



VisiConsult
X-ray Systems & Solutions

Digital Radiography in Aerospace

Underlying principles and migration from film technology

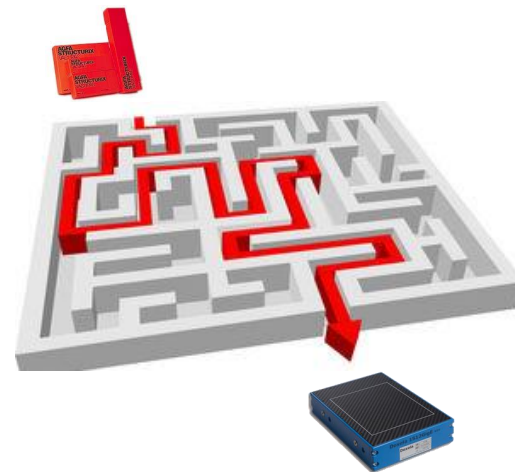
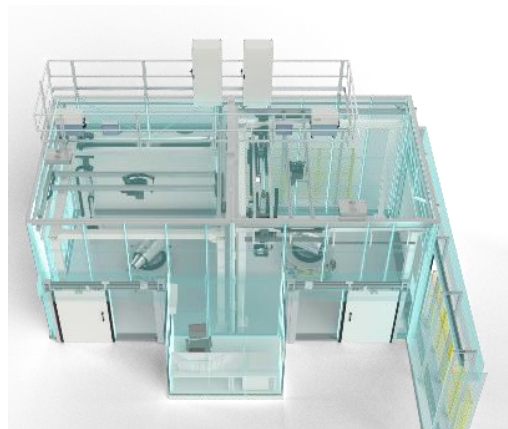
About VisiConsult



- Founded in 1996
- Over 80 employees worldwide
- Located in Northern Germany
- US subsidiary based in Atlanta, GA
- Germany's 4th fastest growing company (in EU 600)



What we will do today



Product overview

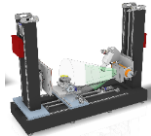


VisiConsult
X-ray Systems & Solutions

| Digital Radiography | | | | Security | Electronics |
|---------------------|--------|----------|--------|----------|-------------|
| Standard systems | Custom | Software | Mobile | | |



Cabinets



CT



XRHMobile



XplusSecurity



XRHCount



Gantry



Pipe

Standard cabinets



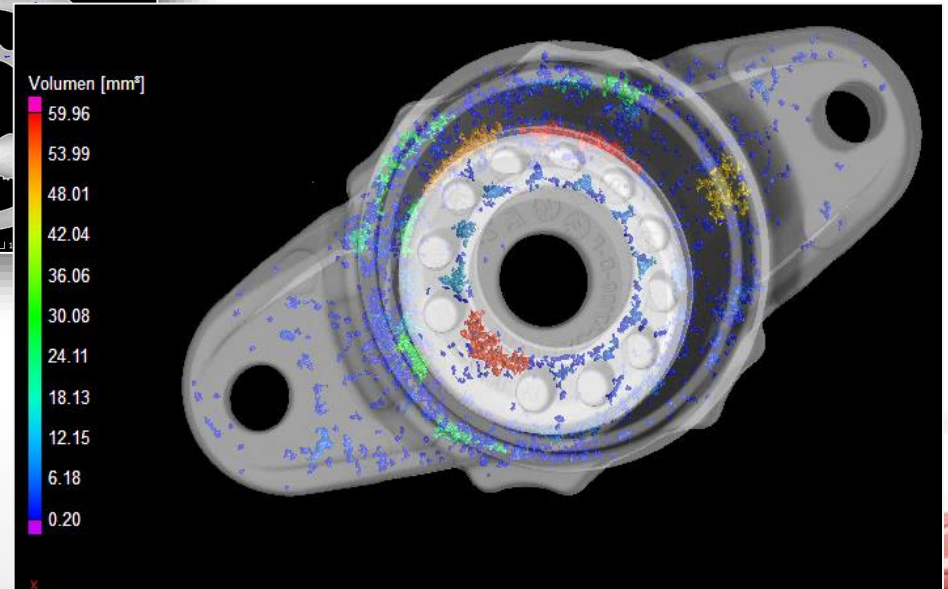
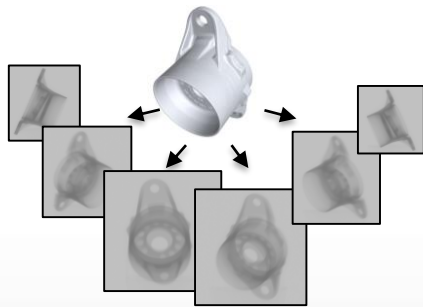
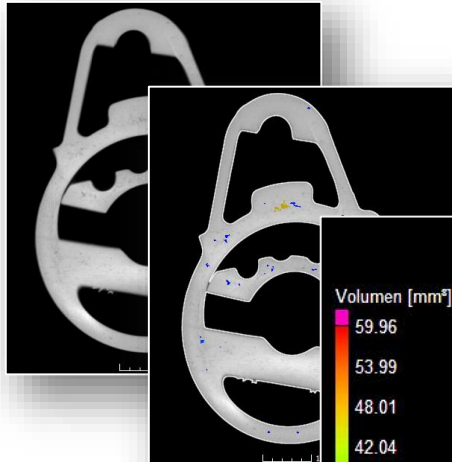
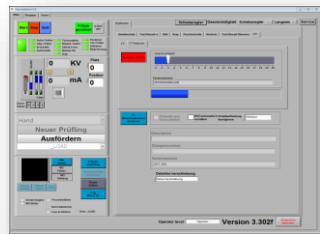
VisiConsult
X-ray Systems & Solutions



