Seeing beyond

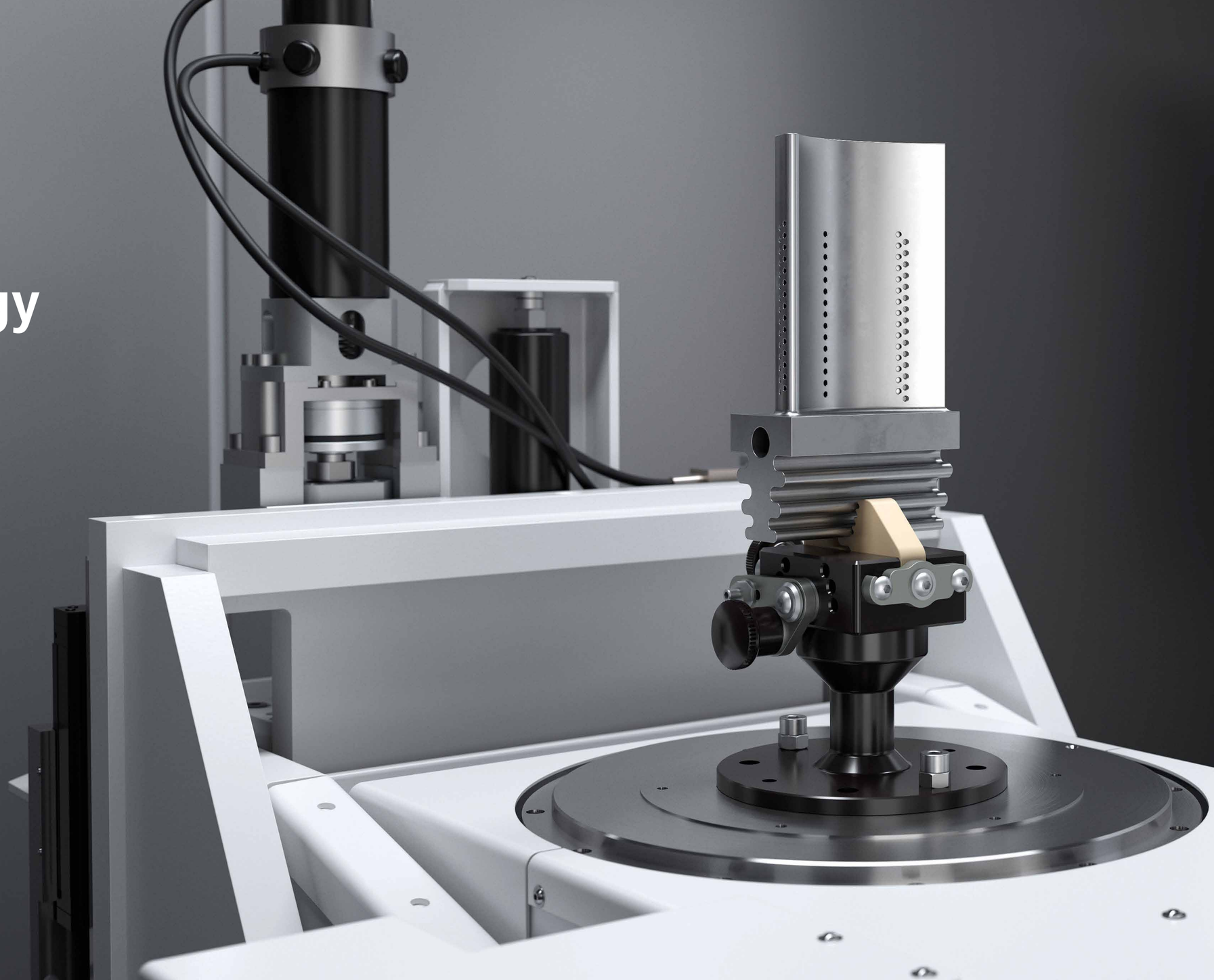
ZEISS X-Ray Series

Make the Invisible Visible

X-Ray Technology
from ZEISS

To examine things, to get to the bottom of them, to get to their core – this desire has always driven science, research, and development.

