diondo
x-ray systems and services

diondo Systems

Industrial Computed Tomography and X-Ray Systems

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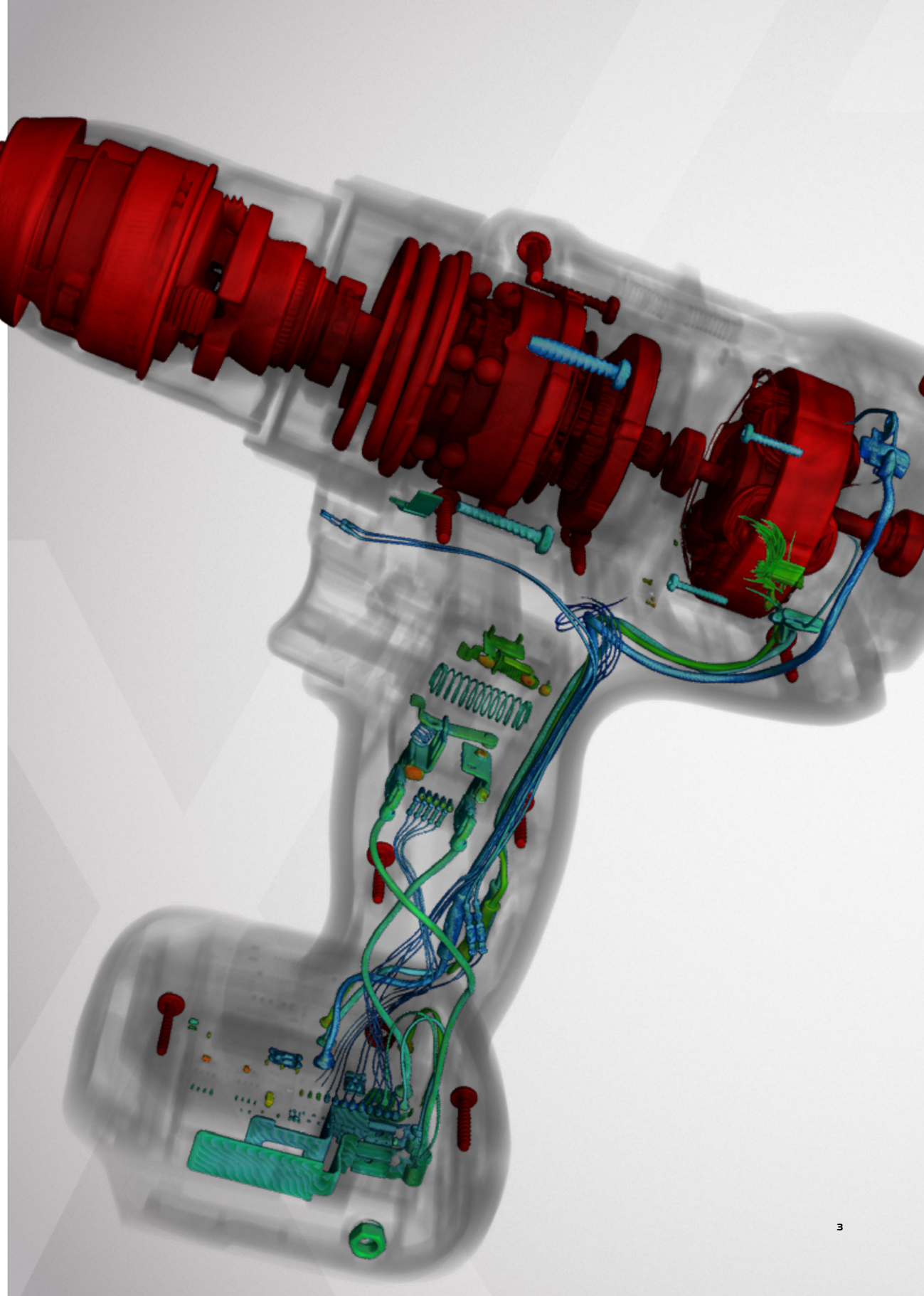


Our evo-series was specially developed to get you started in X-ray computed tomography. The simple user interface eliminates operator errors from the outset. The low price point minimizes your entry risk while our maintenance free concept reduces your recurring costs to zero.

evo systems are based on a precision-engineered steel construction for advanced scanning accuracy and low total weight loading. With a large inspection area in a small footprint, we create flexibility for your tasks while fitting into the smallest labs.

Entry into the World of Industrial Computed Tomography

diondo evo systems

Entry Level Models

evo 03

User-friendly
Basic CT System

evo 05

User-friendly
Micro CT System

	evo 03	evo 05
Sample Size	●○○○○	●●●○○
Sample Density	●○○○○	●●●○○
Resolution	●○○○○	●●●●○
Flexibility	●○○○○	●●●●○

diondo evo 03

User-friendly CT System for Basic Measurement & Inspection Tasks

Sample Size	
Sample Density	
Resolution	
Flexibility	

X-Ray Source	120 [kV]
Source Type	Maintenance Free
Focus Detector Distance	750 [mm]
Detector	FDP
Scan Volume, maximal	Ø 140 x 120 H [mm]
Sample Weight	5 [kg]

diondo evo$_{03}$

User-friendly CT System for Basic Measurement & Inspection Tasks

The innovative **evo$_{03}$** CT System offers intuitive operation that is safe and reliable even for users with little experience. By focussing on the essential functions and pre-selected parameters, efficient use is made possible. The system is characterised by an excellent price-performance ratio and enables a fast return on investment. It is maintenance-free and therefore ideal for long-term use. With its help, you can enter the world of computed tomography and carry out a wide range of analyses.

The versatile **evo$_{03}$** CT System offers a wide range of applications, making it an indispensable tool in various industries. It is ideal for the assembly inspection of complex assemblies, ensures precise void and inclusion analysis of injection moulded parts and easily meets the requirements of even simple measurement tasks. The flexibility of the system allows it to be used in a wide range of industries, including plastics, automotive, pharmaceutical, and electrical, ensuring that quality standards are met at all times. With the **evo$_{03}$** CT System, you can ensure the integrity of your products and optimise your manufacturing processes.

Discover the advantages of our inspection system, which has been reduced to the essentials to make your work easier and better.

Highlights

+ **Return on Investment**

  Outstanding price-performance ratio for a fast return on investment

+ **Compactness**

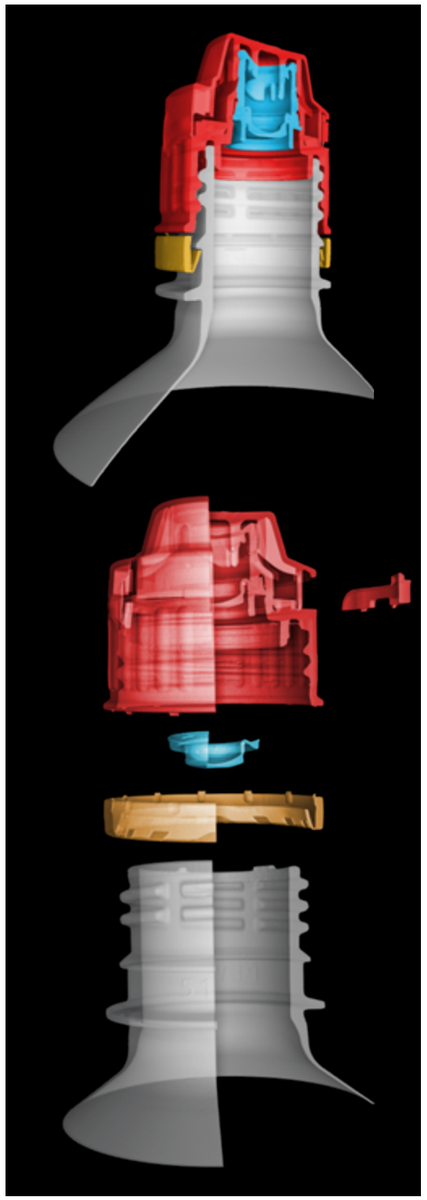
  The ability to move them through normal office doors and the simple power supply via a standard 220 volt socket means they can be used efficiently in almost any room.