Computed Tomography



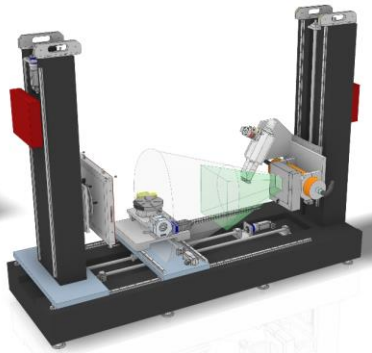
VisiConsult
X-ray Systems & Solutions



Cabinet overview



VisiConsult
X-ray Systems & Solutions



Portable DR solutions



VisiConsult
X-ray Systems & Solutions



X-ray sources



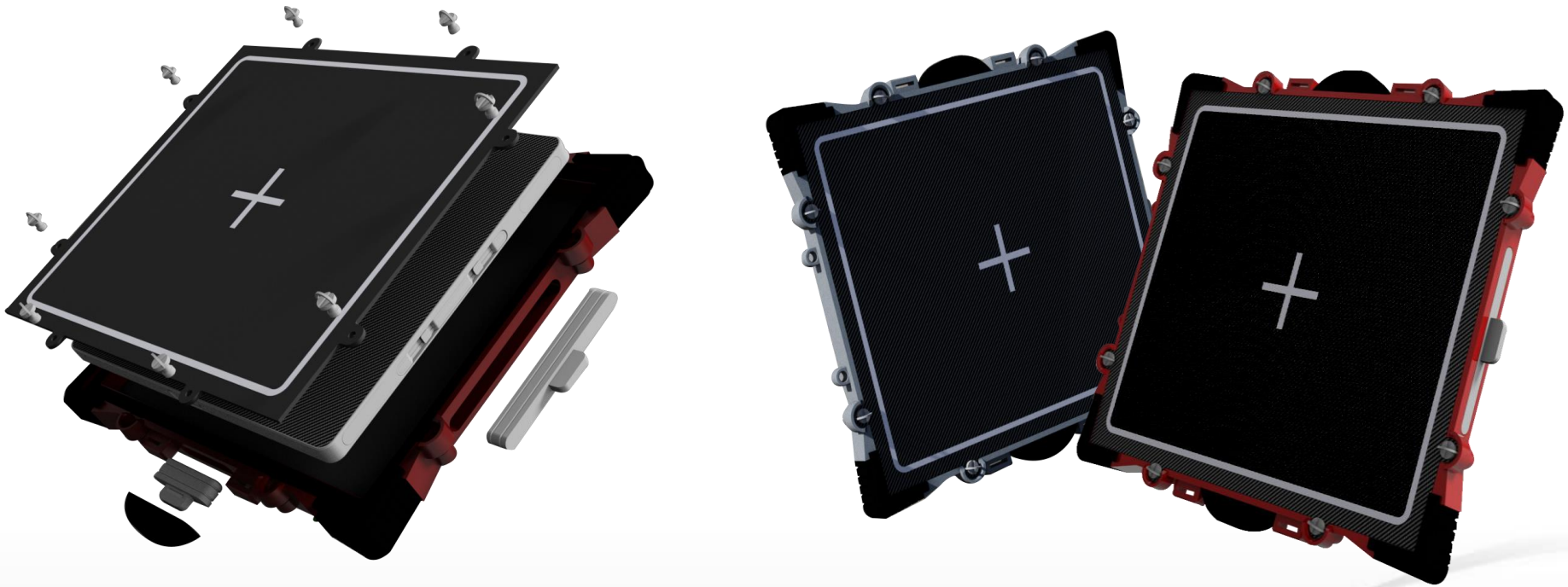
VisiConsult
X-ray Systems & Solutions

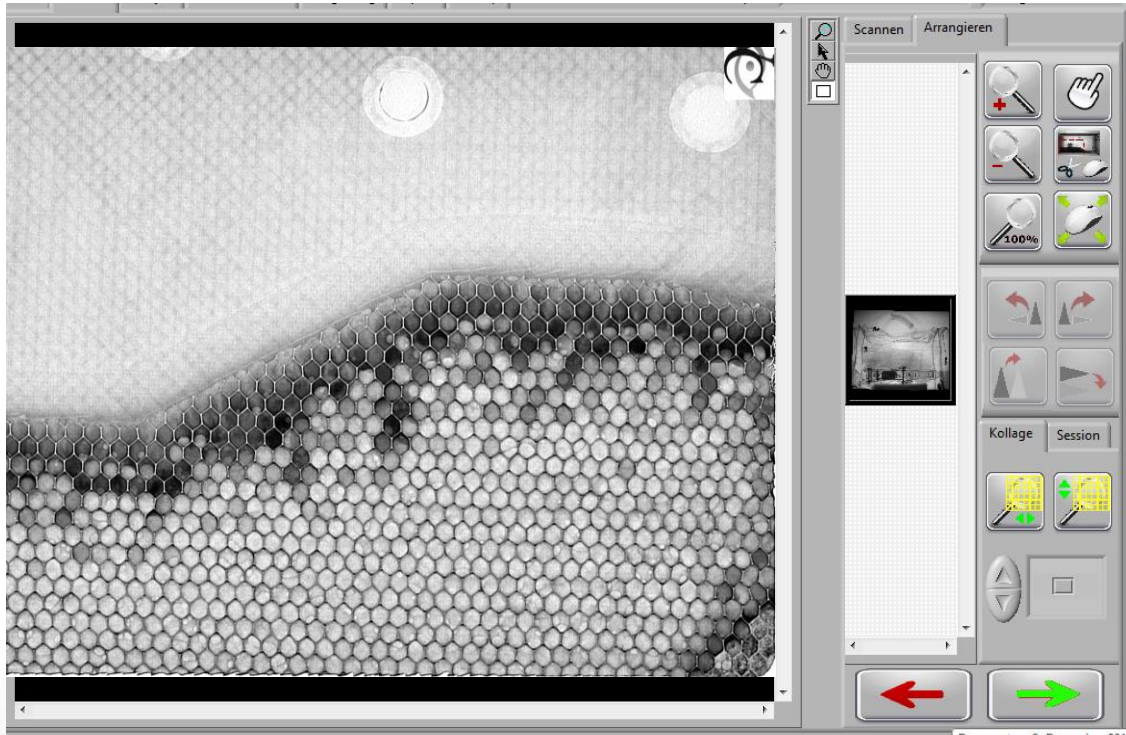


Detector covers



VisiConsult
X-ray Systems & Solutions



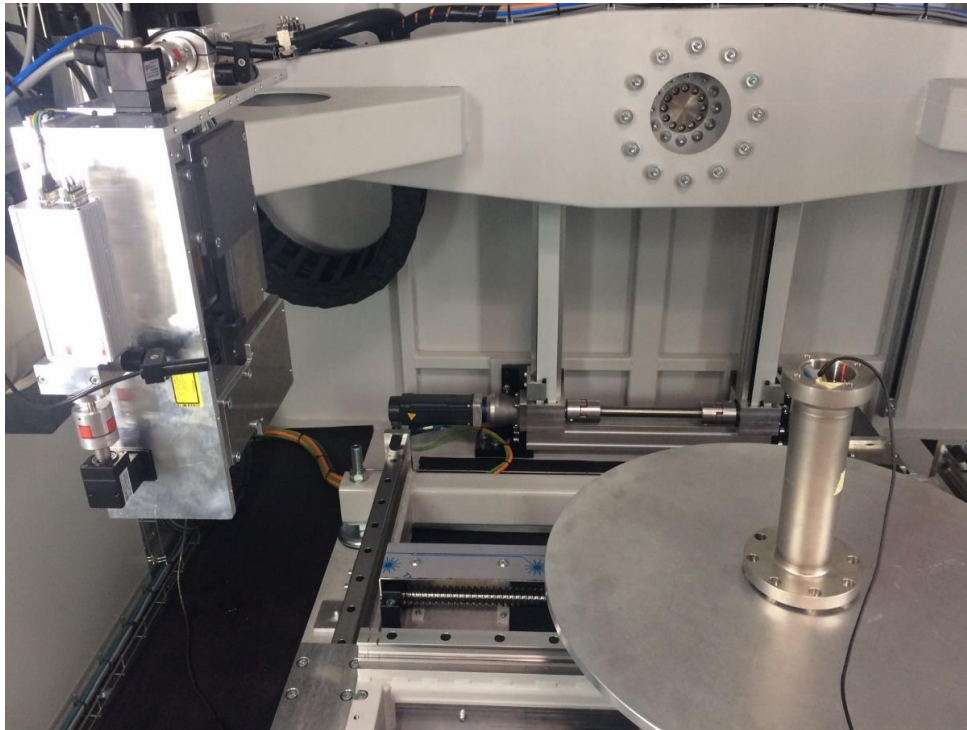


- Running on tablet or laptop
- WiFi connectivity
- Easy touch operation
- Fast setup
- Mission database





Other possible applications:



Single wall weld inspection inspection of small tubes

Cloud inspection



VisiConsult
X-ray Systems & Solutions



XRHGantry system



VisiConsult
X-ray Systems & Solutions

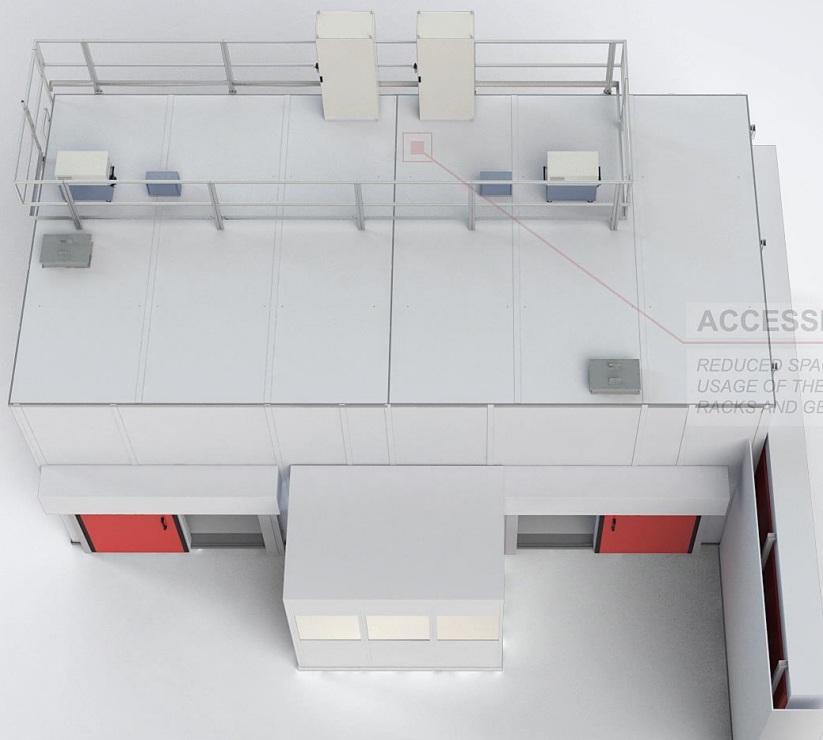


XRHGantry system



VisiConsult
X-ray Systems & Solutions

XRH Gantry



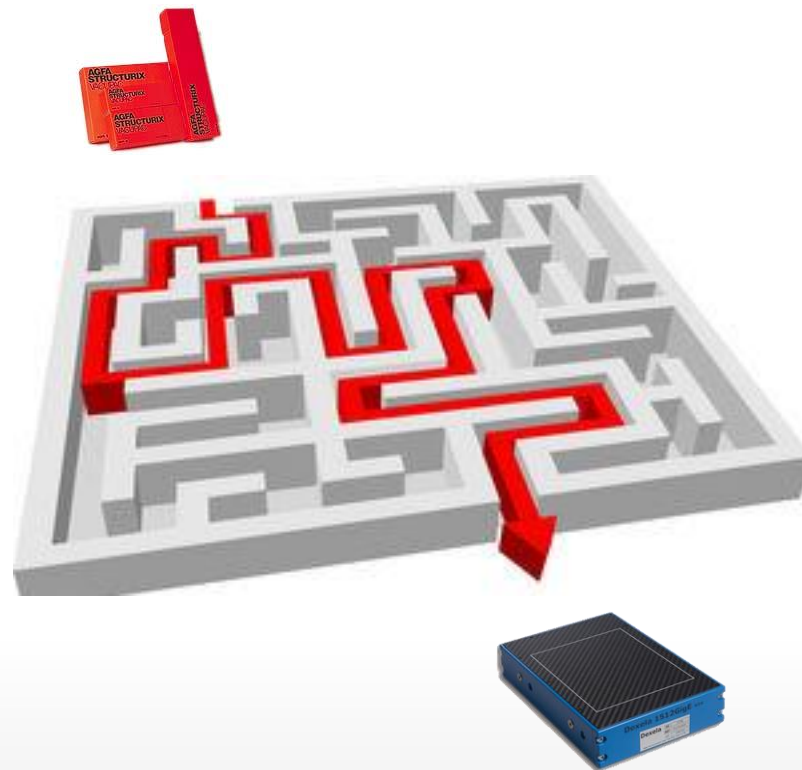
ACCESSIBLE ROOF

REDUCED SPACE REQUIREMENTS THROUGH
USAGE OF THE ROOF FOR ELECTRICAL
RACKS AND GENERATORS

The big challenge?



VisiConsult
X-ray Systems & Solutions



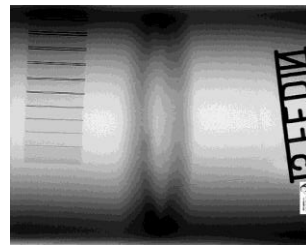
Application centered



VisiConsult
X-ray Systems & Solutions



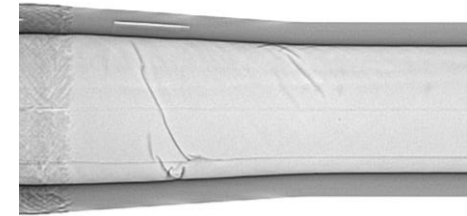
- Disbonds
- Cracks
- Delaminations



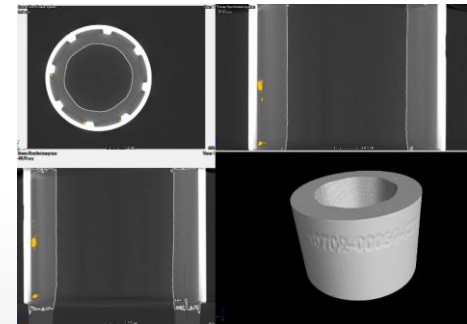
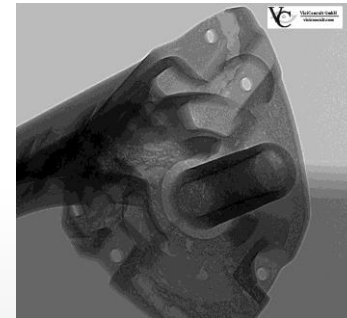
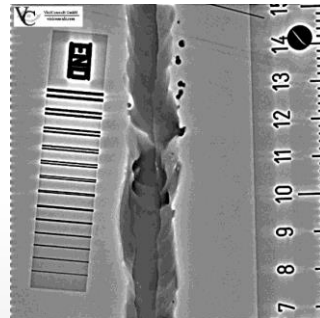
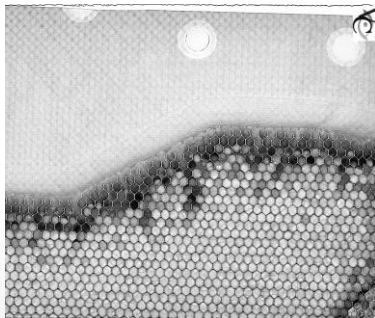
- Cracks
- Pores
- Inclusions



- Porosities
- Inclusions
- Geometry



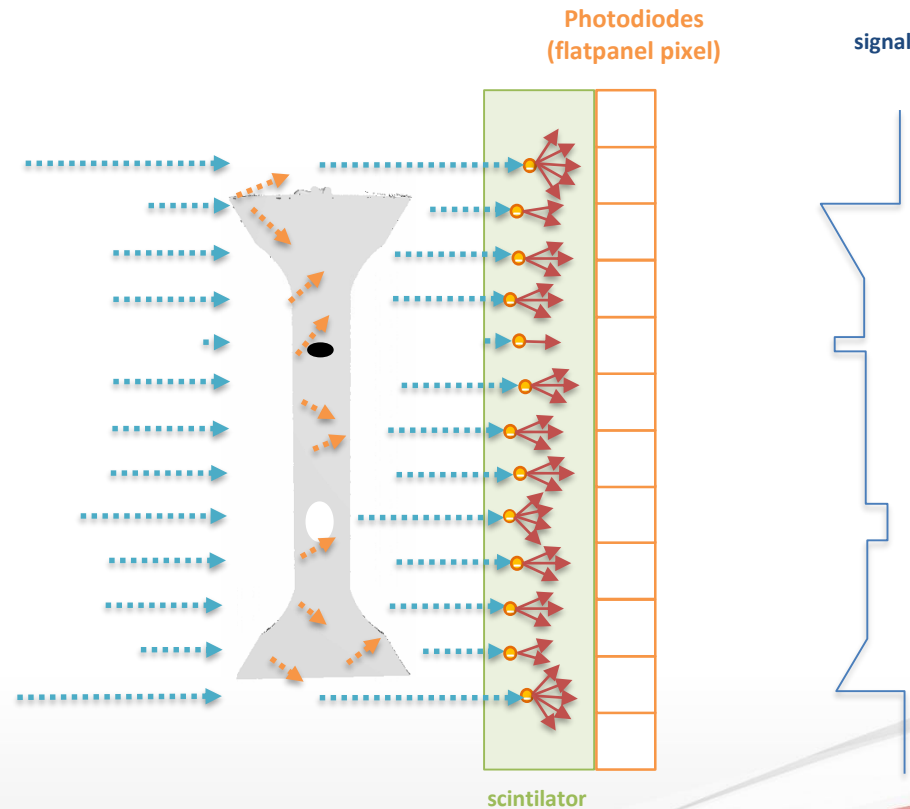
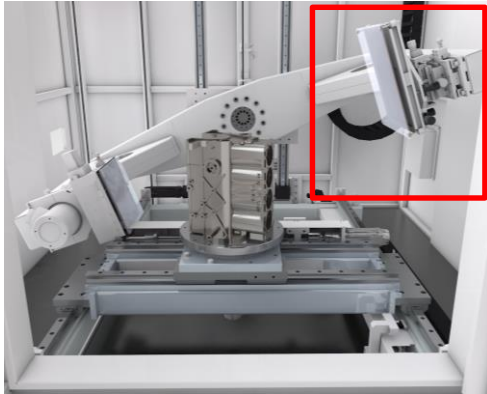
- Delaminations
- Pores
- Inclusions