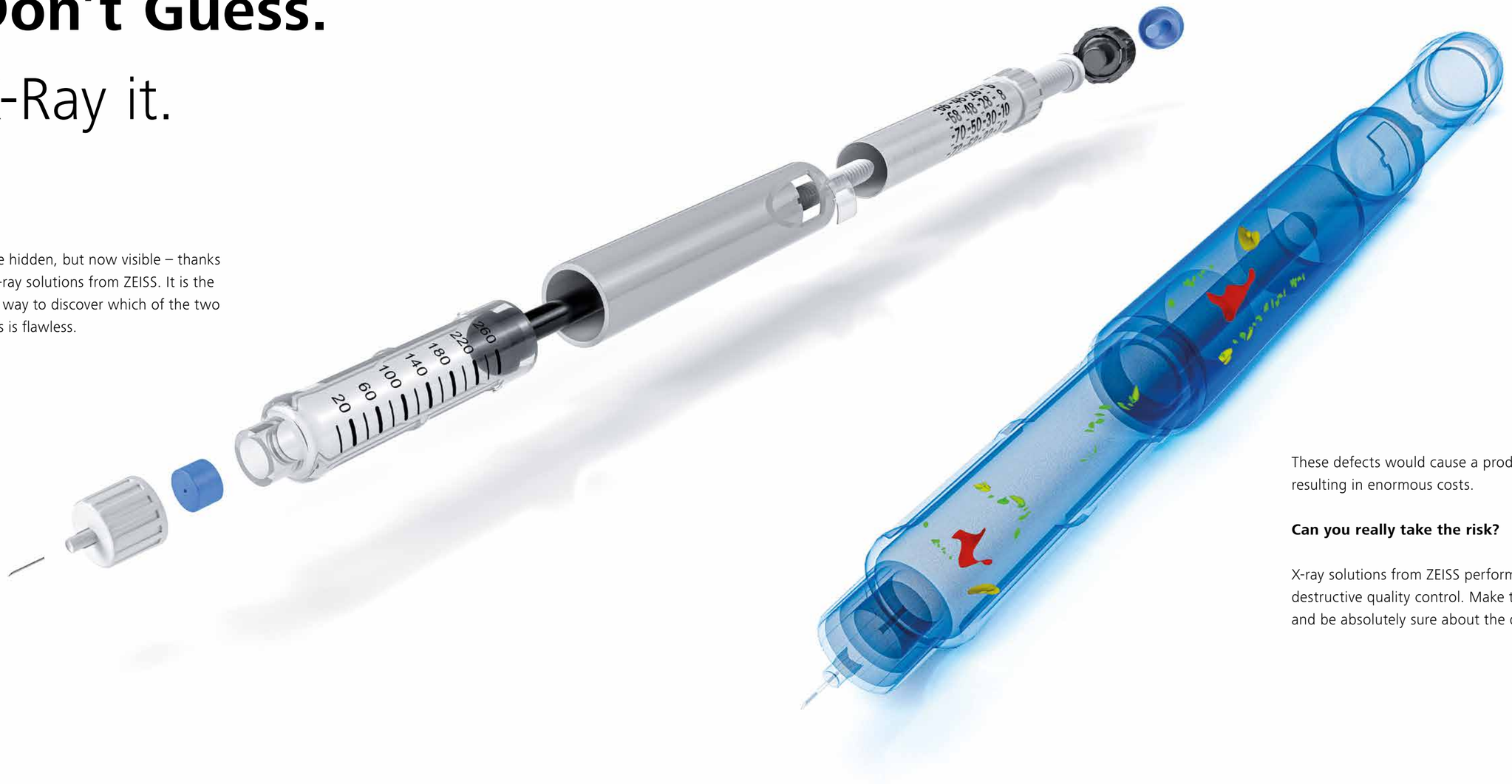
X-ray technology from ZEISS has provided perfect insights for years in these and other areas. When it comes to quality and process control, it reveals what would otherwise remain hidden from even the most watchful of eyes – without destroying the part.



Don’t Guess.

X-Ray it.

Once hidden, but now visible – thanks to X-ray solutions from ZEISS. It is the only way to discover which of the two parts is flawless.



These defects would cause a product recall, resulting in enormous costs.

