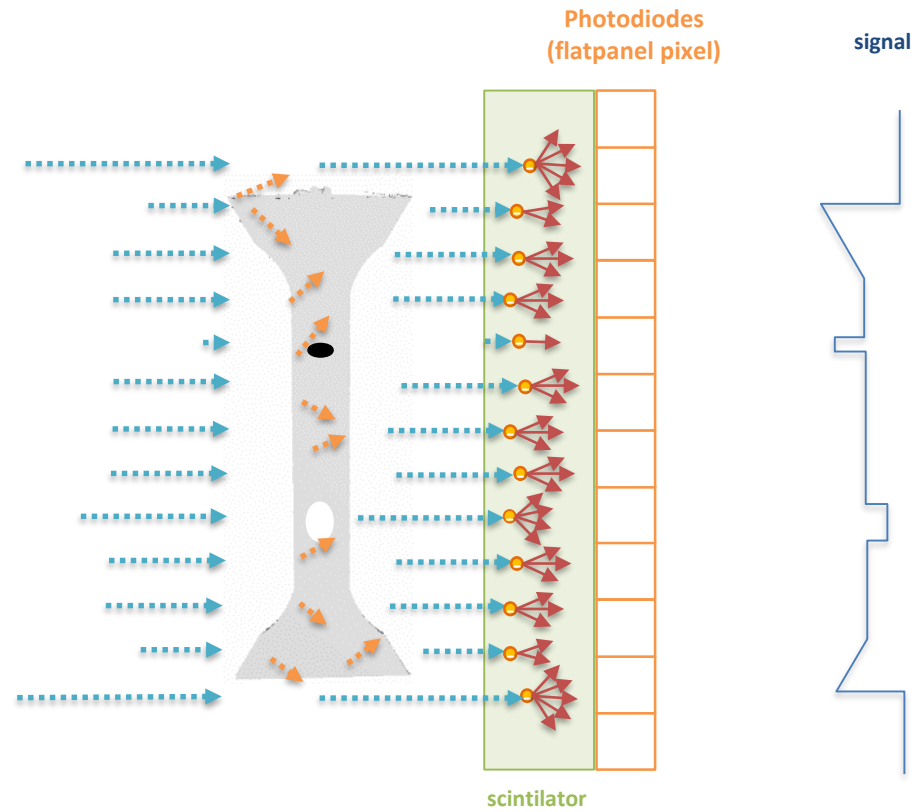
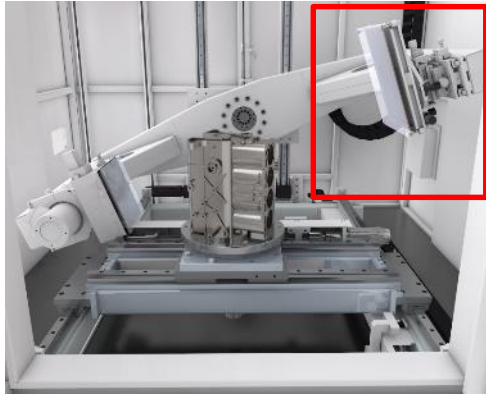


# Magnification and field of view





# Basics of X-ray inspection



# Systems Standard cabinets



130  
kV

## InSpect

- Small footprint and Compact design
- Film, CR or DR
- Microfocus or Minifocus X-ray tube
- Intuitive and simple touch operation
- Modular setup and automation options



225  
kV M

## XRH111<sup>ECO</sup>

- Visual inspection cabinet
- Budget entry level system
- Full image quality
- Full automation features
- Compact layout



225  
kV M A DR CT

## XRH111

- Universal inspection cabinet
- Designed for medium parts
- Optional CT and ADR modules
- Full automation features
- Compact layout and mobility



450  
kV L A DR CT

## XRH222

- Universal inspection cabinet
- Designed for big parts
- Optional CT and ADR modules
- Full automation features
- Most sold system worldwide