Basics of X-ray inspection



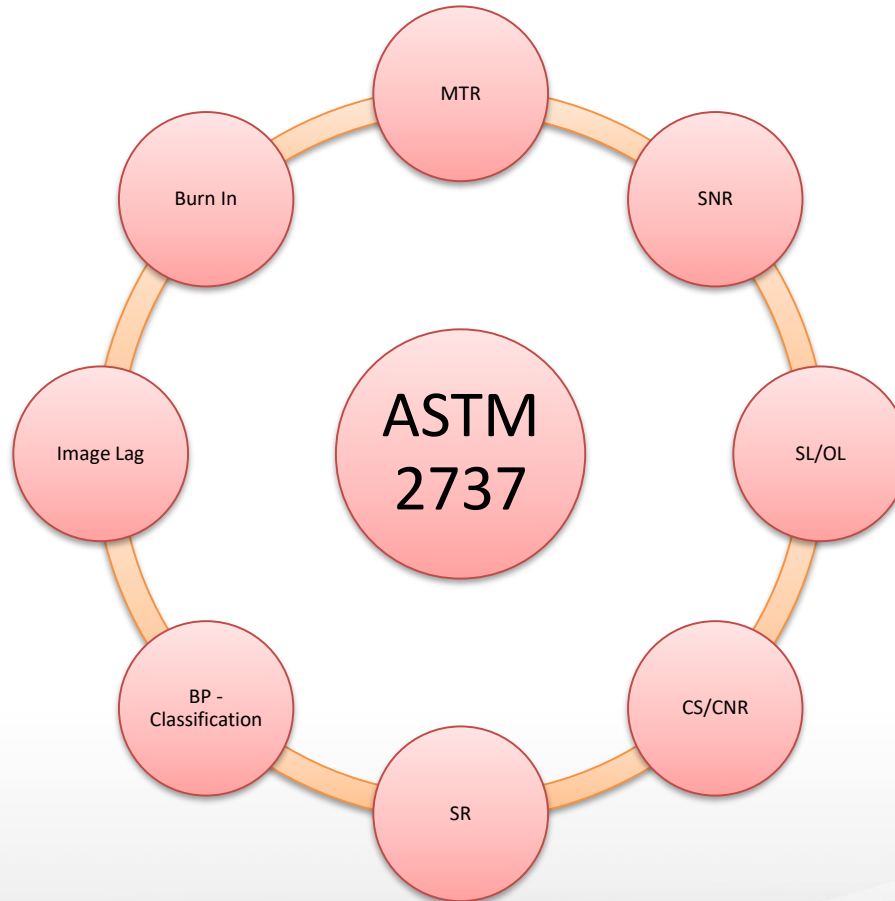
VisiConsult
X-ray Systems & Solutions



System Performance Checks



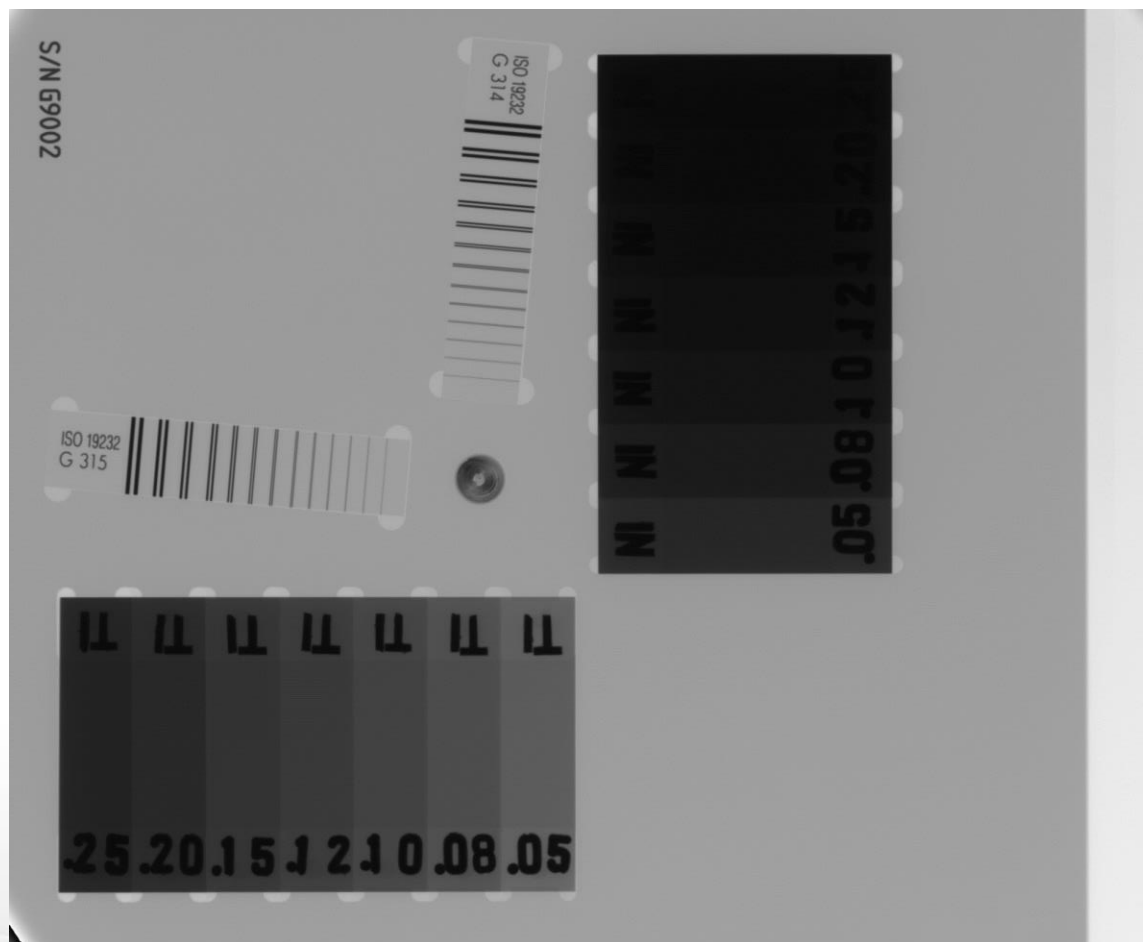
VisiConsult
X-ray Systems & Solutions



DR Phantom



VisiConsult
X-ray Systems & Solutions



Contrast Sensitivity (CS)



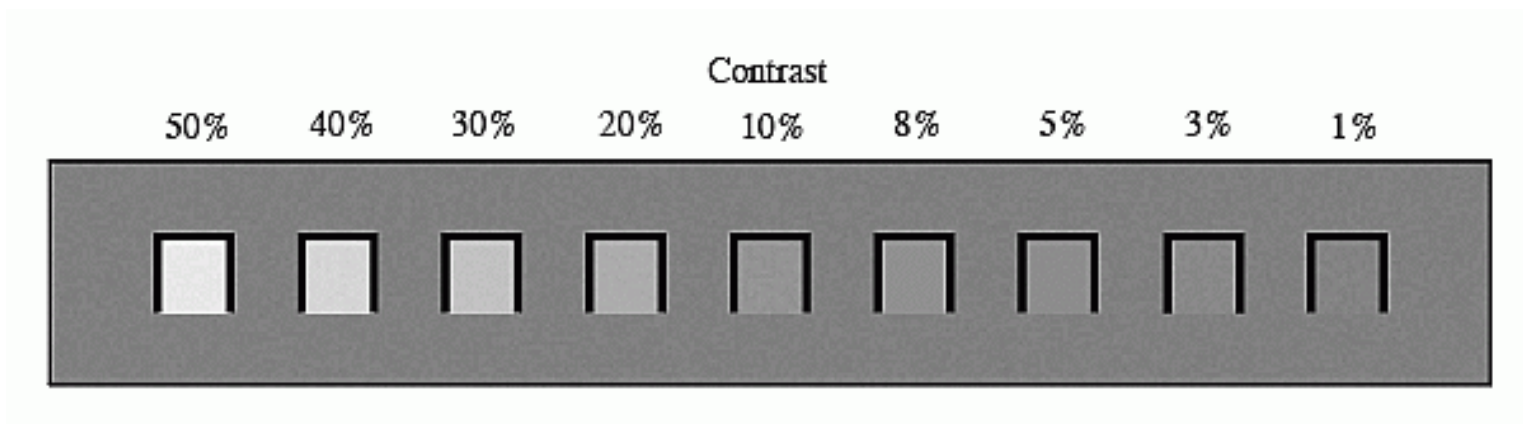
VisiConsult
X-ray Systems & Solutions



Contrast Sensitivity (CS)