+ **Ease of use**

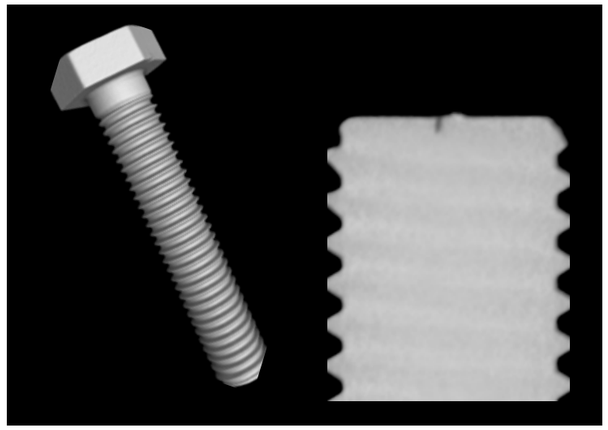
  Intuitive operation that is safe and reliable even for users with little experience

Applications

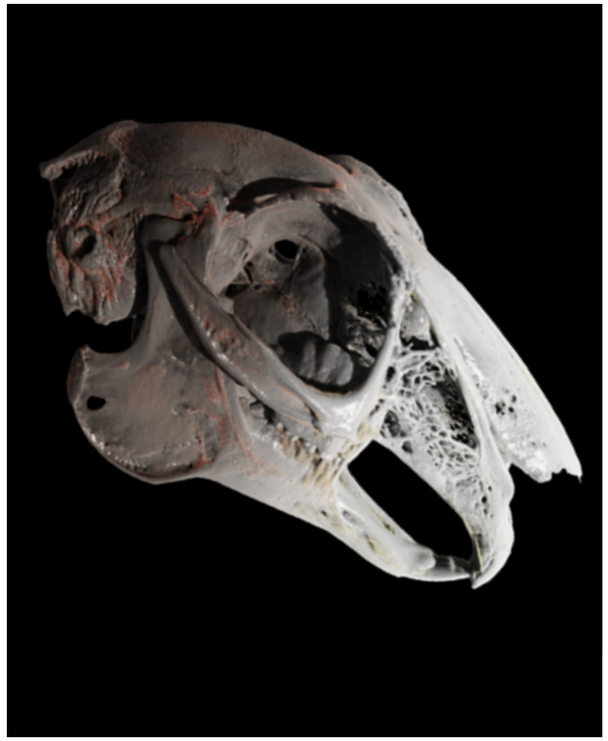
Wide Range of Application Possibilities



Assembly test of a plastic bottle cap



CT scan of a screw



CT scan of a skull brown hare

evo 03

Technical Data

X-ray Tube	120 [kV]
Scan Volume	Ø 100 x 120 H [mm]
Resolution	56 [µm]
System Dimensions	1260 x 870 x 1640 [mm]
System Weight	1290 [kg]
System Connection	230 [V]

diondo evo 05

User-friendly CT System for Versatile Measurement & Inspection Tasks

Sample Size

Sample Density

Resolution

Flexibility

X-Ray Source	150 [kV]
Source Type	Micro Focus
Focus Detector Distance	650 [mm]
Detector	FDP
Scan Volume, maximal	Ø 230 x 160 H [mm]
Sample Weight	5 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

diondo evo$_{05}$

User-friendly CT System for Versatile Measurement & Inspection Tasks

The **evo$_{05}$** was designed as a universal system for imaging small to medium-sized objects. With 3 motorized axes and a wide magnification range, the system is fully equipped. Its detector is equally outstanding: with 3K resolution and 17“ size, it brings upper-class performance to your inspection lab.
A 150 kV source enables a wide range of applications: from plastics and organic samples to composite materials and light alloys.

Versatility
Variable magnification and sample height:
The evo 05 adapts to your test objects, giving you flexibility. Motorized axes make it easier to position objects and focus on the sample.

Return on Investment
The entire system is designed to be maintenance-free over its entire service life - no annual service costs for you!

Ease of use
The design and workflows in the software are tightly matched to each other and guide you quickly and easily to the result.

Highlights

+ **Outstanding Detector**

  Its detector is equally outstanding: with 3K resolution and 17" size, it brings class-leading performance to your lab.

+ **Powerful X-Ray Source**

  A 150 kV microfocus source enables the scanning of a wide range of samples: from plastics and organics to composite materials and light alloys.