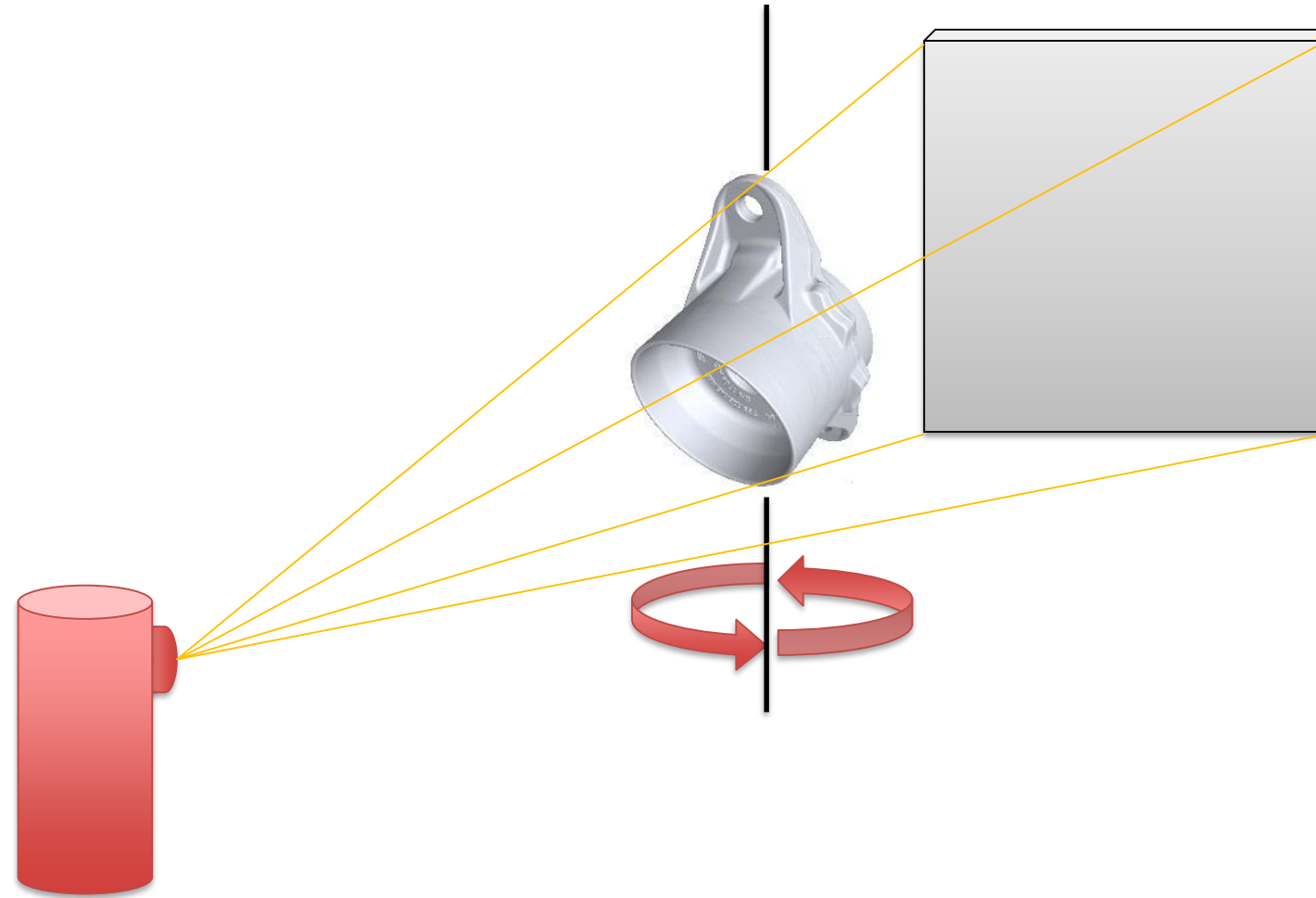


450  
kV kg A DR CT XL

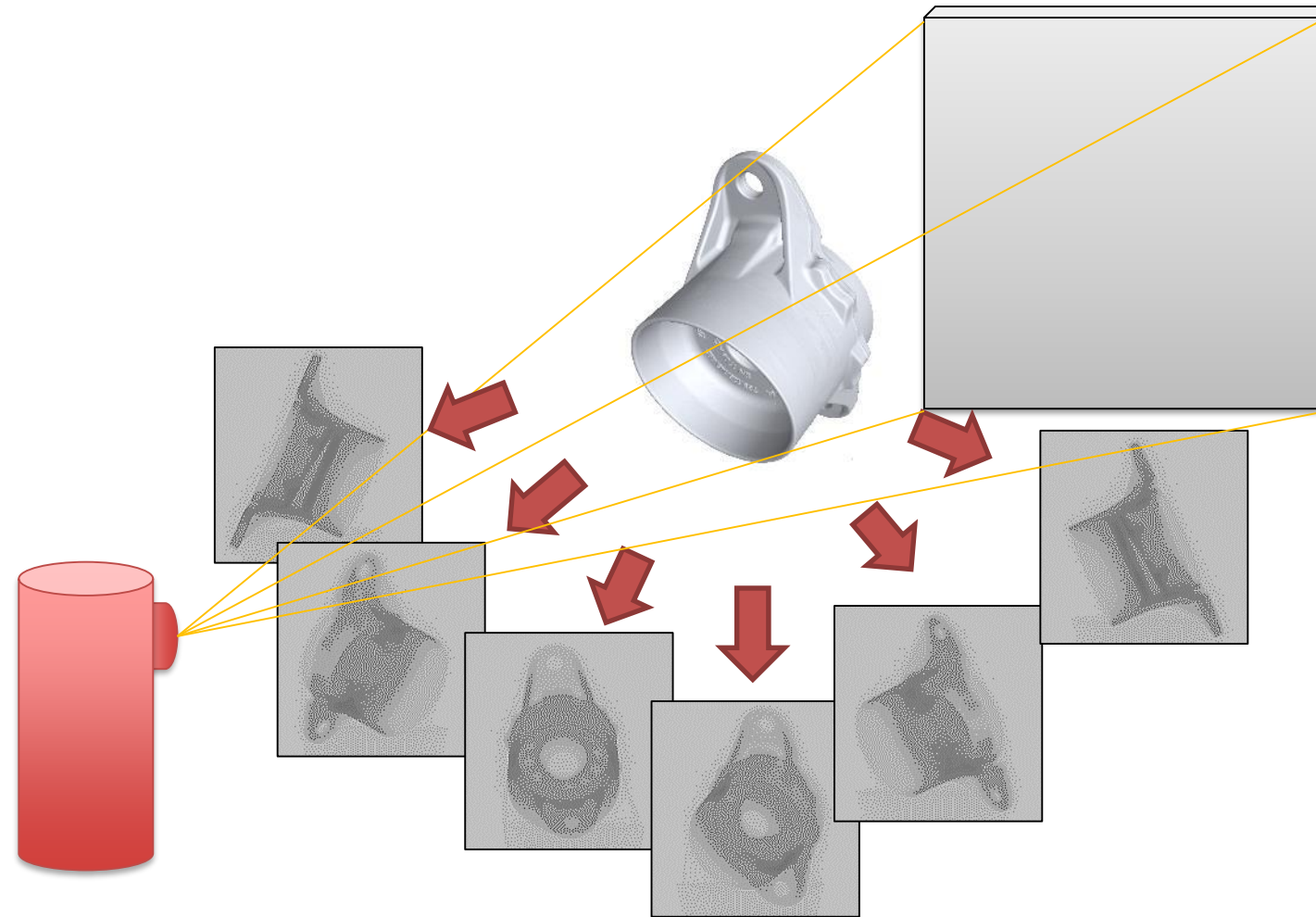
## XRH222<sup>TL</sup>

- 600kg heavy duty manipulator
- Loading by crane through roof
- Optional CT and ADR modules
- Full automation features
- Designed for big and heavy parts