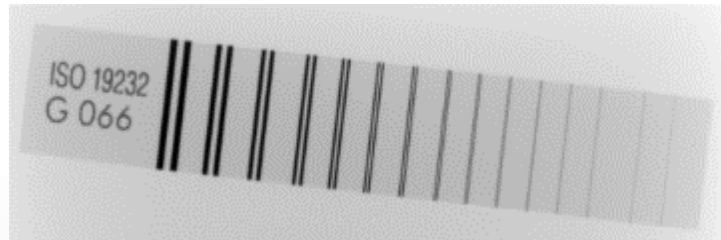
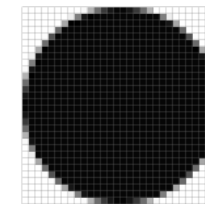
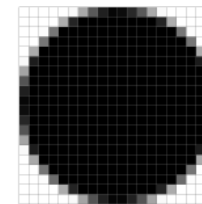
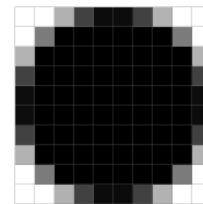
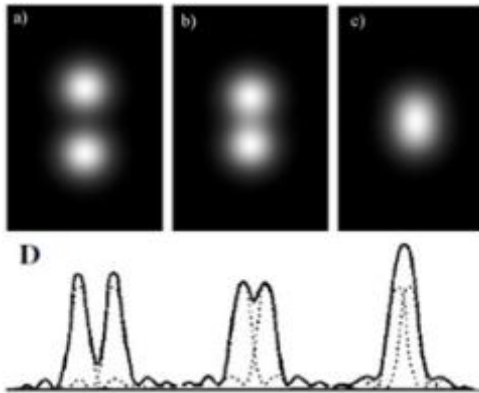
VisiConsult
X-ray Systems & Solutions



Spatial Resolution (SRb)



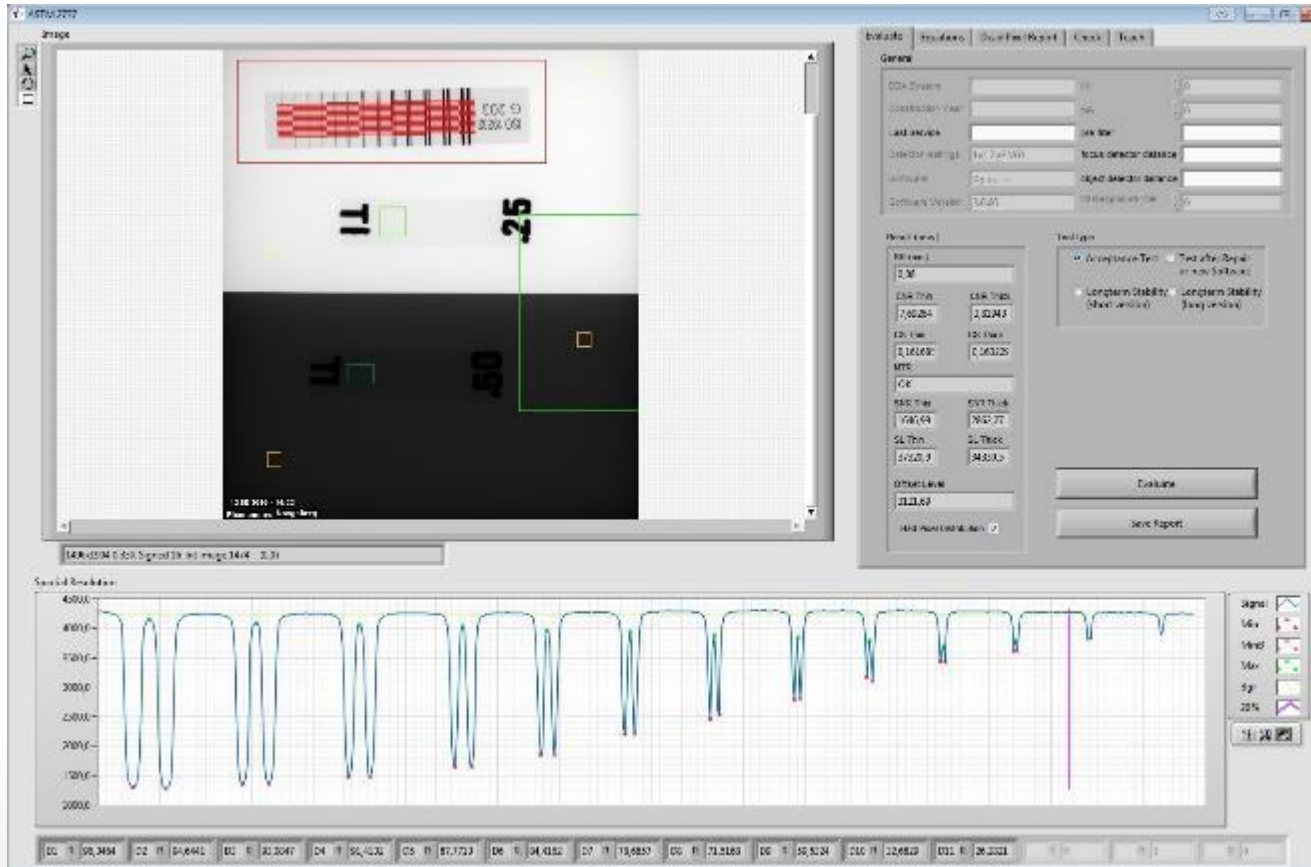
VisiConsult
X-ray Systems & Solutions



Spatial Resolution (SRb)



VisiConsult
X-ray Systems & Solutions



Signal to Noise (SNR)



VisiConsult
X-ray Systems & Solutions

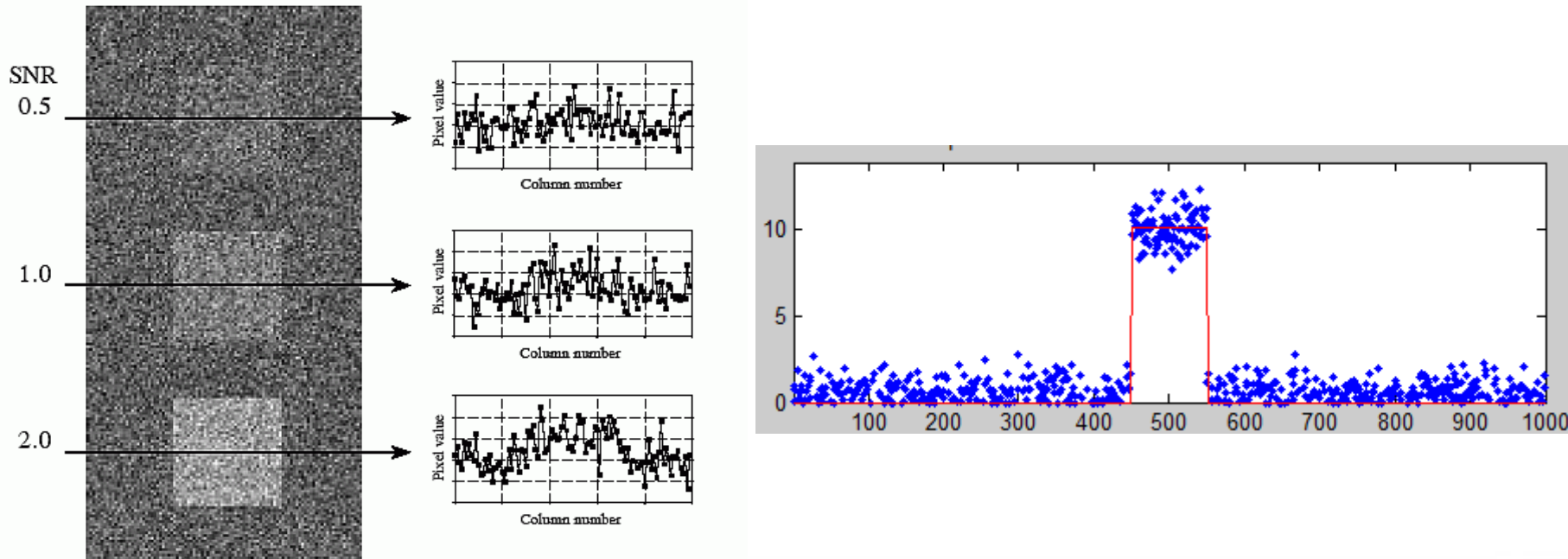


FIGURE 25-8
Minimum detectable SNR. An object is visible in an image only if its contrast is large enough to overcome the random image noise. In this example, the three squares have SNRs of 2.0, 1.0 and 0.5 (where the SNR is defined as the contrast of the object divided by the standard deviation of the noise).