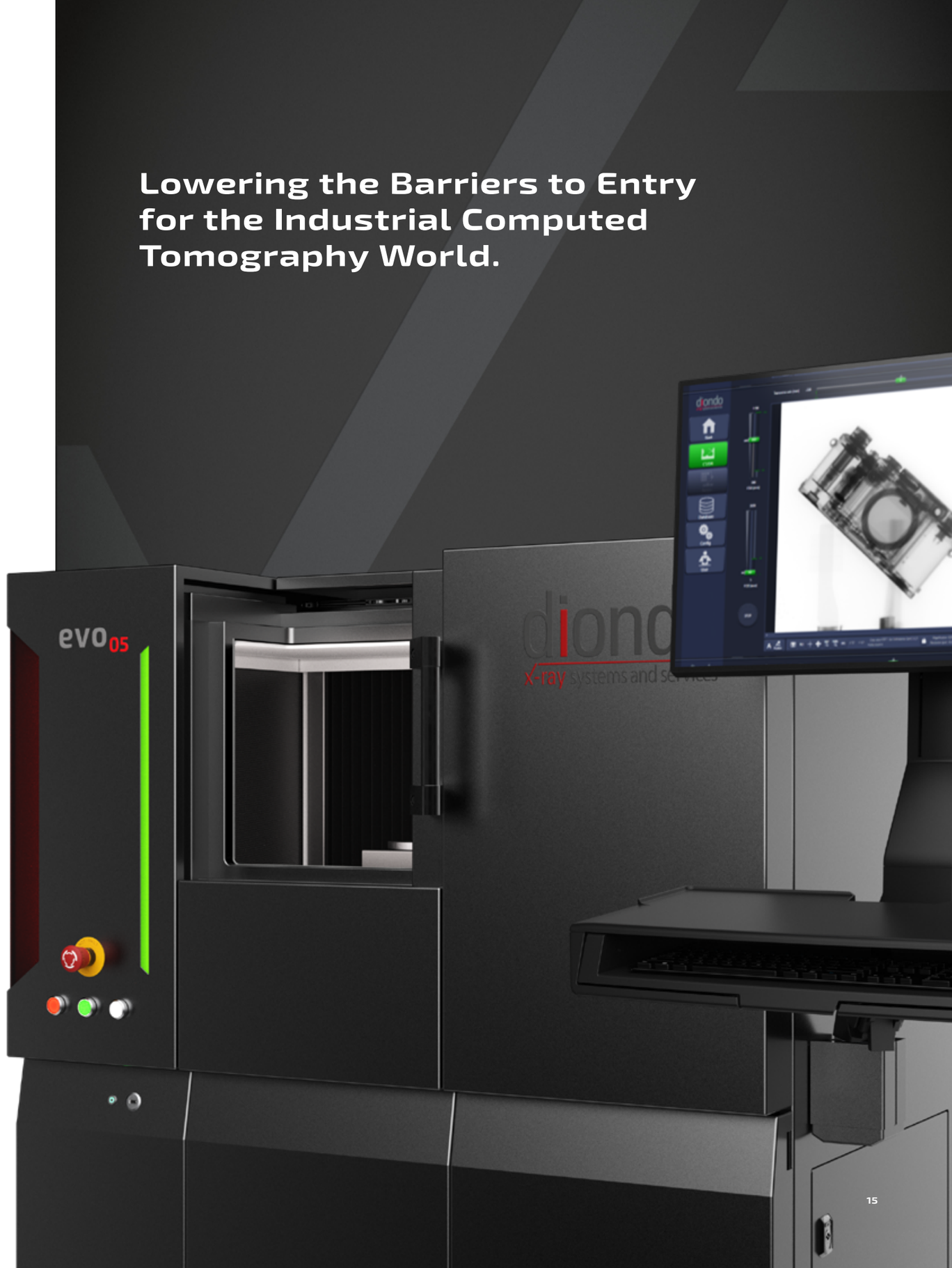
+ **Compactness**

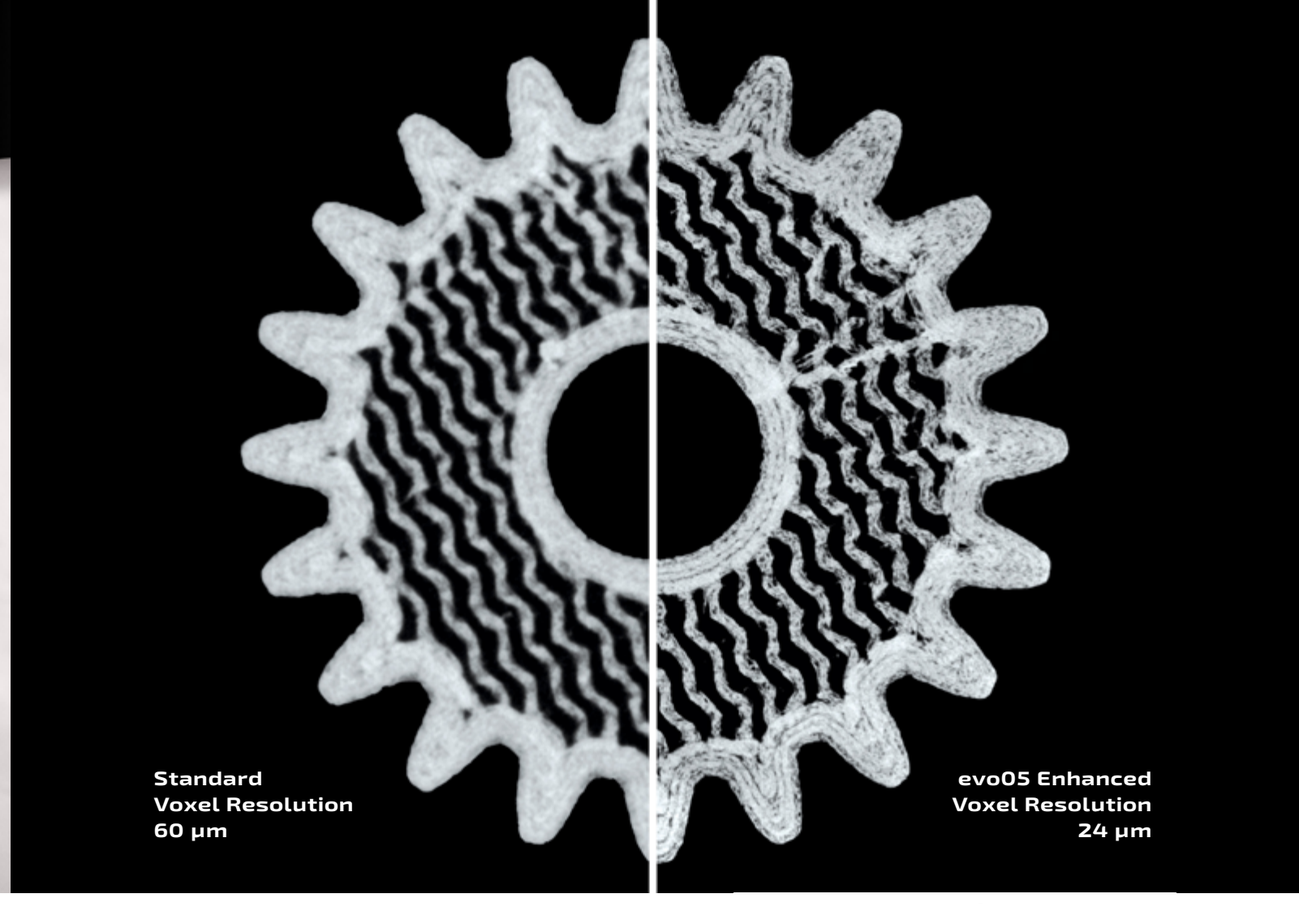
  The system is the smallest in our product family with a footprint of 1.1 m² and can therefore easily also be positioned in smaller rooms, laboratories or directly next to production equipment.

+ **Complete Multiple Inspection Tasks in a Single Scan**

  You can digitalize complex surfaces, perform dimensionally accurate reverse engineering, or effortlessly take a look inside.

Lowering the Barriers to Entry for the Industrial Computed Tomography World.





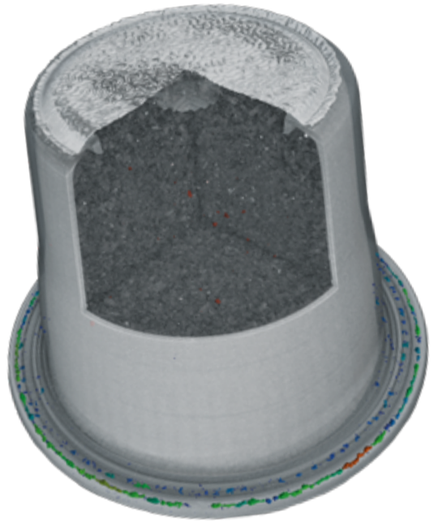
Resolution comparison of an AM geer wheel

High Resolution and High Throughput in a Single Device

Maximal Resolution or Throughput - The Choice is Yours

Thanks to its variable magnification axis, the **evo**$_{05}$ gives you the choice: either scan individual objects with maximum resolution or inspect numerous samples at the same time.
Thanks to its unique full frame detector, fully loaded sample holders fit into the X-ray cabinet and are time-efficiently digitized in a single scan.

There is plenty of space for a variety of mounting fixtures on the sturdy turntable: diondo stacking towers and customised printed test part holders are also part of our product portfolio.



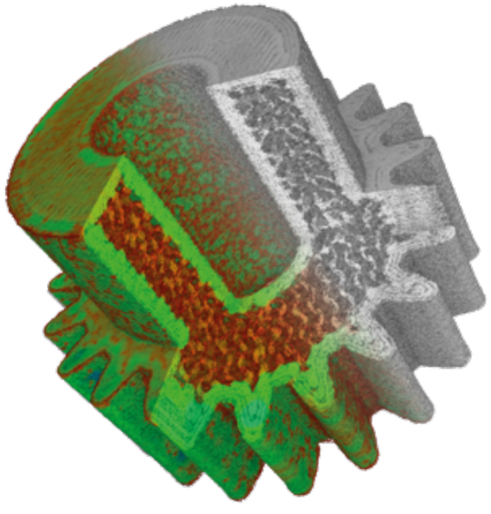
CT scan of a coffee capsule

Metallic Components / Additive Manufacturing

Microfocus Detail Recognition

The quality control of additively manufactured components plays an important role, as the components are often subject to high safety standards in the automotive and aerospace sectors despite weight reductions.

Aluminium parts or small metallic components with higher density, such as the additively manufactured aluminium samples shown, can also be reliably inspected.
Thanks to microfocus detail recognition, you can analyse even the smallest features.