Can you really take the risk?

X-ray solutions from ZEISS perform advanced, non-destructive quality control. Make the invisible visible – and be absolutely sure about the quality of your parts.

Reveal the Hidden Secrets of your Part

X-Ray Technology Provides Completely New Insights into the Invisible

You can capture, analyze, measure, and inspect internal structures quickly and non-destructively.

Warpage
All of the parts are finished, but they do not fit together, because they are warped? It is better to measure the internal and external structures during production and intervene early in the manufacturing process. This cuts costs.

Cavities
Vacuum build-up during the cooling process can greatly reduce the quality of the part. If cavities are not detected, this may lead to cracks in the parts under load.

Residuals
Residuals such as sand from casting molds or metal powder for 3D printing can be detected quickly and easily in just one scan.

Pores
Pores may form if the temperature is not ideal during casting. Depending on the size, position, and number of air inclusions, this defect weakens the material and may cause functional impairments.

Inclusions
Inclusions of slag, oxides, sand, steel or tungsten can be a problem during further processing or cause cracks.

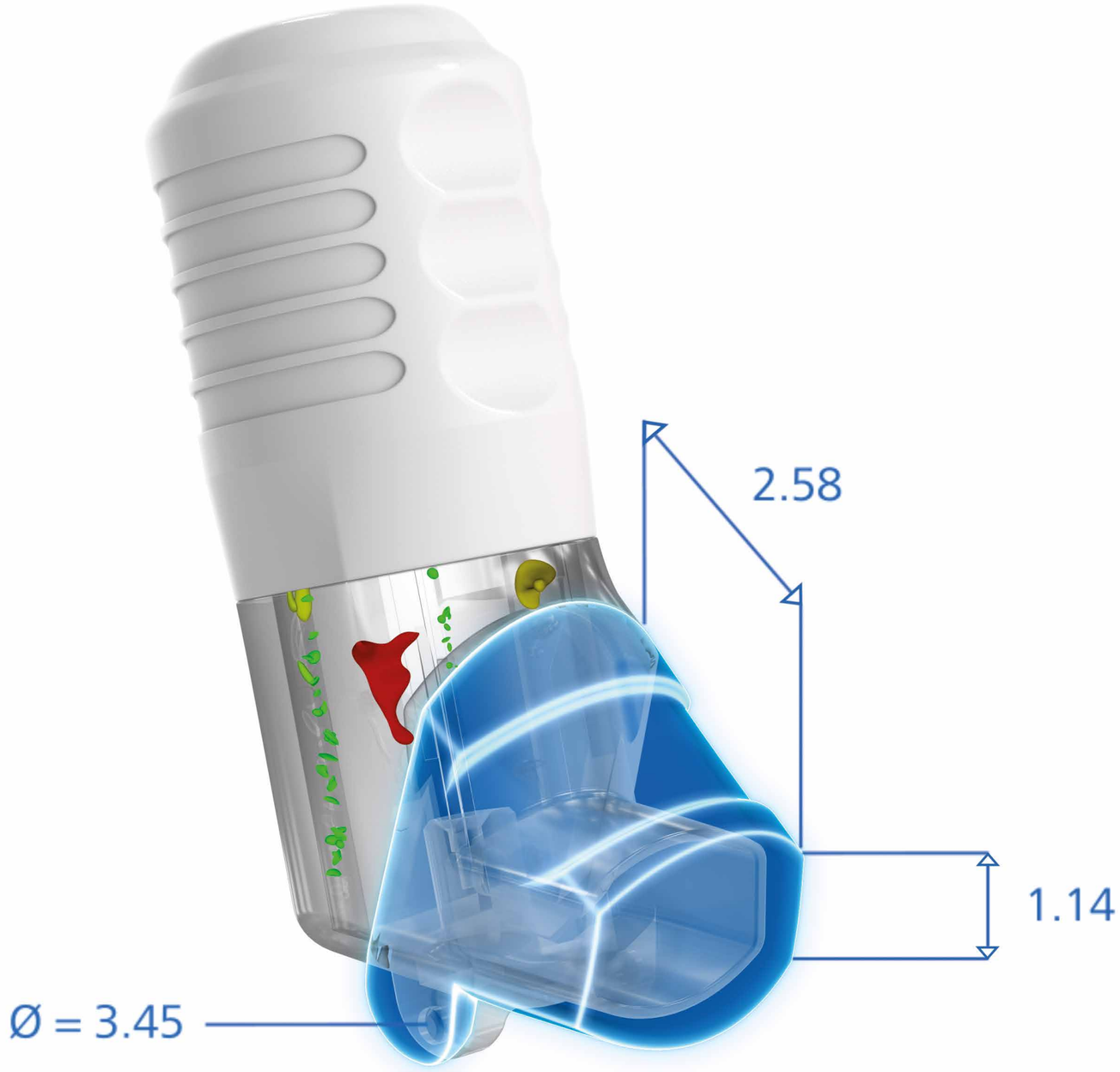
Cracks
What was initially just a small crack can develop into a major problem under stress. Cracks in the material can have an enormous effect on the stability of the part. This can become a risk, especially with safety-relevant components.