# Basics of computed tomography



# Basics of computed tomography

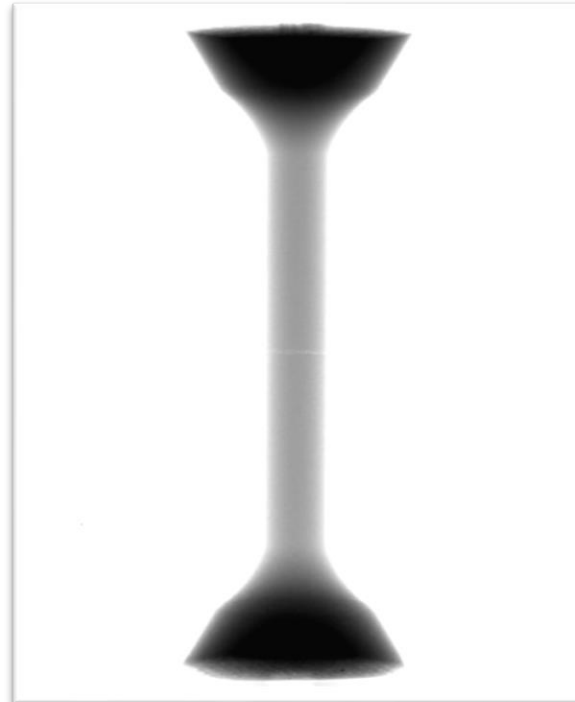


# From a part, to a 2D image, to a 3D model

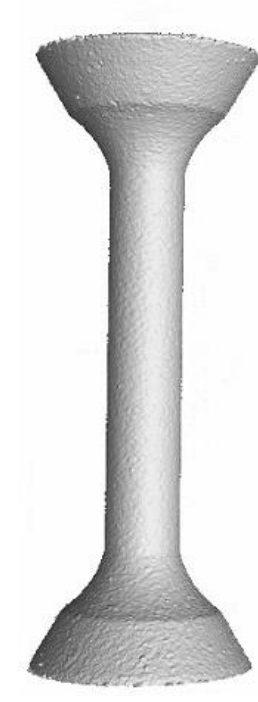
SAMPLE



2D X-RAY IMAGE



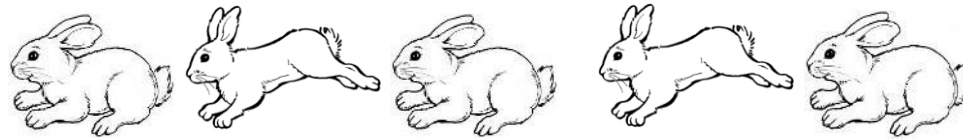
CT VOLUME



# Basics of computed tomography

## STOP & GO SCAN

- ✓ Reduced scattering artefacts



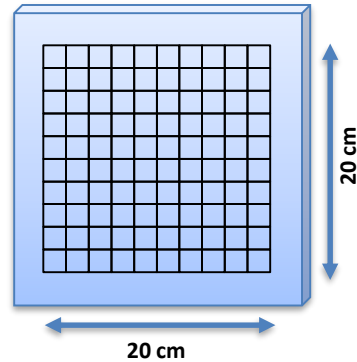
## QUICKSCAN / FASTSCAN

- ✓ Reduced acquisition time