Report generation



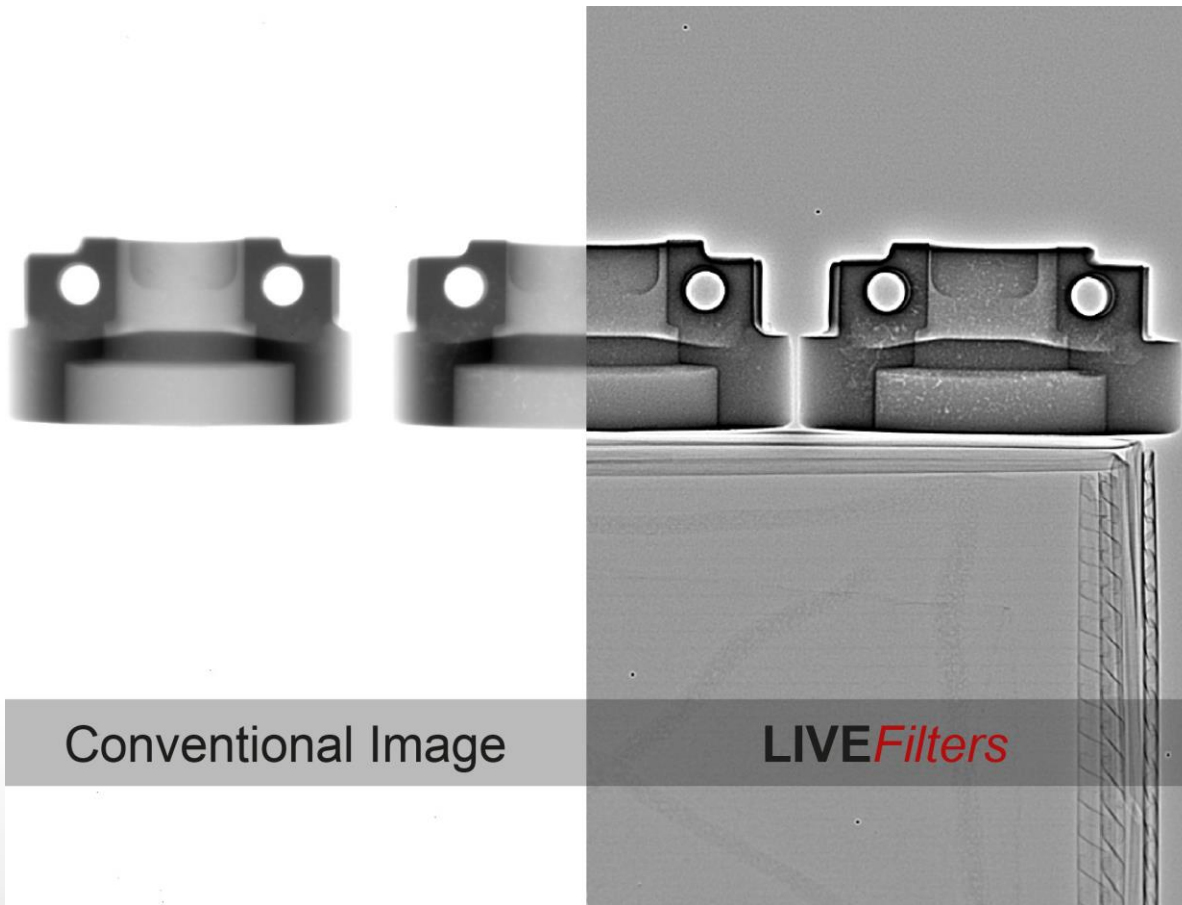
VisiConsult
X-ray Systems & Solutions

| | | | | | | | | |
|--------------------------|---|-------------------------------------|---|---------------------------|------------------------------------|---------------|-------|---------------|
| DDA System | | voltage | kV | | | | | |
| Construction Year | | tube current | mA | | | | | |
| Last Service | | pre filter (material and thickness) | | | | | | |
| Detector Settings | | focus detector distance | mm | | | | | |
| Software | | object detector distance | mm | | | | | |
| Software Version | | total exposure time per image | s | | | | | |
| Test | <input type="checkbox"/> Acceptance Test | Used IQIs | <input type="checkbox"/> 5-Groove-Wedge | Material of the used IQIs | <input type="checkbox"/> Aluminium | | | |
| | <input type="checkbox"/> Test after Repair or new Software | | <input type="checkbox"/> Duplex Plate Phantom | | <input type="checkbox"/> Titanium | | | |
| | <input type="checkbox"/> Longterm Stability (short version) | | <input type="checkbox"/> Duplex Wire IQI (EN 462-5) | | <input type="checkbox"/> CRIS | | | |
| | <input type="checkbox"/> Longterm Stability (long version) | | <input type="checkbox"/> Hole IQI | | | | | |
| | | | <input type="checkbox"/> Wire IQI (EN 462-1) | | | | | |
| | <input type="checkbox"/> no IQI required | | | | | | | |
| Tests | Unit | Result (new) | | Limit | | Result | | Remark |
| | | thin | thick | thin | thick | thin | thick | |
| Spatial Resolution | SR | µm | | | | | | |
| Contrast Sensitivity | CS | % | | | | | | |
| Material Thickness Range | MTR | mm | | | | | | |
| Signal-to-Noise Ratio | SNR | | | | | | | |
| Signal Level | SL | | | | | | | |
| Image Lag | Lag | % | | | | | | |
| Burn in | BI | % | | | | | | |
| Offset Level | OL | | | | | | | |
| Bad Pixel Distribution | | | | | | | | |
| Date of Tests | | | | | | | | |
| Conclusion | | | | | | | | |
| Operator | | | | | | | | |