FACTS

Technology with Benefits

It is self-evident that X-ray technology makes hidden things visible. However, the fact that this opens up completely new possibilities in quality assurance and results in significant added value for the customer is less well-known. Let us explain this to you.

- One scan – full certainty: Measure, analyze, and inspect hidden defects and inner structures that cannot be detected with coordinate measuring machines.
- Thanks to X-ray, you can cut parts non-destructively and look inside.
- No more complex fixturing. This saves time and money.
- By scanning all internal and external structures with computed tomography systems (CT), parts can be reproduced even if no CAD model is available.



FIGURES

An Investment that Pays Off

Amortized after 12 months

A thorough inspection right after the casting process is important when producing aluminum castings. Companies face high costs if defects are not detected until later in production. This is why investing in an automated inline solution for quality assurance pays off in less than 12 months.

30-70% faster tool correction

Producing tools and molds is very costly, because it usually requires several iteration loops until tools are optimally adjusted and molds are perfectly formed. This process can be improved and shortened by 30-70% by capturing all structures in a 3D model with CT and the software ZEISS REVERSE ENGINEERING (ZRE). Thus, costs of tools can be significantly reduced.

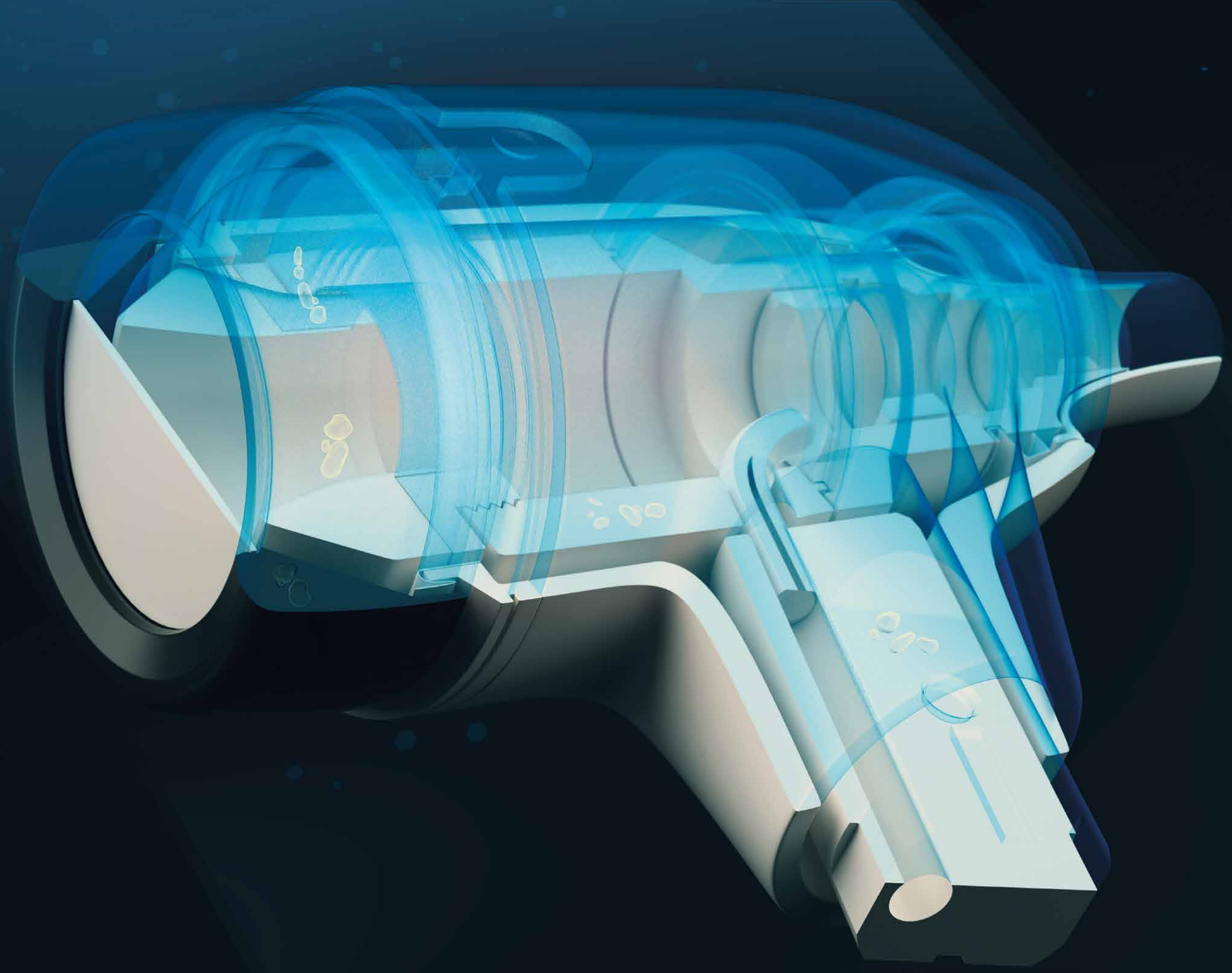
Reduce setup times by up to 80%

The setup table ZEISS FixAssist® CT will help you maximize the use of your CT and make your quality assurance processes more efficient. This accessory can reduce setup times by up to 80%. Even better: Your investment will pay for itself in less than four months!

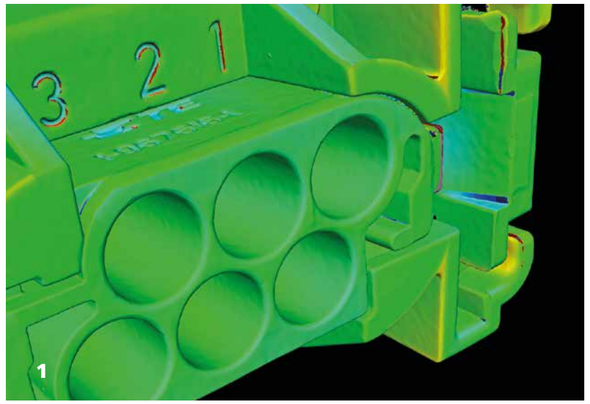
APPLICATIONS

Take a Close Look at Every Detail

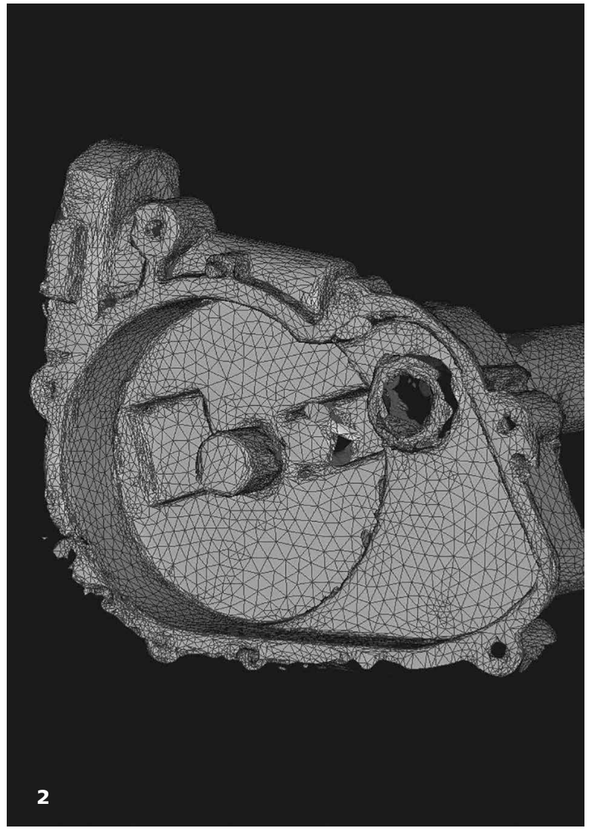
Automotive, aerospace, medical technology, electronics, consumer goods – each industry has its own manufacturing processes, along with different potential defects that are normally hidden from the eye. X-raying casted, moulded or printed parts open up completely new potential applications – from inspecting internal defects and the dimensional measuring of internal structures to structural material analysis.