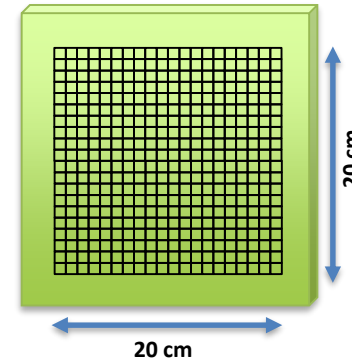
# Basics of computed tomography

## RESOLUTION VS. DATA VOLUME



Pixelpitch: 200 µm  
Pixelmatrix: 1000 x 1000 px

CT Data Volume:  
1000 x 1000 x 1000 x 16 bit  
**= 1,86 GB**

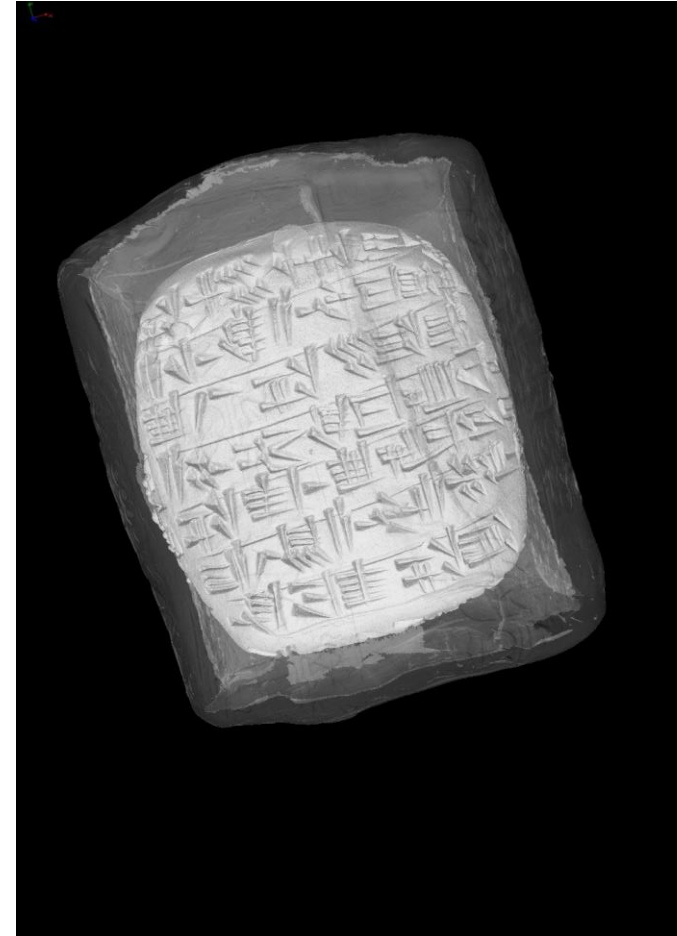


Pixelpitch: 100 µm  
Pixelmatrix: 2000 x 2000 px

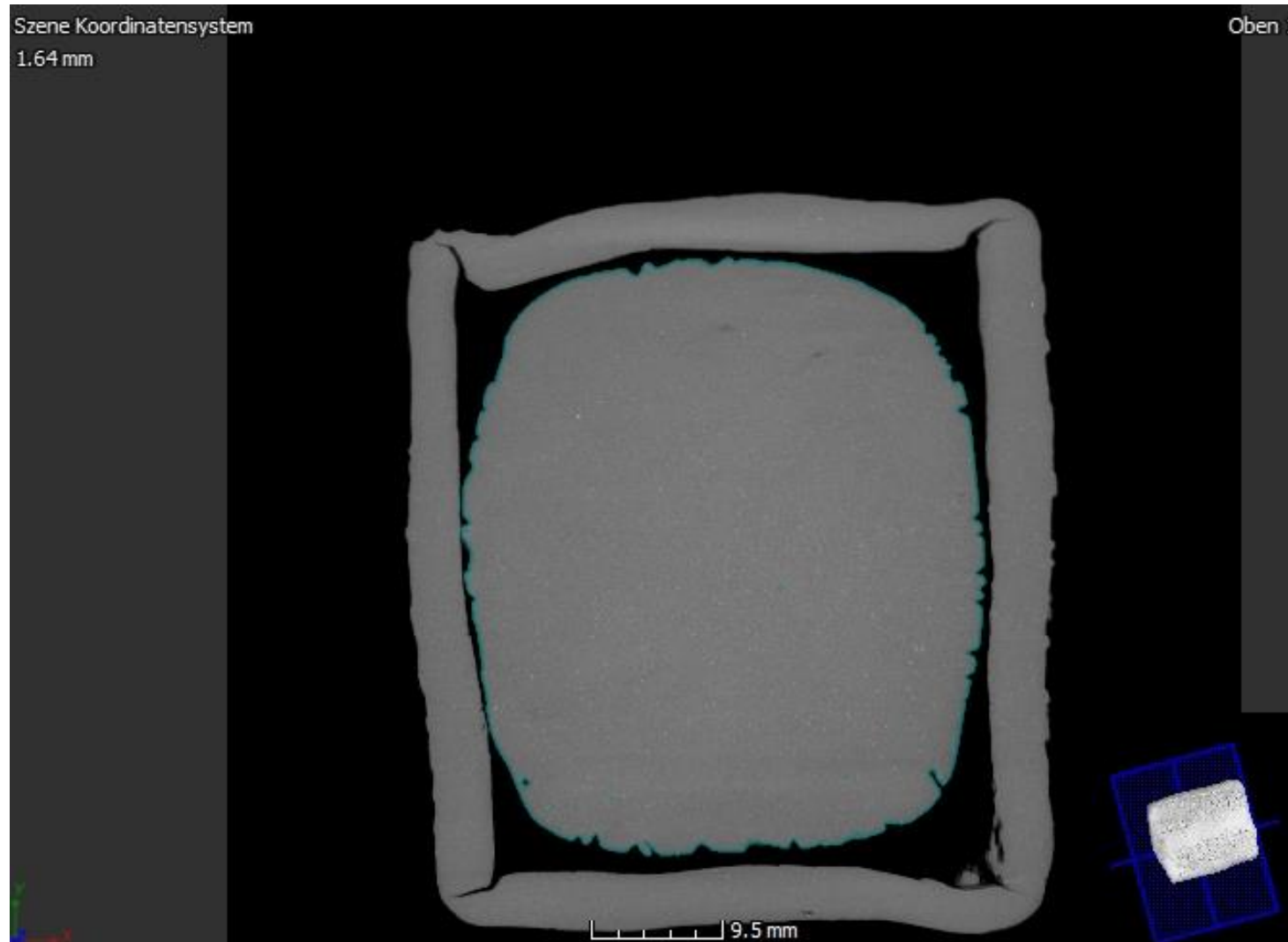
CT Data Volume:  
2000 x 2000 x 2000 x 16 bit  
**= 14,9 GB**