Wall thickness analysis on an AM gear wheel

evo 05

Technical Data

X-ray source

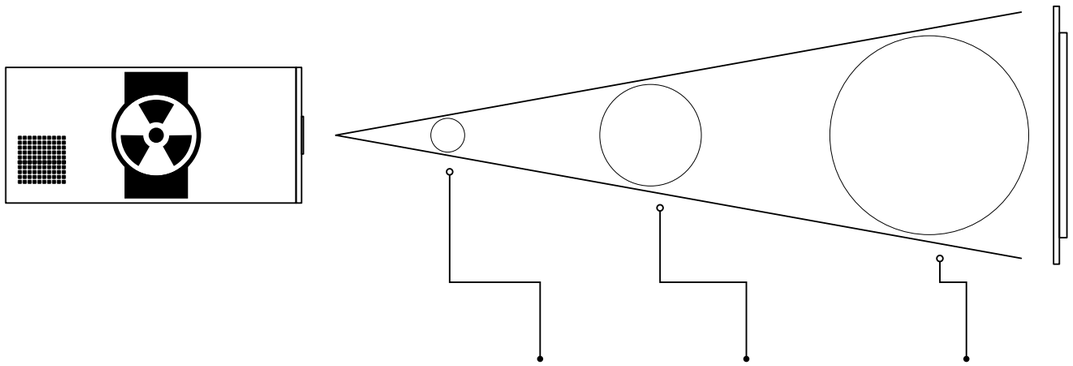
Sealed Microfocus X-ray Source	
X-ray Tube Voltage	40 bis 150 [kV]
X-ray Tube Current	10 bis 500 [µA]
Maximum Output	75 [W]
Minimal Focal Spot Size	≤ 5 [µm]

Detector

3K Digital Flat Panel Detector	
Active Area	417 x 417 [mm²]
Active Matrix	3000 x 3000 px
Pitch	139 [µm]
Dynamic Range	16 bit

System Performance

Focus-Detector-Distance	650 [mm]
Scan Volume, maximal	Ø 230 x H 160 [mm]
Sample Weight	5 [kg]
Voxel Resolution	≤ 10 [µm]
System Dimensions	L 1260 x B 870 x H 1640 [mm]
System Weight	1.3 [t]



Voxel Size	10 µm	20 µm	95 µm
Sample Diameter	12 mm	25 mm	240 mm

diControl Features

DR-Function, Batch Mode, Daily Check,
Health Monitor, Limited Angle CT

Find more information
in our **diControl** brochure.

diondo d systems

From Highest Resolution to Highest Energy

Automotive, aerospace, medical, electronics, consumer goods - every industry has its own processes. Every material, every manufacturing process has the potential for different defects inside components that are normally hidden from the eye.

3D Computed Tomography (CT)
With the aid of CT technology, internal and external defects and details of a component are recorded in 3D non-destructively.

2D digital radiography (DR)
Radiography provides high-resolution 2D data information of the part under inspection, even in real time.

Perfect CT Solutions for each Application

Non-destructive, complete and true-to-scale examination of the inner and outer structure of test objects - this describes industrial computer tomography (CT).

In the industrial sector this leads to two main applications: Testing and measuring.
Compared to other test methods, CT allows the spatial assignment of the defect and the exact determination of its size, largely independent of the material, even if the test object has a very complex structure.

Our d - series is the professional solution for your testing and measuring needs.
All systems are based on high-precision granite manipulators to guarantee accurate measuring results and to achieve highest resolutions.

Unlike many other systems, the X-ray source and detector are also mounted on a granite base. Thus, you benefit from first-class thermostability, which is essential for precise serial inspection tasks as well as stable long-term imaging.

diondo diControl

Our professional software solutions are designed for productivity and ease of use, incorporating a full suite of advanced features:

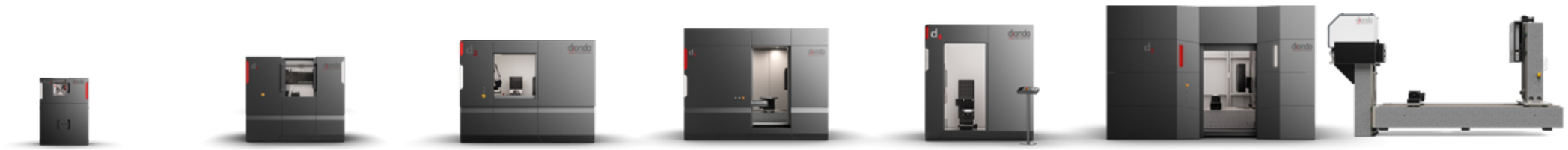
- Multiple Offset CT
- Dual-Helix CT
- Multiline CT
- diScatter
- Consistency Check
- Metrology

Find more information in our **diControl** brochure.

diondo d systems

From Highest Resolution to Highest Energy

Perfect CT Solutions for each Application



	diondo $d_{sub\mu}$	diondo d_1	diondo d_2	diondo d_3	diondo d_4	diondo d_5	diondo d_7
	Highest Resolution Sub-Micron CT System	High Performance Micro CT System	Powerful Micro CT System	Ultimate Flexibility in a Compact Footprint	Powerful CT System for High-Density Parts	Universal CT System with a Large Variety of Applications	High Energy Linac CT
Sample Size	●○○○○○	●●○○○○	●●●○○○	●●●●○○	●●●●○○	●●●●●○	●●●●●●
Sample Density	●○○○○○	●●●○○○	●●●○○○	●●●●○○	●●●●●○	●●●●●○	●●●●●●
Accuracy	●●●●●●	●●●●●●	●●●●●○	●●●●●○	●●●○○○	●●●●○○	●●○○○○
Resolution	●●●●●●	●●●●○○	●●●●●○	●●●●●○	●●●○○○	●●●○○○	●●○○○○
Footprint	●○○○○○	●●○○○○	●●●○○○	●●●●○○	●●●○○○	●●●●●○	●●●●●●

diondo $d_{sub\mu}$

Sub-Micro CT System for Materials Research with the Highest Resolution

Sample Size	
Sample Density	
Accuracy	
Resolution	
Footprint	

diondo $d_{sub\mu}$

Sub-Micro CT System for Materials Research with the Highest Resolution

The compact Sub-Micro CT System has been developed for analyzing three-dimensional structures in materials research. The sub-µ-resolution captures the finest structures three-dimensionally, which are often to be found in connection with fiber-reinforced materials or organic materials.

Indirect Detector System

In contrast to conventional Micro CT Systems, which work with high magnification, the Sub-Micro CT Systems owe their high spatial resolution to their innovative x-ray camera, which allows fully automatic switching between three fields of view. The smallest of them scans your samples with 0.3 µm/voxel and the largest captures a measuring volume of up to 5 mm (1.4 µm/voxel scanning).

Highlights

+ **Innovative Detector System**

  with three different fields of view and sCMOS camera

+ **Compact Design**

  due to the integration of the entire periphery.