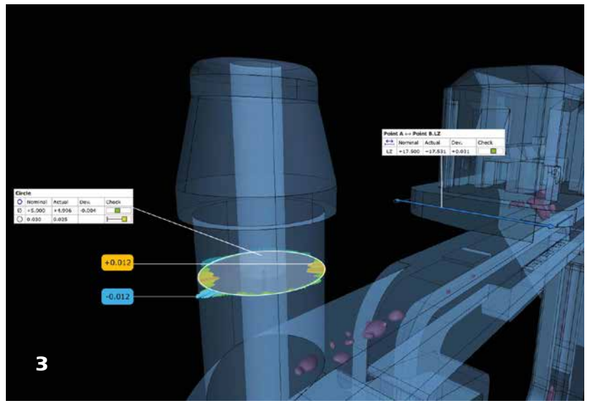
Applications
Metrology



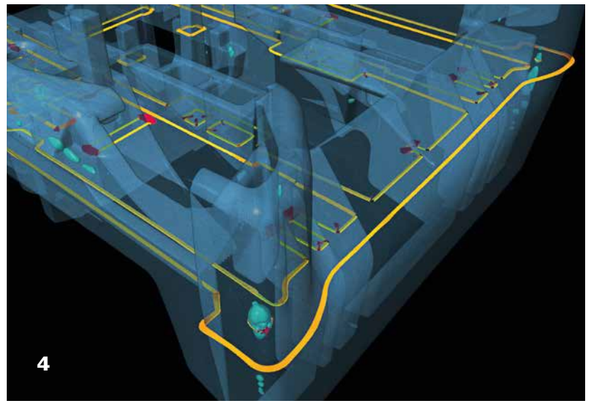
1 – Nominal/actual comparison
Deviations from the CAD model or master part are visualized in a color comparison.



2 – Development & Reverse Engineering
You can easily create CAD models from 3D volume data – significantly accelerating product development and reverse engineering processes.

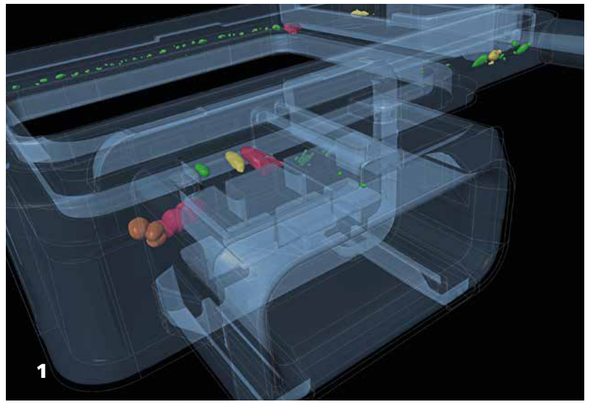


3 – Dimensional control
Thanks to computed tomography, the dimensional accuracy of complex internal and external features can be checked in just one scan.