# Results



# Results

















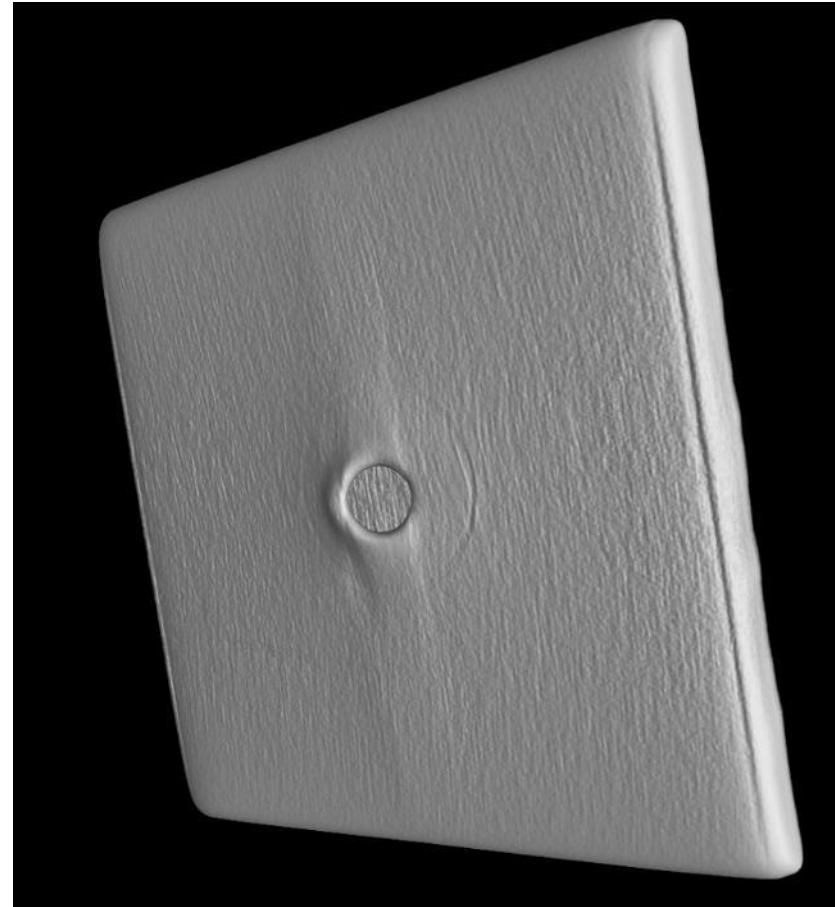




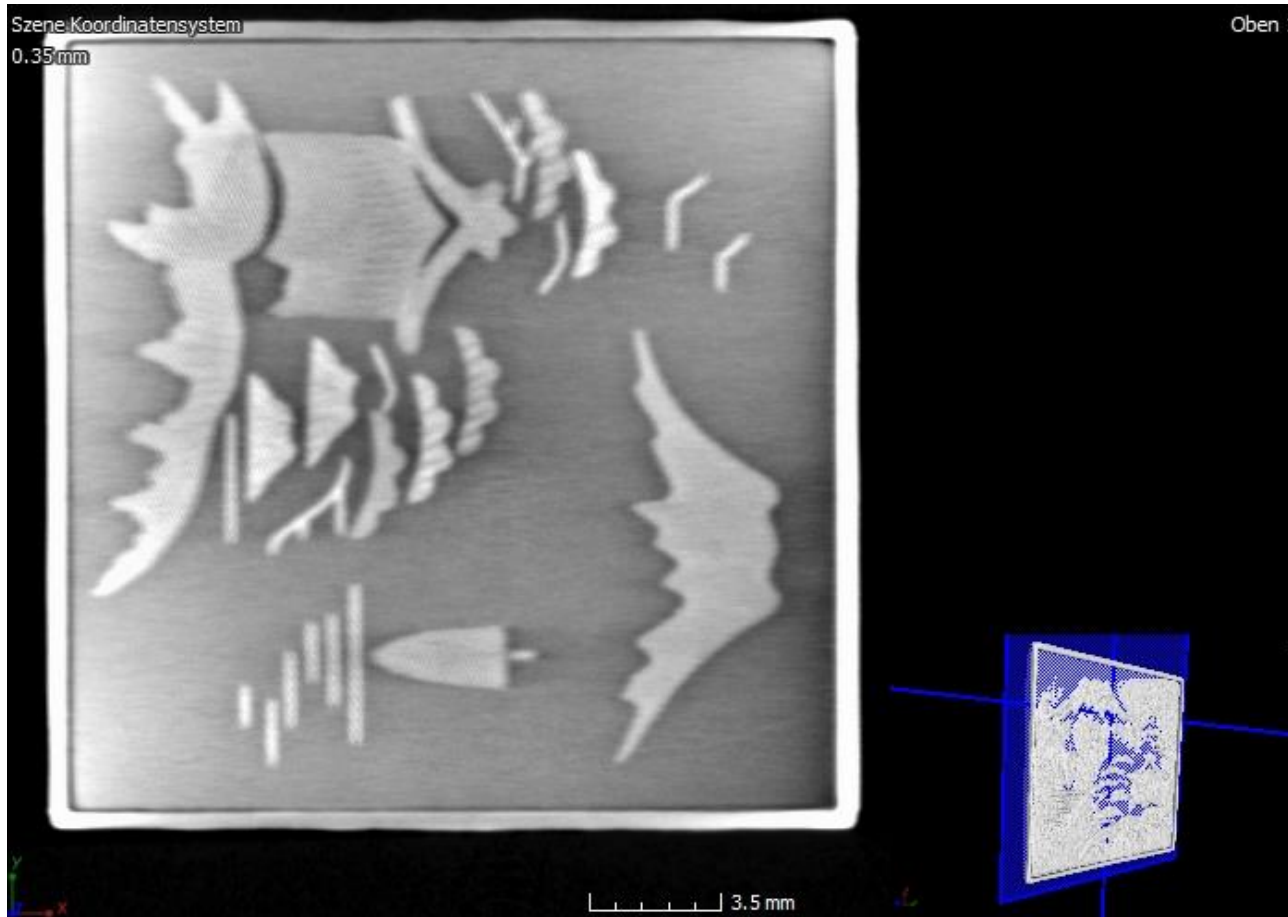




# Results