+ **High-Precision Manipulator**

  due to piezo-based linear axes and air bearing rotary axis

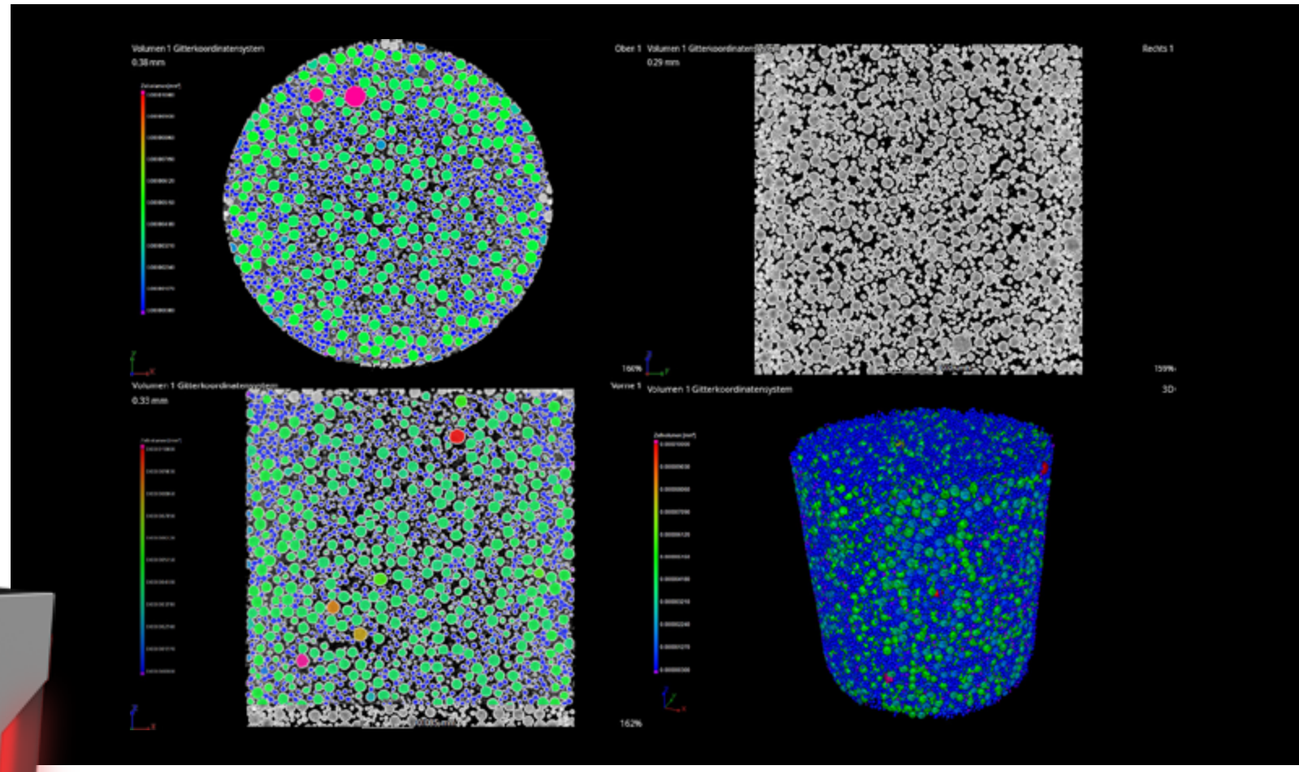
diondo $d_{sub\mu}$

Sub-Micro CT System for Materials Research with the Highest Resolution

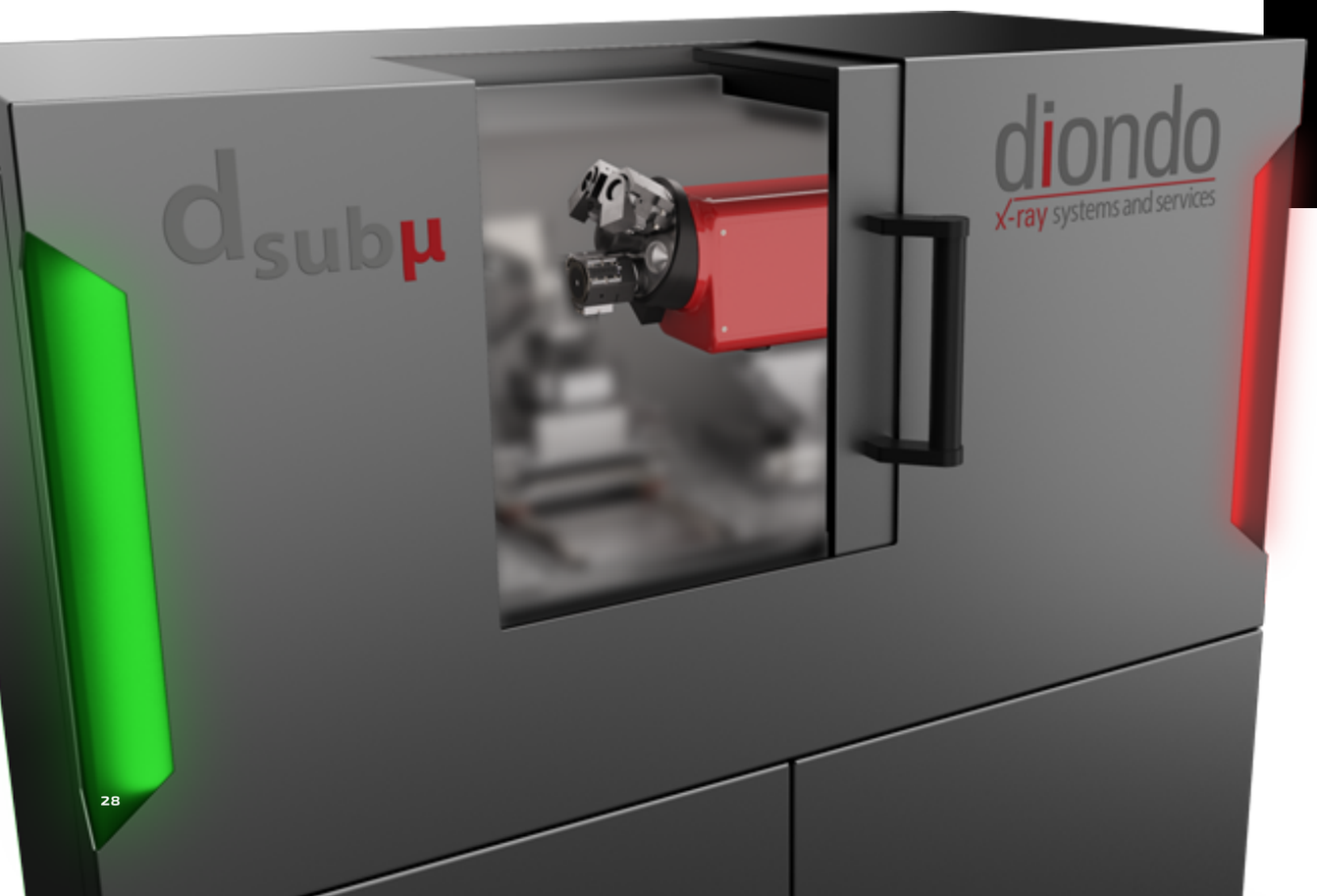
Applications

With a maximum voxel resolution of 300 nanometers they are particularly suited for the three-dimensional analysis of micro structures. The main areas of application lie in materials research, in particular for lightweight composite materials such as carbon fiber and glass fiber composites in order to determine the density and/or the spatial orientation of the fiber.

Other areas of application are metal alloys (phase fractions and shape within the metal structure), metallic and organic foams (pore size and distribution), as well as natural materials such as wood, bone and stone.