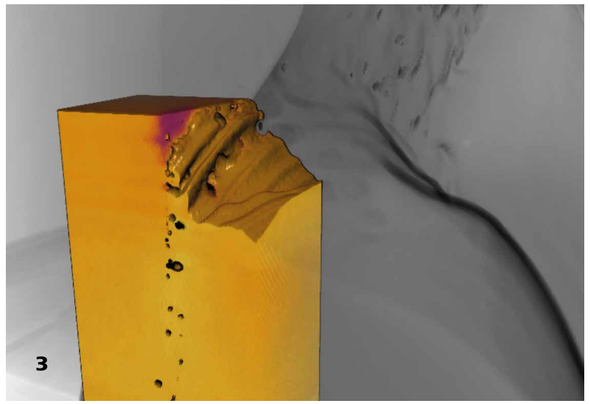
4 – Wall thickness analysis
A color-coded representation shows the wall thickness of internal structures.

Applications
Inspection

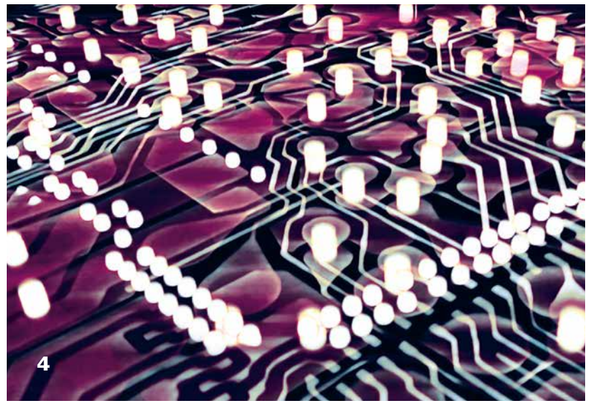


1 – Defect analysis
You can detect cavities, pores, cracks and other defects quickly and easily.

2 – Assembly control
Assembled parts are checked for function and fit.

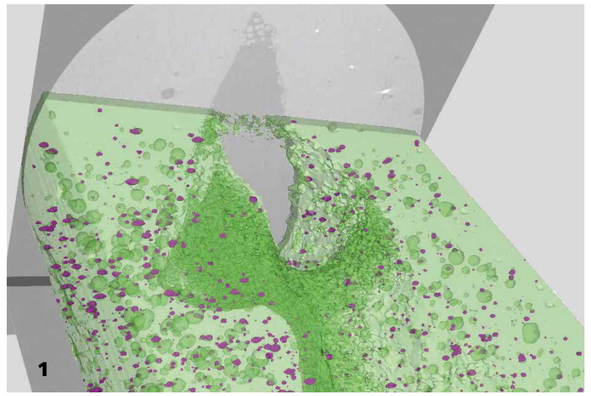


3 – Joining technology control
In just one scan you can see whether welded, soldered, glued or riveted joints are really flawless.

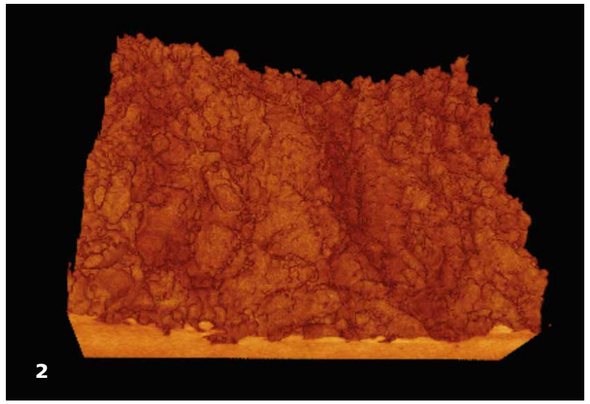


4 – Electronic testing
Defects quickly become visible when electronic parts, e.g. circuit boards or batteries, are X-rayed.

Applications
Analysis

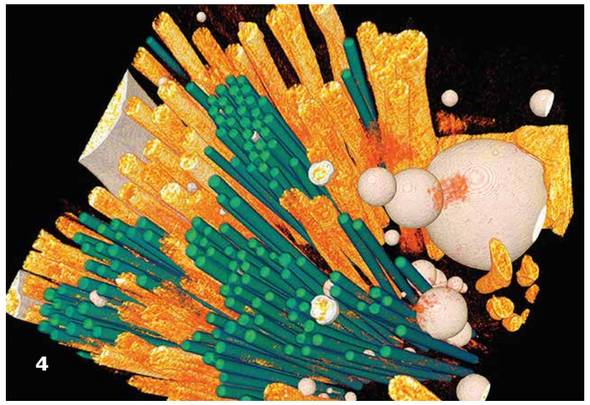


1 – Structural analysis
A 3D structure characterization provides important insights thanks to high-resolution X-ray microscopy.