Digital Filters

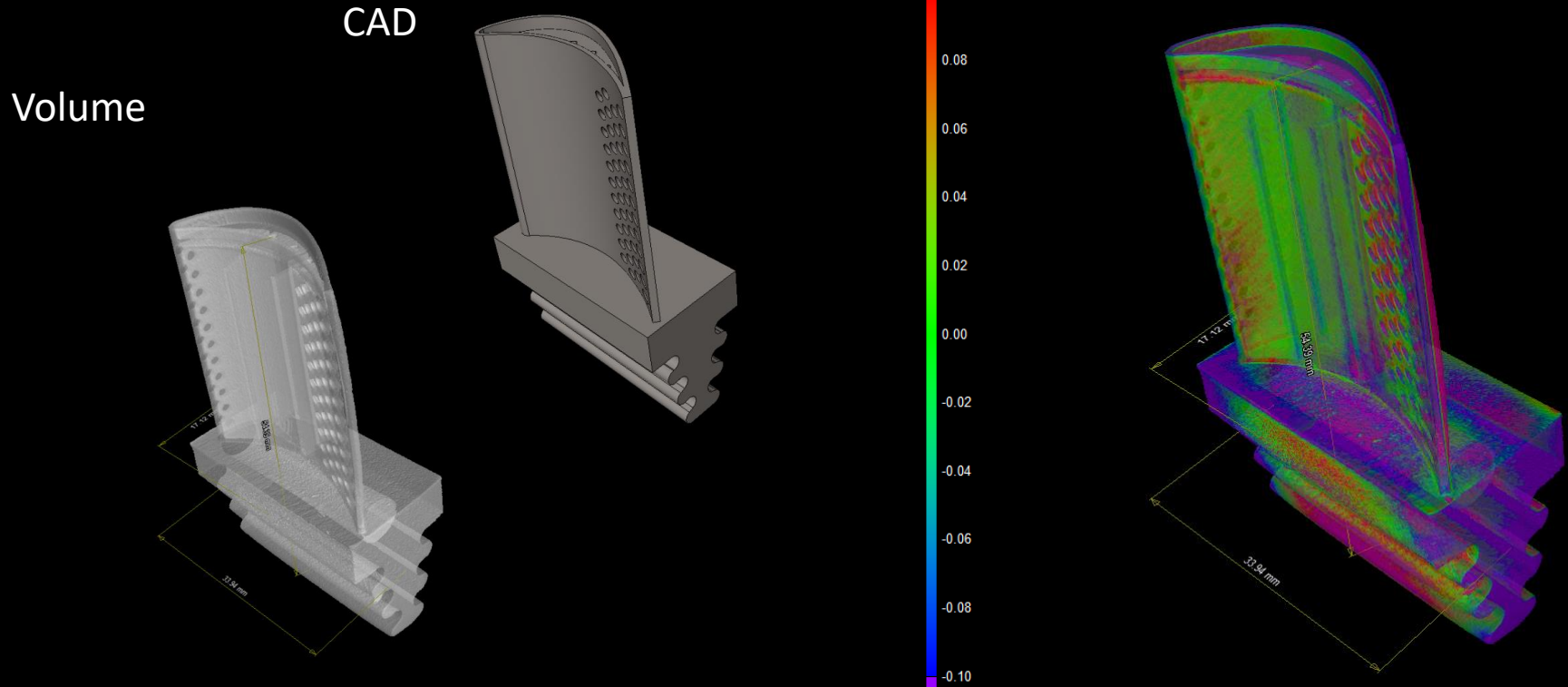


VisiConsult
X-ray Systems & Solutions



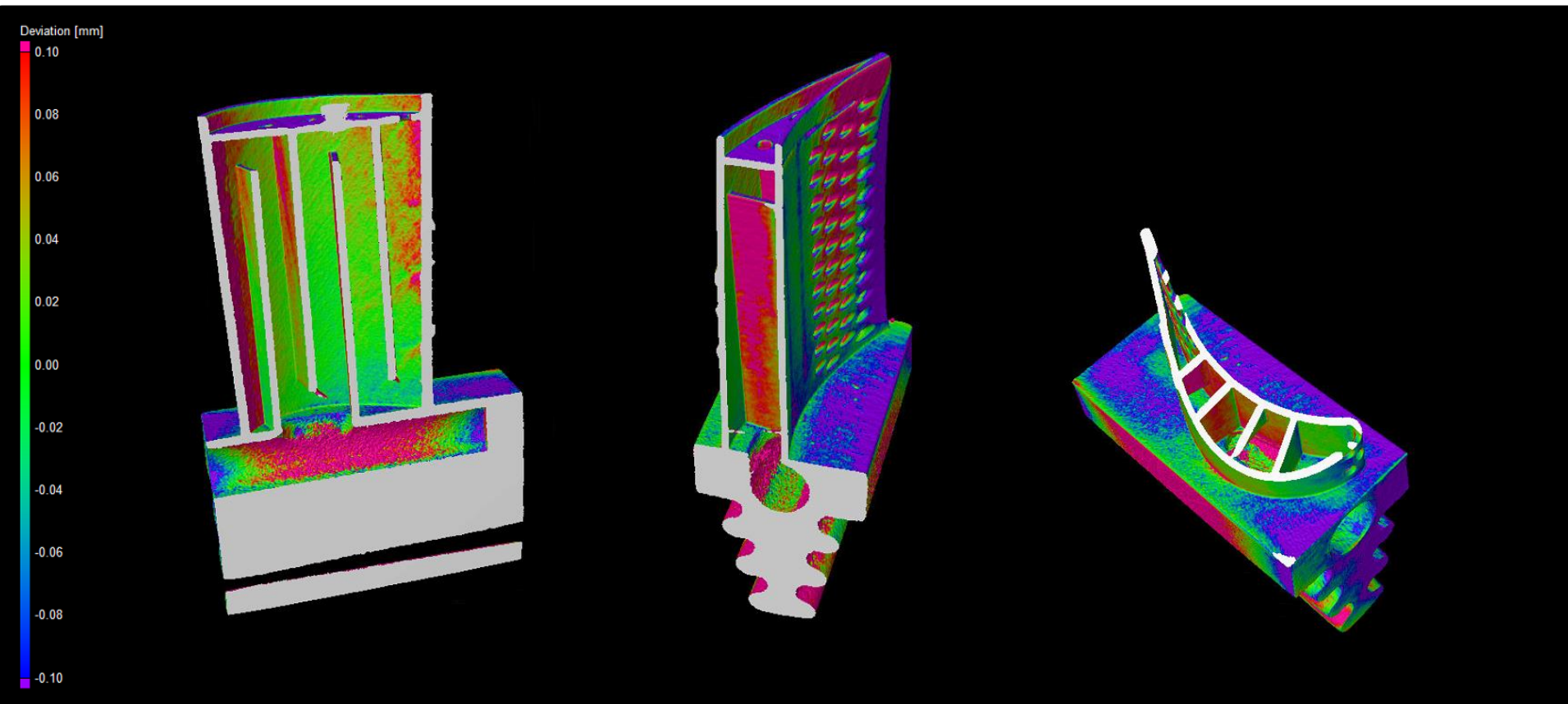
Computed Tomography (CT)

ANALYSES: Actual-nominal comparison



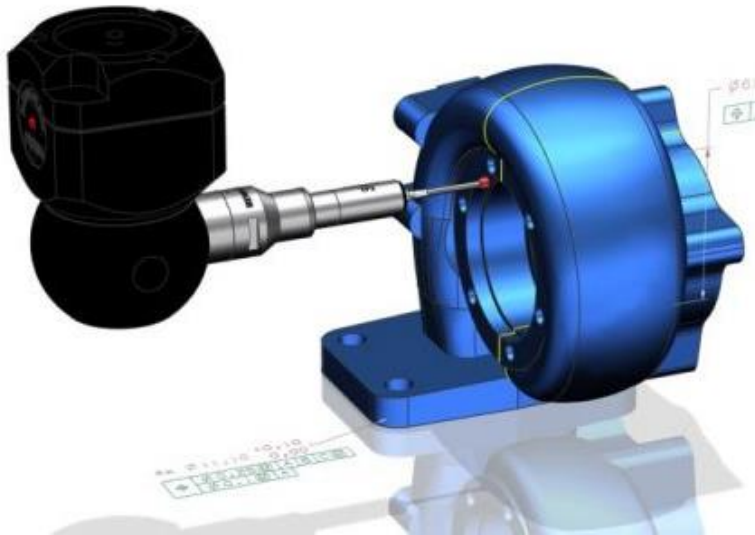
Computed Tomography (CT)

ANALYSES: clipping boxes to have a look on inner walls



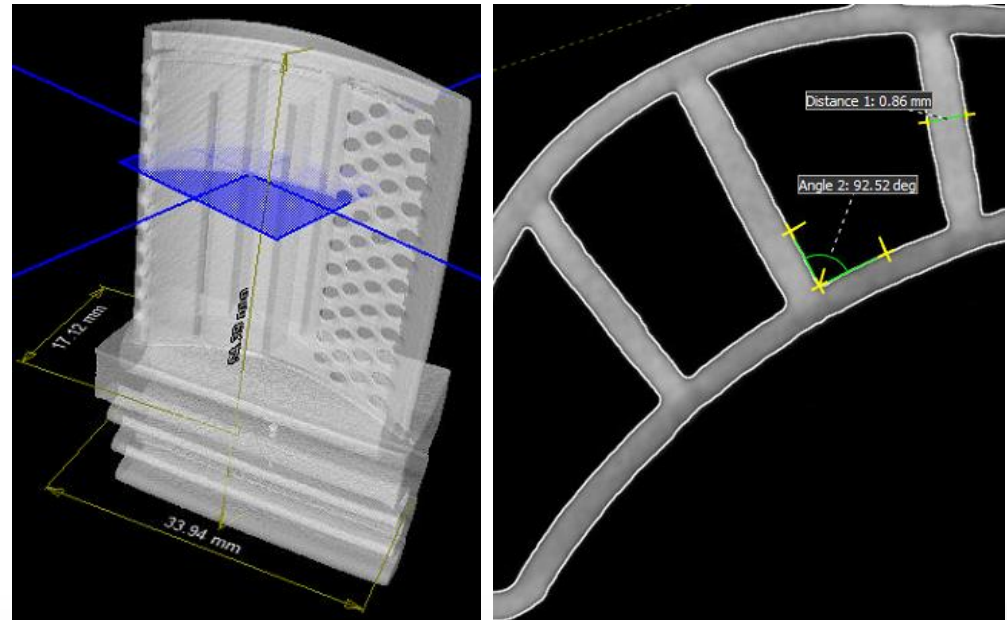
Computed Tomography (CT)

ANALYSES: dimensional measuring



<https://de.industryarena.com/conmatix/blog/cmm-inspection-voll-integriert-in-siemens-nx--3192.html>

traditional with CMM
(coordinate measuring machine)