Analysis of the particle size of an AlSi powder



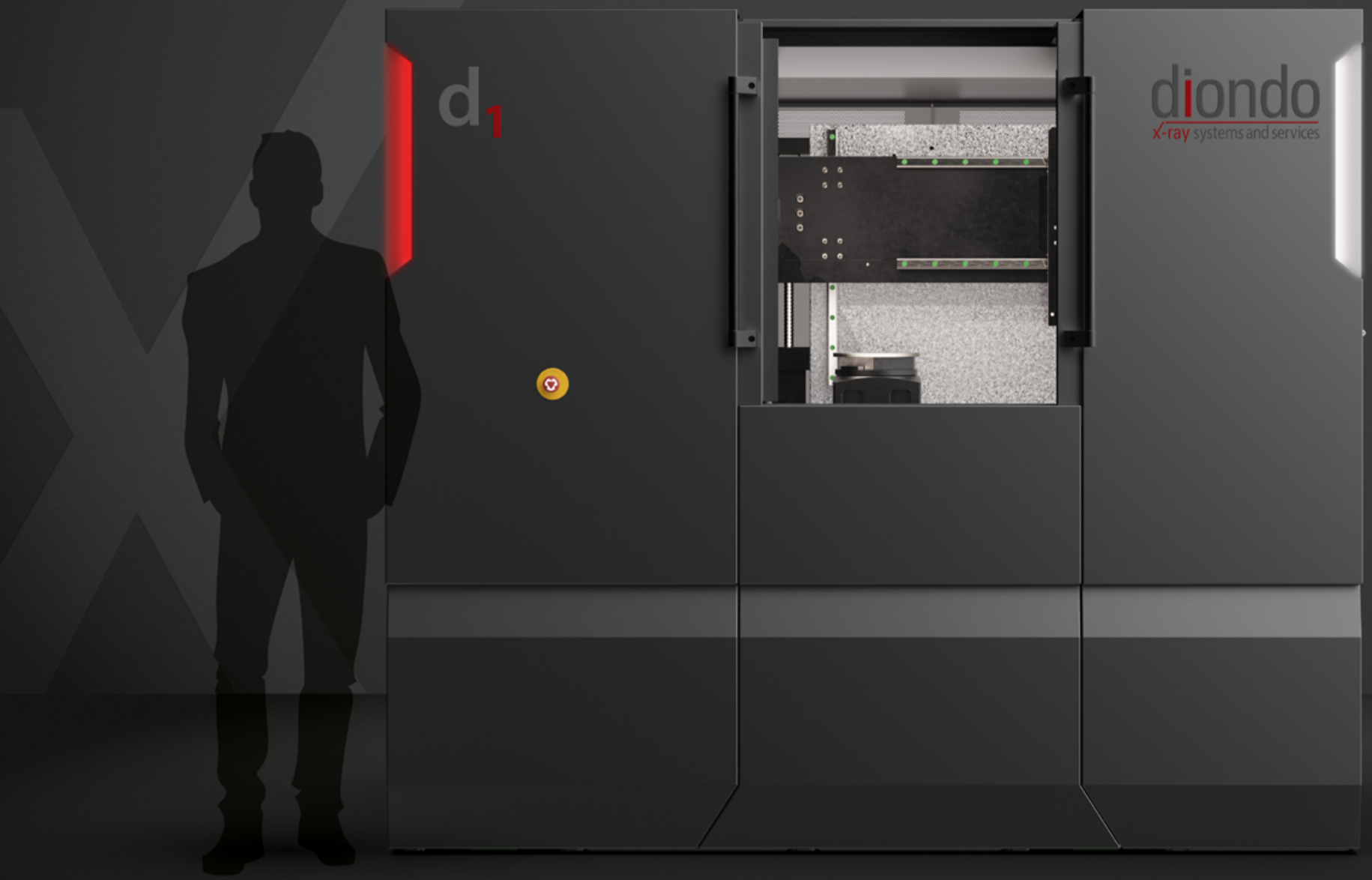
diondo $d_{sub\mu}$

Technical Data

X-Ray Source	20-90 kV, max. 8 Watt		
Detector	4 Megapixel sCMOSChip, 6.5 µm Pixel Resolution		
Voxel Resolution [µm]	0.3	0.56	1.4
Optic	20 x	10 x	4 x
CT Scan Field [mm]	0.62	1.2	2.8
Extended Scan Field [mm]	1.1	2.1	5.0
System Dimensions	L 1170 x B 645 x H 1615 [mm]		
System Weight	890 [kg]		
Manipulation	granite based, 6 piezo-based linear axes, air bearing rotary axis		

diondo d1

Compact High Performance Micro CT System



Sample Size	
Sample Density	
Accuracy	
Resolution	
Footprint	

X-Ray Source	190 - 240 [kV]
Source Type	Micro | Meso Focus
Focus Detector Distance	800 [mm]
Detector	FDP
Scan Volume, maximal	Ø 400 x 400 H [mm]
Sample Weight	20 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

diondo d$_1$

Compact High Performance Micro CT System

The high-resolution micro-CT system **diondo d$_1$** has been perfected for the analysis and measurement of small-to-medium-sized components. By using a high-power transmission X-ray source, a fourfold higher resolution is achieved in the same measuring time compared to conventional systems. Alternatively, with the same resolution, the measuring time can be reduced by a factor of four. The extremely high transmission power also enables the analysis of challenging material combinations such as those used in electromobility applications, e.g. in the development of battery cells.

High-Performance Transmission X-Ray Source

Classical CT systems work with reflection tubes as the radiation source. The high power required here to penetrate challenging materials or higher wall thicknesses in components has a negative impact on maximum resolution.

By using a high power transmission X-ray source, up to four times higher resolution can be achieved for the same measurement duration compared to conventional systems. Alternatively, the measuring time can be shortened by a factor of four for the same resolution, which is of great advantage not only for small series production.

Highlights

+ **Breathtaking Resolution in Extremely Short Time**

  The high penetration power of the 240 kV transmission tube combined with the ultimate target power of 80 watts revolutionizes CT analysis in terms of resolution and scan time of challenging samples.

+ **Peak Precision & Maximum Inspection Volume**

  The combination of a tightly-spaced pixel grid and an especially large active area enables both an extremely high resolution for the examination of small objects and the imaging of large samples in one scan.

+ **High-Precision Granite Manipulator**

  Inherent rigidity and temperature stability guarantee highest precision even after many years of intensive use.

+ **Coordinate Measuring Technology**

  Reproducible 3D measurement technology for highest demands according to VDI/VDE 2630-1.3

+ **Advanced Scanning Modes**

  including helix scanning for high flexibility

User-Friendly Accessibility

Easier Accessibility

The innovative design of the double door allows for easy loading and unloading. Partial opening of the roof allows more complex component fixtures to be conveniently set up.

Accurate and Effective Test Object Centering

Motorized Translation Stage

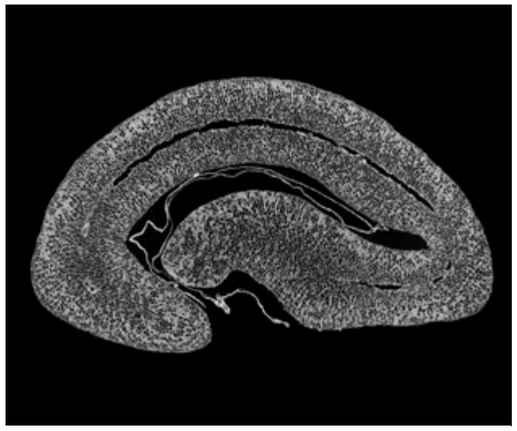
If the test object is not positioned exactly in the centre of rotation by the user, this leads to a loss of resolution or the test object "running out" during a rotation.

The motorized translation stage is a solution for accurate and effective test object centering.
Control takes place entirely via the diControl. This is particularly useful when working with stacking devices where test objects cannot all be optimally positioned at different heights by hand.

As the test object is always perfectly positioned in the center of rotation by means of the translation stage, only the rotation is performed compared to virtual rotation principle, which results in maximum precision for metrological applications in accordance with the VDI/VDE 2630.

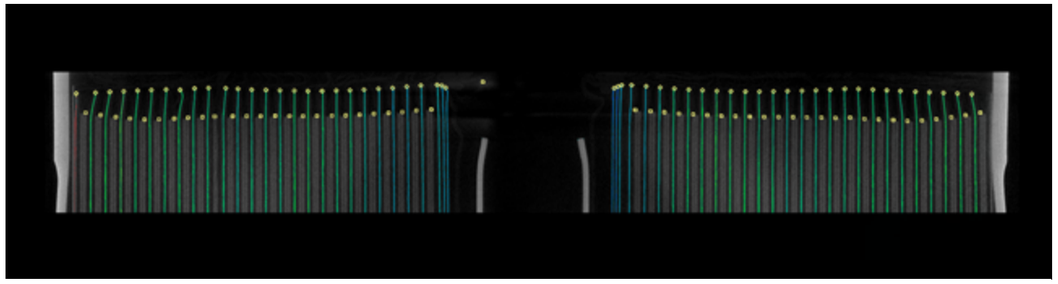
Applications

Wide Range of Application Possibilities

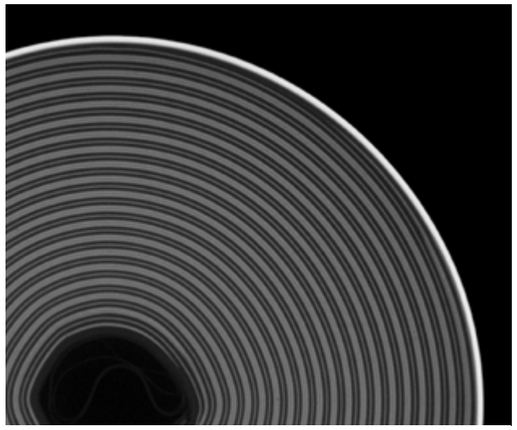


CT scan of a Coffee Bean

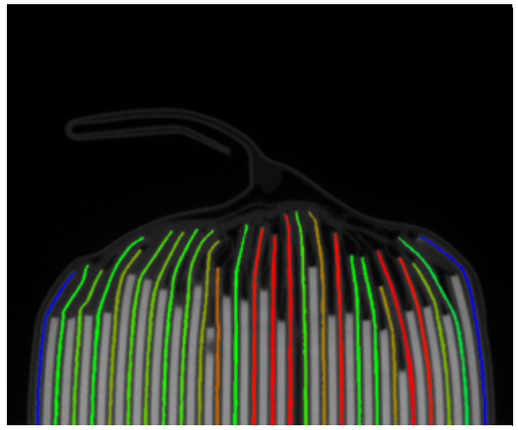
CT scan of a Plastic Connector



Automated battery analysis of a round cell



CT scan of a round cell



Automated battery analysis of a pouch cell

diondo d1

Technical Data

Selectable X-ray Source 1

Transmission Tube

X-ray Tube Voltage	190 / 225 / 240 [kV]
Target Power	50 / 80 / 120 [W]
JIMA resolution	0.5 / 0.9 / 2.0 [µm]