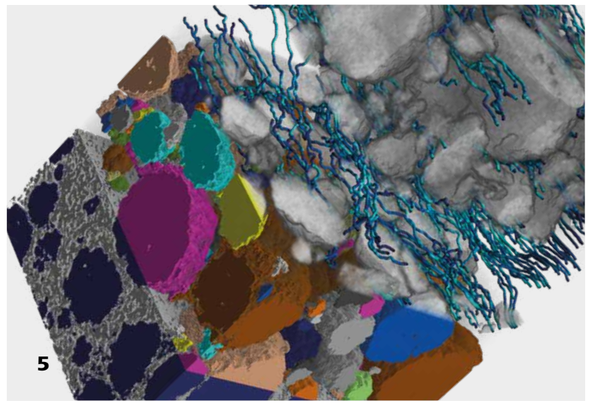


2 – Roughness analysis
Surface roughness can be analyzed for both external and internal structures.

3 – In-situ & 4D analysis
With in-situ and 4D analyses, the behavior of materials under external influences and over time can be analyzed.



4 – Fiber composite analysis
Analyzing fiber composites visualizes the 3D distribution and orientation of different elements within a composite material.



5 – Analysis of grain size & distribution
Grain size and distribution are decisive factors in determining the hardness and strength. This is why it is important to analyze them.

Your Need
Our X-Ray Solutions

The industrial use of X-ray technology offers a significant advantage: The digitization of complex parts also includes the inner geometries in finest detail. 2D and 3D X-ray technology is characterized by high efficiency due to the simultaneous inspection of many components.

ZEISS X-Ray Series

Applications

Every industry and application has its challenges that need to be mastered.

As a long-time expert in X-ray technology, we are familiar with your problems and can support you with our expertise and solutions.

SYSTEMS

Be it precise measurement, fast inspection or analysis down to the nanometer scale, ZEISS has the right solution for your application – with high-precision CTs, automated 2D and 3D X-ray systems, and high-resolution 3D X-ray microscopes.

SERVICES

You can even X-ray your parts without your own X-ray system – by using the X-ray scanning service at the ZEISS Quality Excellence Centers. Reap the benefits of ZEISS X-Ray Series and see for yourself without taking any risk.

SOFTWARE

Software solutions from ZEISS support data acquisition and reconstruction, relying on leading image enhancement algorithms including correction for mixed materials. The software evaluation software combines powerful volume features with innovative measurement tools. Defects can be automatically detected based on Artificial Intelligence. All results are displayed and analyzed in one report.

ACCESSORIES

We offer a number of additional options to ensure that you get the most out of your hardware solutions. With ZEISS FixAssist® CT, for example, you can reduce setup times by up to 80%. This makes you even more productive.

ZEISS X-Ray Systems at a Glance

LAB - INSPECTION, METROLOGY & ANALYSIS

ZEISS METROTOM
High-precision metrology & inspection

METROTOM 1 (HR)
METROTOM 800 130 kV
METROTOM 6 scout
METROTOM 800 225 kV (HR)
METROTOM 1500

ZEISS Xradia
High-resolution analysis & inspection

Xradia 800 & 810 Ultra
Xradia 610 & 620 Versa
Xradia 510 Versa
Xradia 410 Versa
Xradia Context microCT

PRODUCTION LINE - INSPECTION & METROLOGY

ZEISS VoluMax
Fast & automated 3D inspection & metrology

VoluMax 400
VoluMax 800 130 kV
VoluMax 800 225 kV
VoluMax F1500
VoluMax F1500 thunder
VoluMax 9 flash
VoluMax 9 titan

ZEISS BOSELLO
Fast & automated 2D inspection

BOSELLO MAX
BOSELLO OMNIA
BOSELLO WRE thunder
BOSELLO HEX

For more information please visit:
www.zeiss.com/metrology/x-ray

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Subject to change in design and scope of delivery and as a result of ongoing technical development.