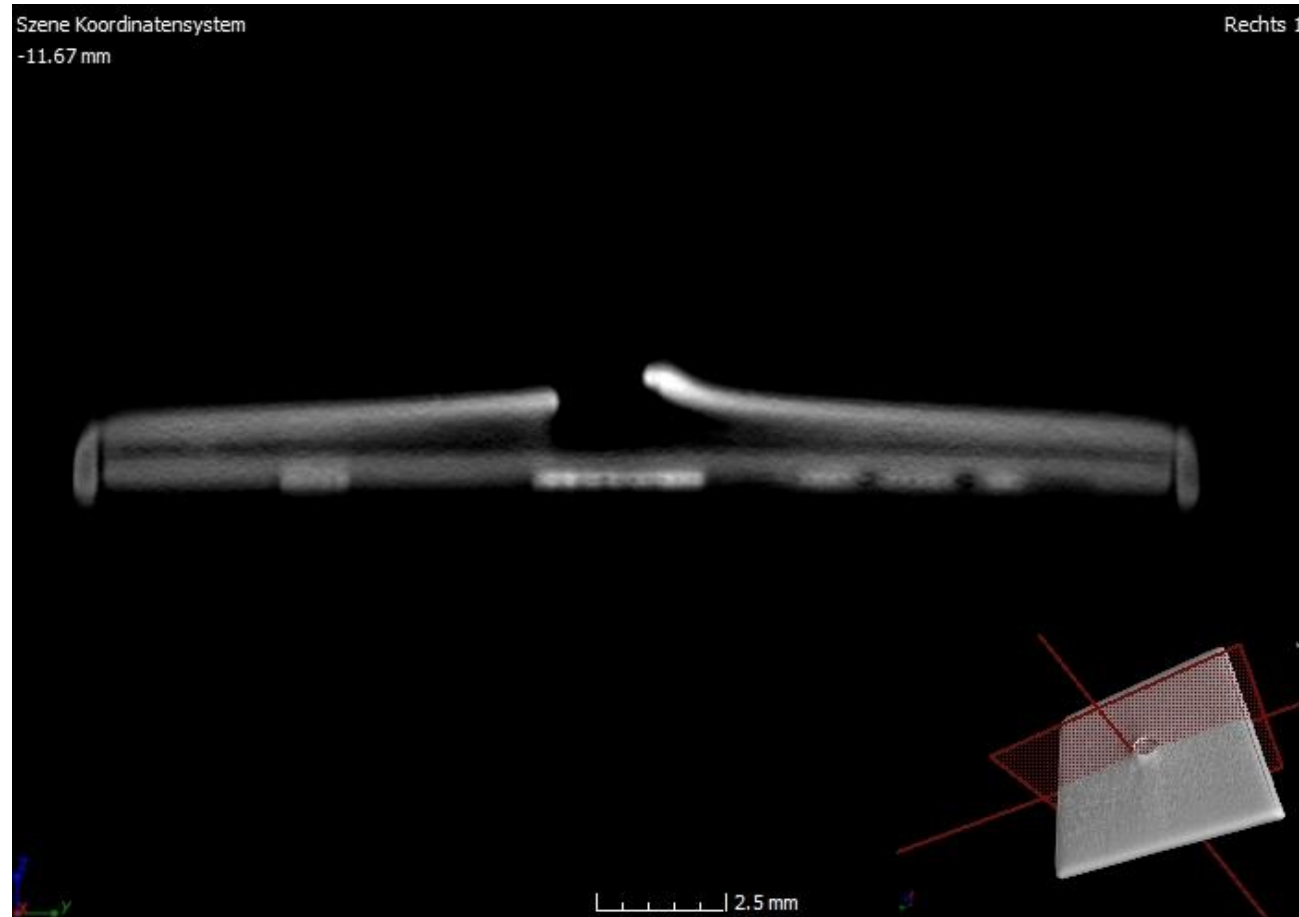


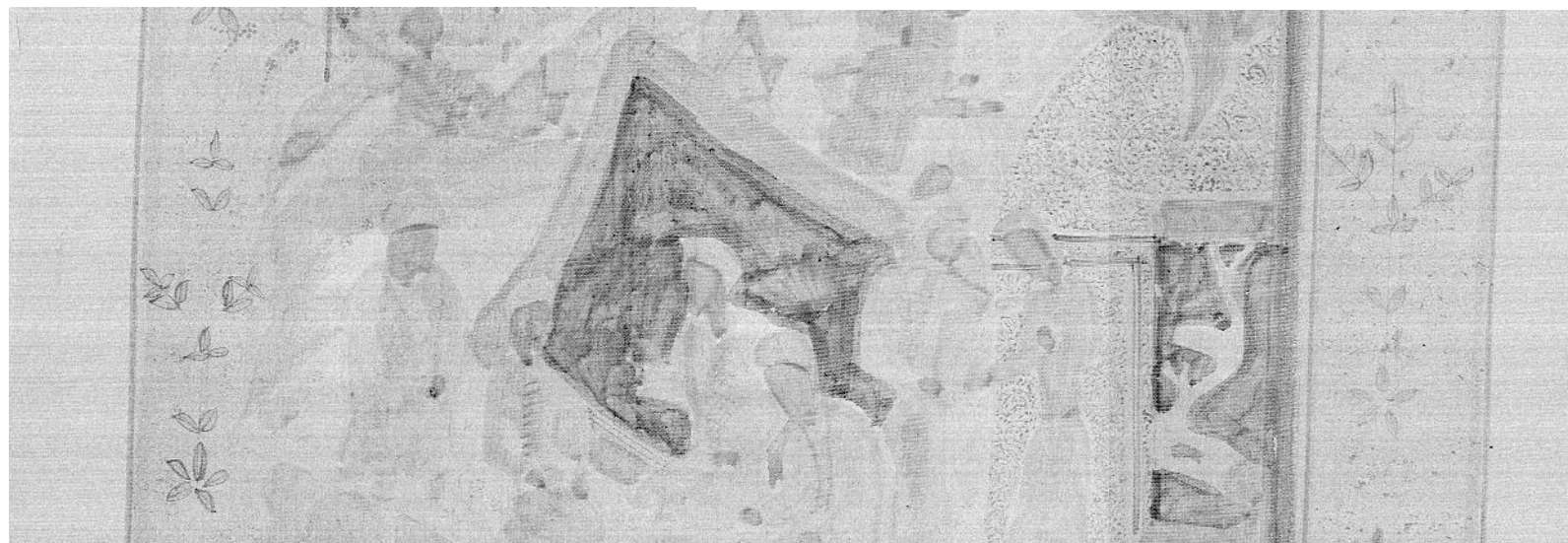
# CT – Structure





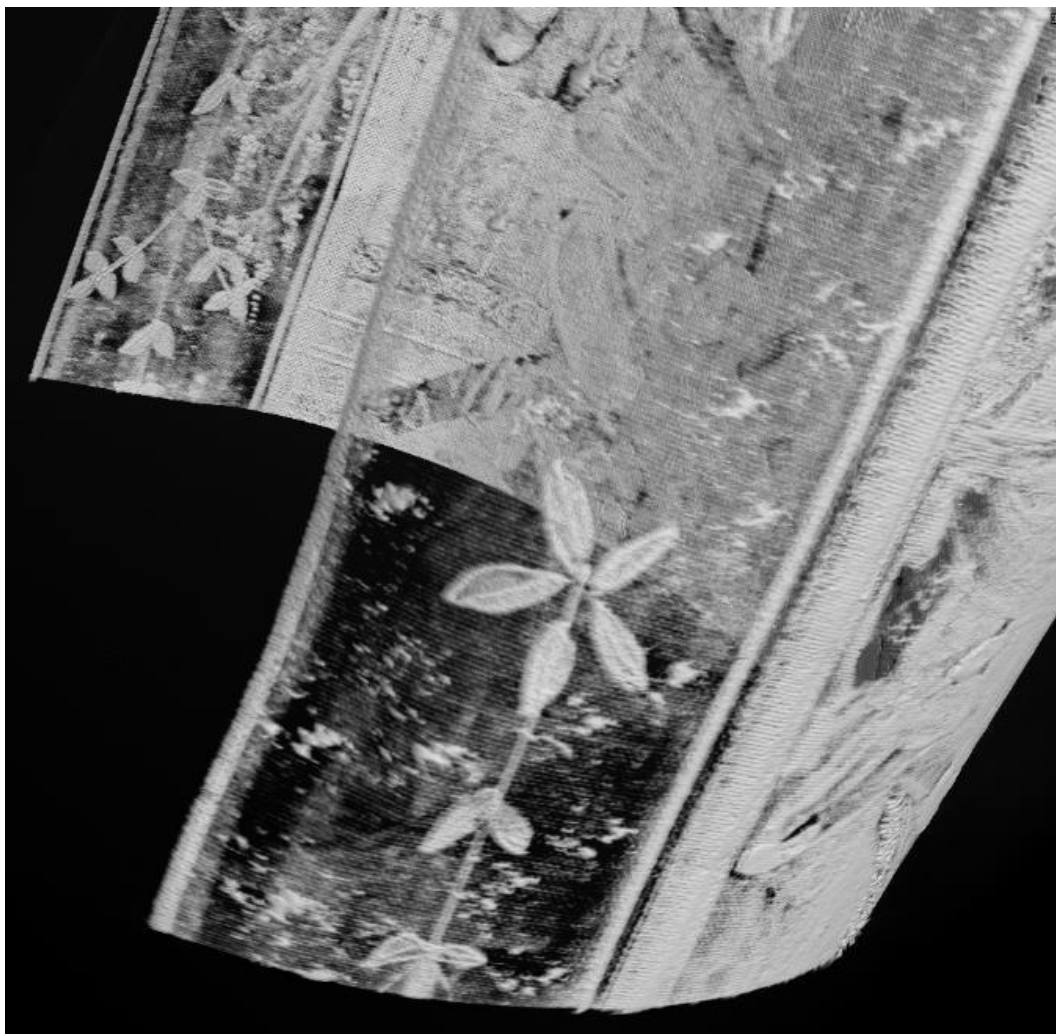
# CT – Metal Plates