Selectable X-ray Source 2

Meso Focus Tube

X-ray Tube Voltage		225 [kV]	
Target Power	50 [W]	130 [W]	200 [W]
Minimal Focal Spot Size	50 [µm]	130 [µm]	200 [µm]

Detector

Digital Flat Panel Detector

	3K	4K
Active Area	417 x 417 [mm²]	427 x 427 [mm²]
Active Matrix	3000 x 3000 px	4200 x 4200 px
Pitch	139 [µm]	100 [µm]
Dynamic Range	16 bit	16 bit

Manipulation

Number of Axes	4 / 5 axes
Focus-Detector-Distance	400-800 [mm]
Manipulator Material	granite base

Test Sample

Sample Size, maximal	Ø 470 x H 600 [mm]
Scan Volume, maximal	Ø 450 x H 400 [mm]
Sample Weight	20 [kg]

System

System Dimensions	L 2350 x W 1550 x H 2060 [mm]
System Weight	5.5 [t]
Active Ventilation	yes
Climate Control	optional

Additional Options

Collision Protection	included
Positioning Laser	included
Motorised Filter Changer	optional
Motorized Translation Stage	optional
Beam Collimator	optional
Climate monitoring	optional
Metrology package VDI/VDE 2630-1.3 - MPE_{SD}: 5 µm + L /100	optional

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3

Find more information in our **diControl** brochure.

* All dimensions are nominal and may vary depen ding on system configuration. Customized adjustments are available on request.

diondo d2

Powerful Micro CT System for Small to Medium-Sized Components

Sample Size	
Sample Density	
Accuracy	
Resolution	
Footprint	

X-Ray Source	190 - 320 [kV]
Source Type	Micro Focus
Focus Detector Distance	400 - 1200 [mm]
Detector	FDP
Scan Volume, maximal	Ø 520 x 650 H [mm]
Sample Weight	50 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

diondo d_2

Powerful Micro CT System for Small to Medium-Sized Components

The versatile Micro CT System **diondo d_2** has been optimized to analyze and measure tiny to medium-sized components.
The broad range of applications includes everything from classical non-destructive analyses via high-precision metrological coordinate measuring technology in accordance to VDI/VDE 2630 1.3 up to production control series inspection. Because of its great adaptability, the Micro CT System sets new standards in science and industry alike.

Highlights

+ **Multi-Axis Granit Manipulator**

  with infinitely variable distance between focus and detector for maximum resolution and scan speeds.

+ **Brilliant 3K Detector**

  for 30% higher detail detectability with extremely short measurement times

+ **Stunning Resolution in Extremely Short Time**

  The high-resolution 3K detector in combination with an infinitely variable distance between focus and detector revolutionizes the CT analysis in terms of resolution and scan time.

+ **Optional Dual-Tube Configuration**

  Micro and Nano Focus tube options provide exceptional flexibility, while a maximum of X-ray energy of 320 kV guarantees excellent material penetration

+ **Flexible Footprint**

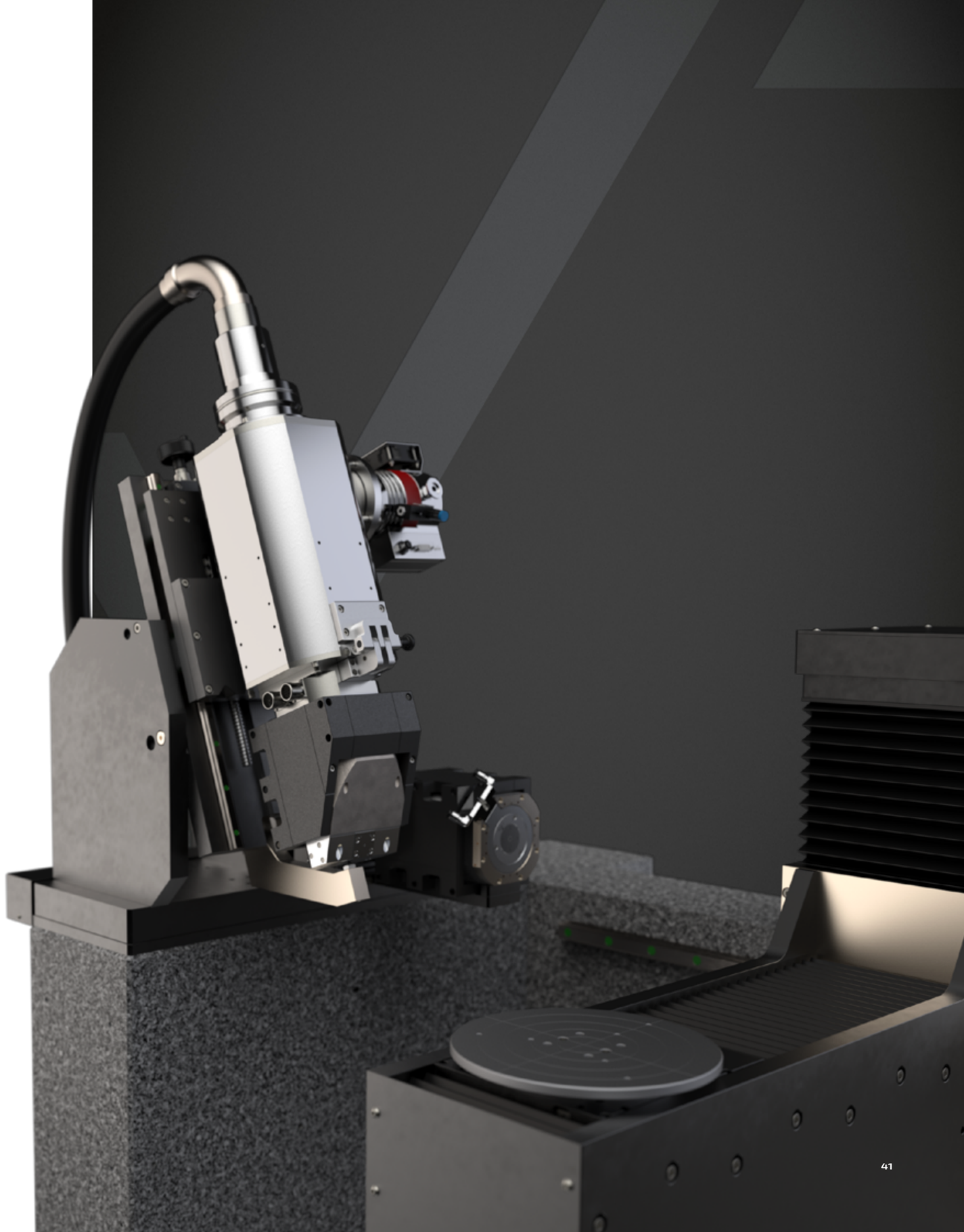
  As a plug-and-play version with integrated control cabinet; or as a stand-alone version with individual adaptation to the planned installation location in the inspection laboratory.