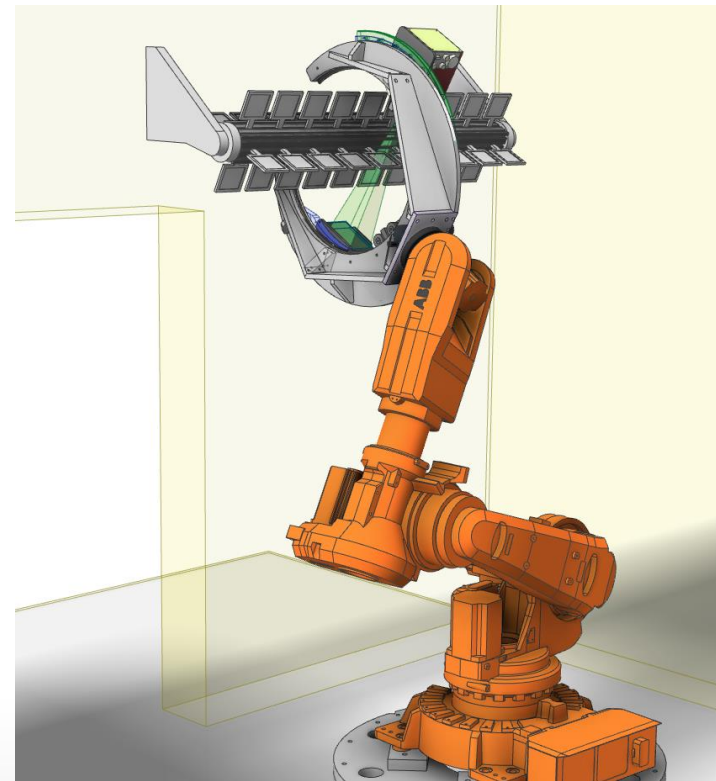
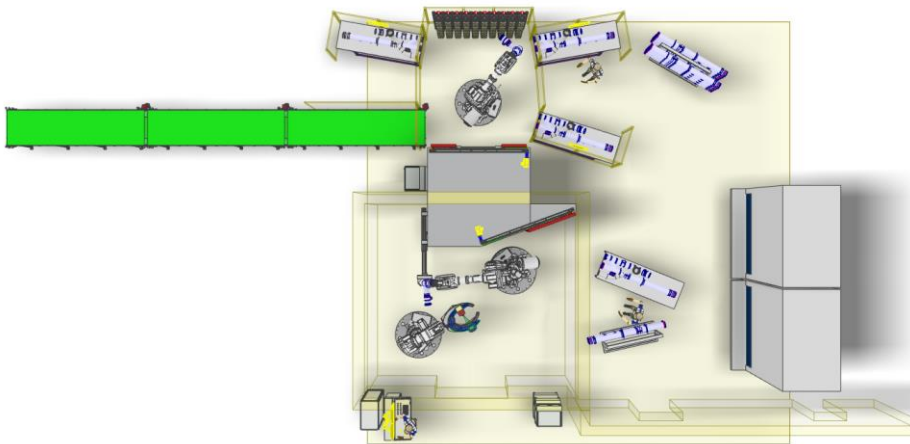
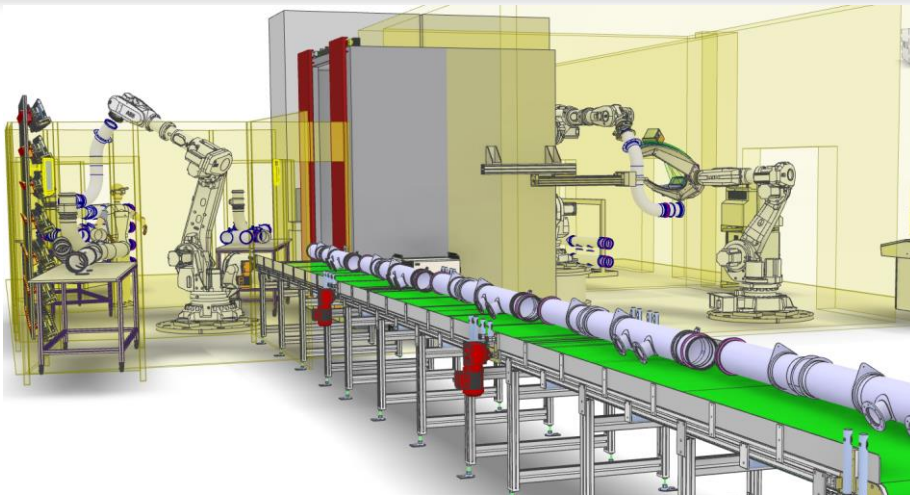


dimensional measurements in CT:
distances, angles, min/max distance ...

Automation example



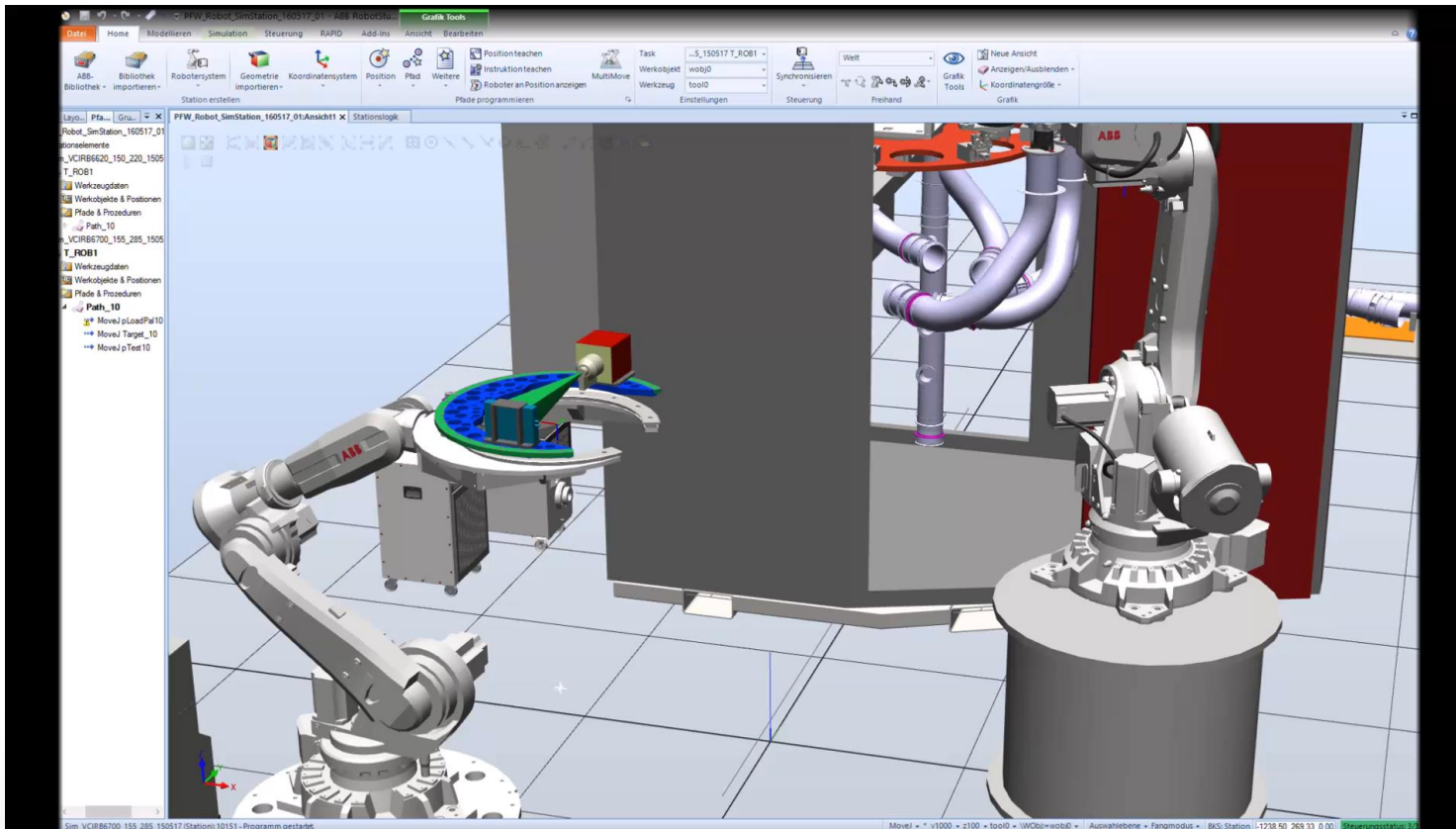
VisiConsult
X-ray Systems & Solutions



Automation example



VisiConsult
X-ray Systems & Solutions



Automation example



VisiConsult
X-ray Systems & Solutions



Thanks for your attention



VisiConsult
X-ray Systems & Solutions



General Conversion

Intuitive unit converter including distances, time, weight and many more.

Geometric Calculations

Calculate geometric / optimal magnification, unsharpness and many more within seconds.

Computed Tomography

Quick calculation of projections, required energy, geometric values and much more.

X-Ray Standards

Comprehensive overview about all X-ray ASTM and ISO standards

IQI Calculations

Overview and converter for many different Image Quality Indicators.

Formulas & Glossary

Extensive overview and explanations of common formulas and terms.



VisiConsult

X-ray Systems & Solutions GmbH

l.schulenburg@visiconsult.de