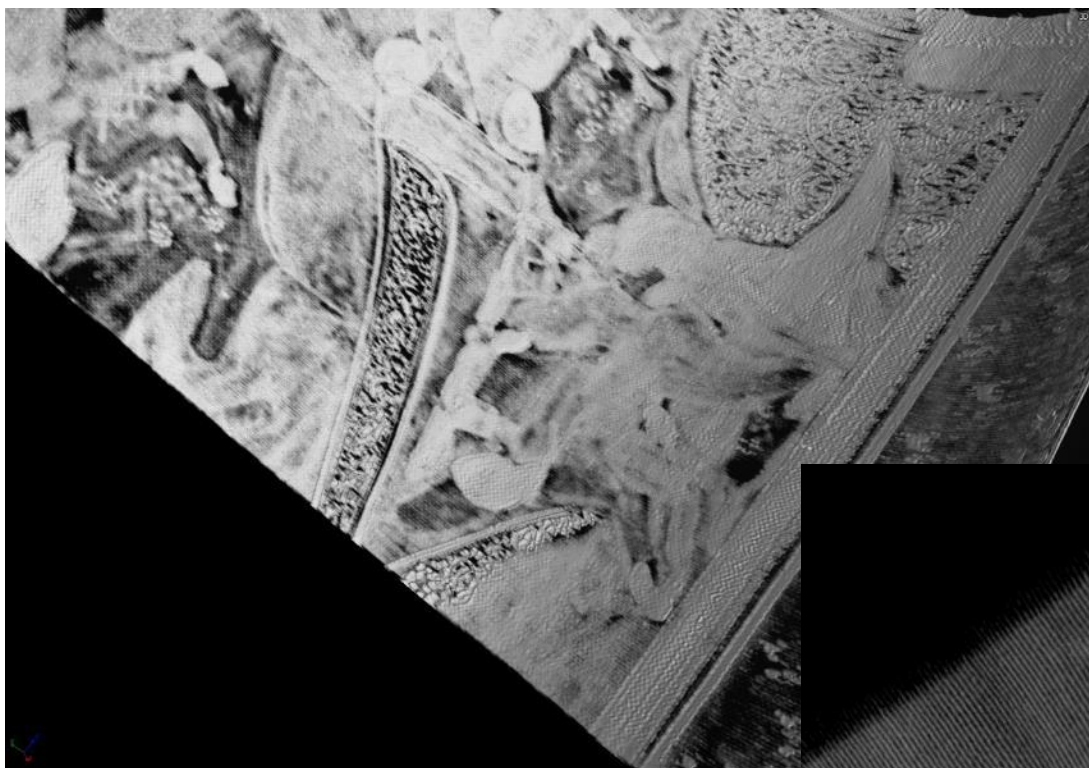




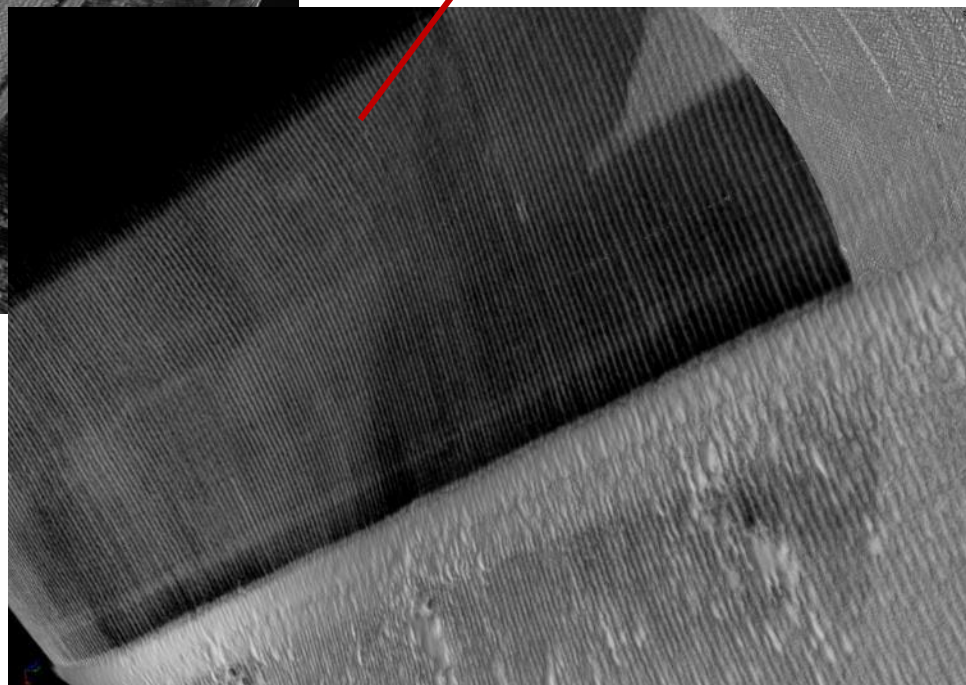




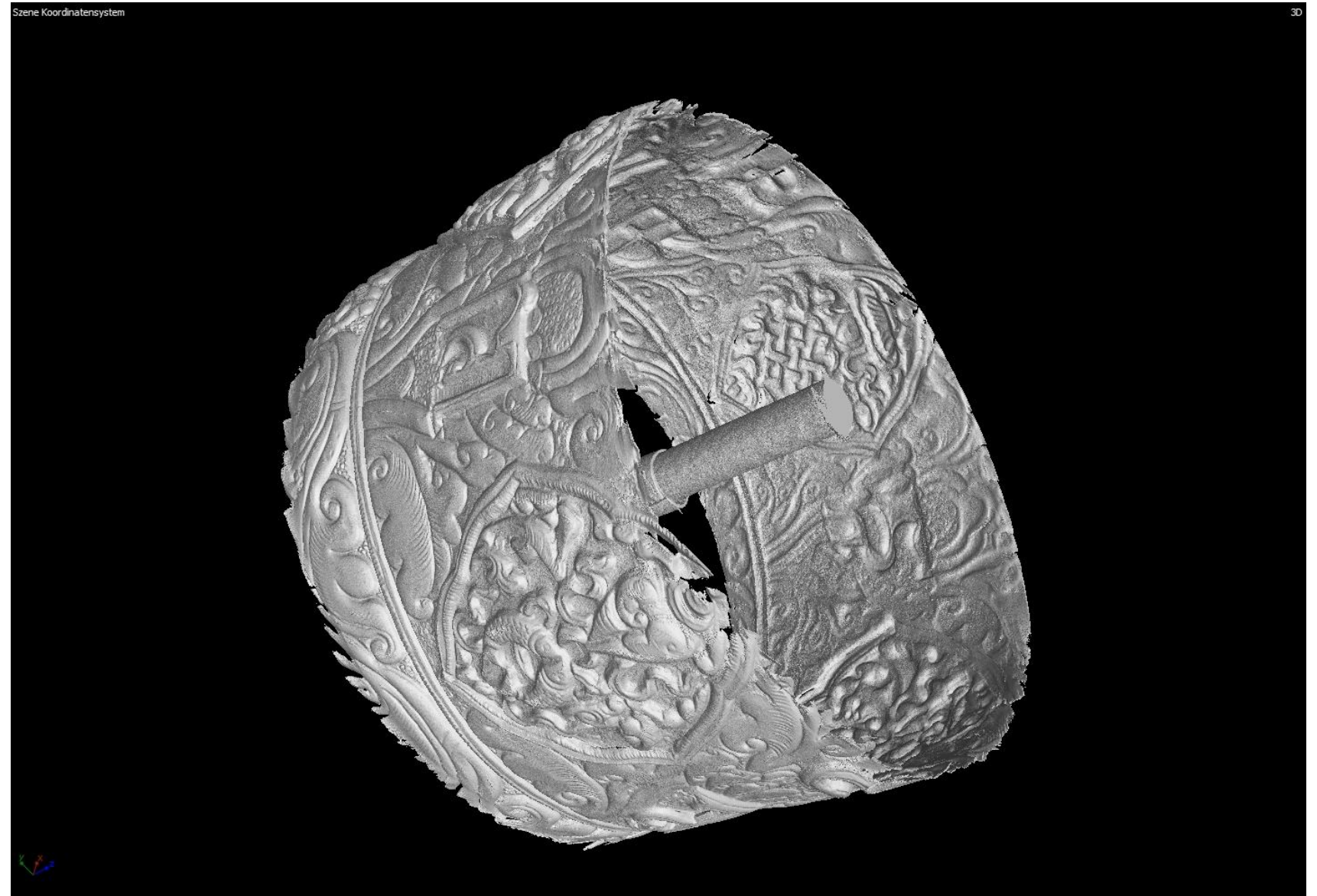




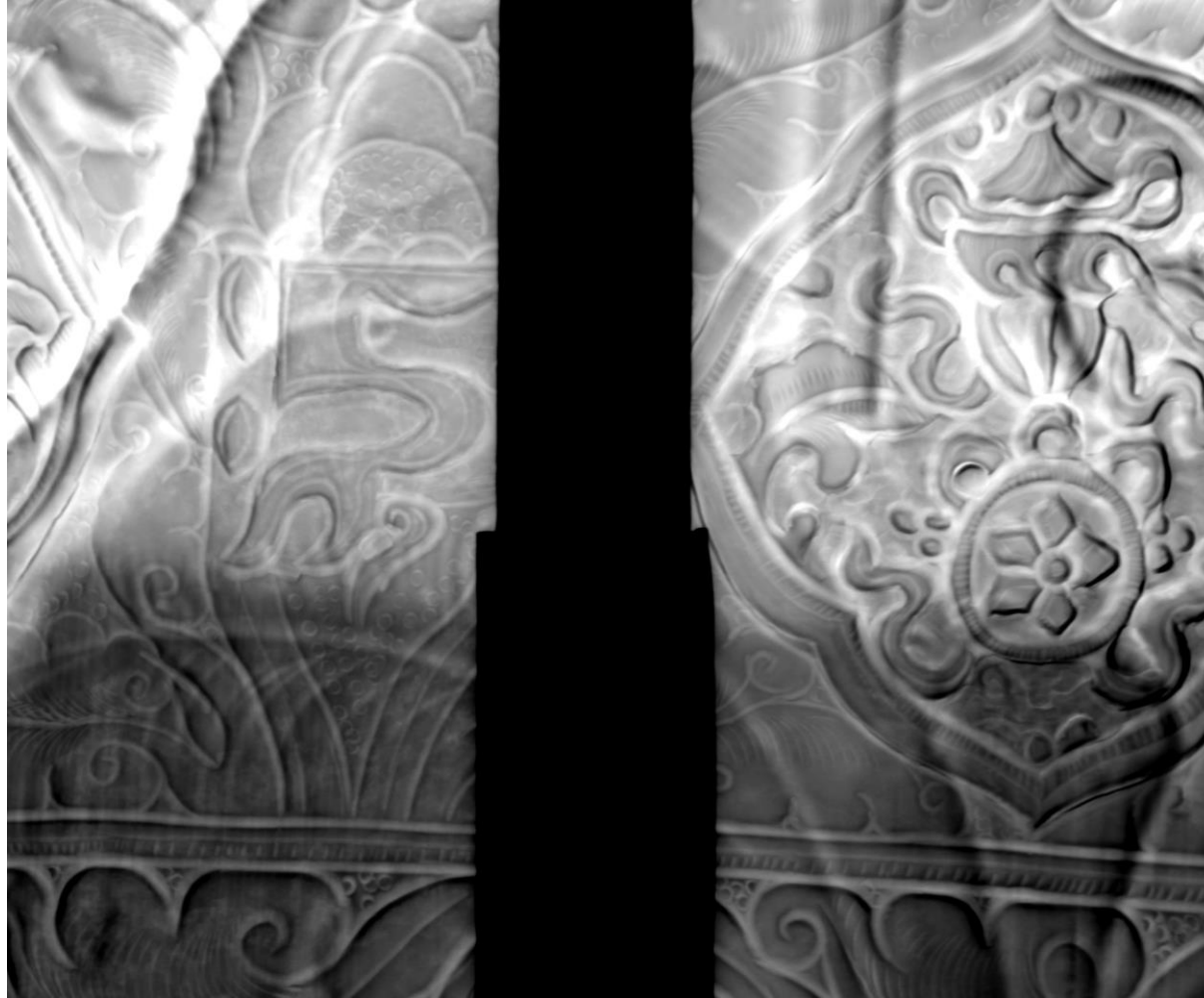
Unpainted silk



# Gebetsmühle



# Gebetsmühle



# Virtually Unwrapping the En-Gedi Scroll







**Thank you for your attention**