+ **Reliable Measurement Technology**

  Reproducible 3D measurement results for highest demands through maximum long-term stability and high-precision positioning of the granite manipulator. VDI/VDE 2630-1.3 Metrology; MPESD of 5 + L/100 µm

+ **Maximum Flexibility**

  for autonomous measuring operation, in situ analyses and much more



Automatic Part Changer

Maximize your Throughput

Allows scanning of multiple (different) test parts in a row.

Expansion of the Testing Capacity

After the set up of the CT scans the operator no longer needs to be present - night shifts and weekends can be used for capacity expansion without any additional staff.

No Restrictions for Classic Single Part Tests

For classic single part tests the mounting station can be moved in a space-saving parking position.

Multi-plate component mounts

High-Performance Micro CT System

The Most Powerful Unipolar Microfocus X-Ray System on the Market

With 640 Watt @ 320 kV the microfocus system provides ultimate penetration power even for challenging materials.

Without Cool Down Times

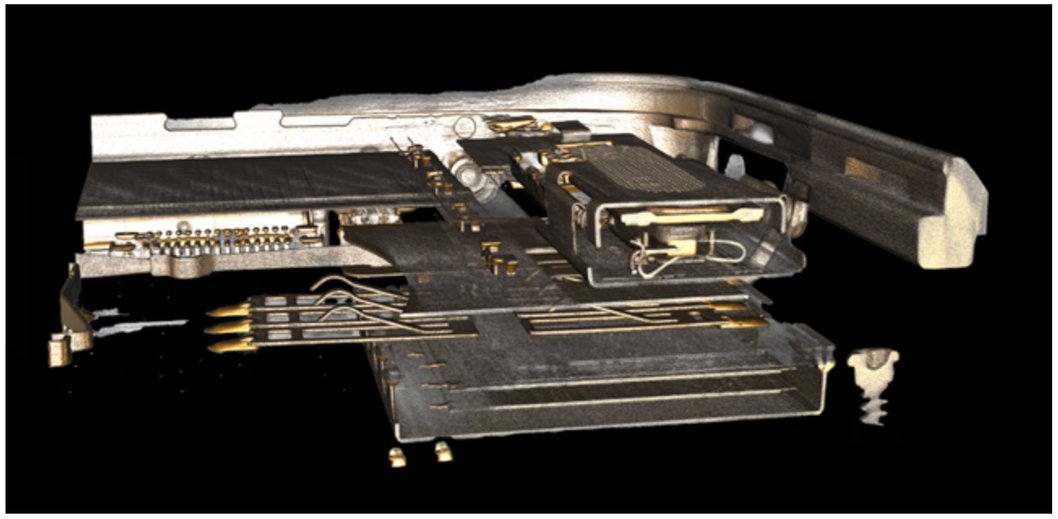
or any other restrictions, the microfocus system can be operated in the same way as conventional 225 kV systems.

No Compromises on Resolution

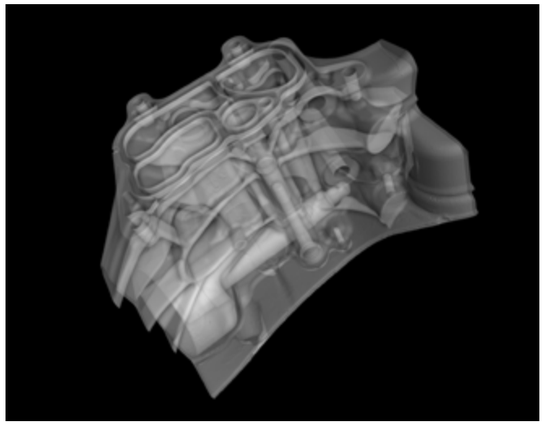
Despite the maximum acceleration voltage of 320 kV, the X-ray system offers an impressive resolution of 5 µm.

Applications

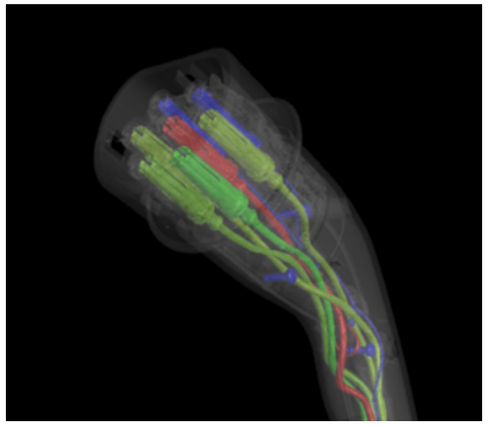
Wide Range of Application Possibilities



CT scan of a smart phone



CT scan of a aliminium housing



CT scan of a charging plug for electric cars

Applications

Three-dimensional measuring and testing of additively manufactured components, electro-mechanical assemblies, workpieces made of plastic [connectors, switches, housings, etc.], light metal cast components [pistons, housings, heat exchangers, etc.], composite materials [CFK, GFK] as well as high-alloy steels [valves, tensile specimens, etc.].

Industries

- Automotive Industry
- Electronics
- Additive Manufacturing
- Science & Research
- Aerospace
- Material Science
- Medical Technology
- Plastics Processing

diondo d2

Technical Data

Selectable Micro X-ray Sources

	Transmission Tube	Reflection Tube
X-ray Tube Voltage	190 / 225 / 240 [kV]	240 / 300 /320 [kV]
Target Power	50 / 80 / 120 [W]	300 / 450 / 640 [W]
JIMA resolution	0.5 / 0.9 / 2.0 [µm]	4 / 5 [µm]

Detector

Digital Flat Panel Detector

	3K	4K
Active Area	417 x 417 [mm²]	427 x 427 [mm²]
Active Matrix	3000 x 3000 px	4200 x 4200 px
Pitch	139 [µm]	100 [µm]
Dynamic Range	16 bit	16 bit

Manipulation

Number of Axes	5 / 6 axes
Focus-Detector-Distance	400 - 1200 [mm]
Manipulator Material	granite base

System

System Dimensions	L 2900 x W 2050 x H 2180 [mm]
System Weight	10.5/15 [t]
Climate Control	yes

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3

Find more information in our **diControl** brochure.

Test Sample

Sample Size, maximal	Ø 520 x H 750 [mm]
Scan Volume, maximal	Ø 520 x H 650 [mm]
Sample Weight	50 [kg]

Additional Options

Collision Protection	included
Positioning Laser	included
Motorised Filter Changer	optional
Motorized Translation Stage	optional
Beam Collimator	optional
Climate monitoring	optional
Automatic Part Changer	optional
diPlanar	optional
Ultra Wide Field of View Extension	optional
diScatter Bundle	optional
Metrology package VDI/VDE 2630-1.3 - MPE_{SD}: 5 µm + L /100	optional

* All dimensions are nominal and may vary depen ding on system configuration.
Customized adjustments are available on request.

diondo d3

Ultimate Flexibility in a Compact Footprint

Sample Size	
Sample Density	
Accuracy	
Resolution	
Footprint	

X-Ray Source	190 - 450 [kV]
Source Type	Micro | Mini | Meso Focus
Focus Detector Distance	400 - 1500 [mm]
Detector	FDP
Scan Volume, maximal	Ø 600 x 900 H [mm]
Sample Weight	100 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

diondo d_3

Ultimate Flexibility in a Compact Footprint

The **diondo d_3** provides a market leading flexibility and versatility to footprint ratio. The selection of X-ray sources in combination with up to 8 axis manipulation including the Infinitely variable Source Detector Distance lead to unprecedented range of options. Users benefit from the latest technologies and access to the most innovative X-ray sources that not only combine high resolution and high energies in one CT system but also enable them to do so at the same time.

Highlights

+ **High Energy | High Resolution | High Versatility**

  Extensive range of applications from microCT to high-energy CT due to dual tube configuration

+ **Coordinate Measuring Technology**

  Reproducible 3D measurement technology for highest demands in accordance with VDI/VDE 2630-1.3

+ **Large Inspection Envelope**

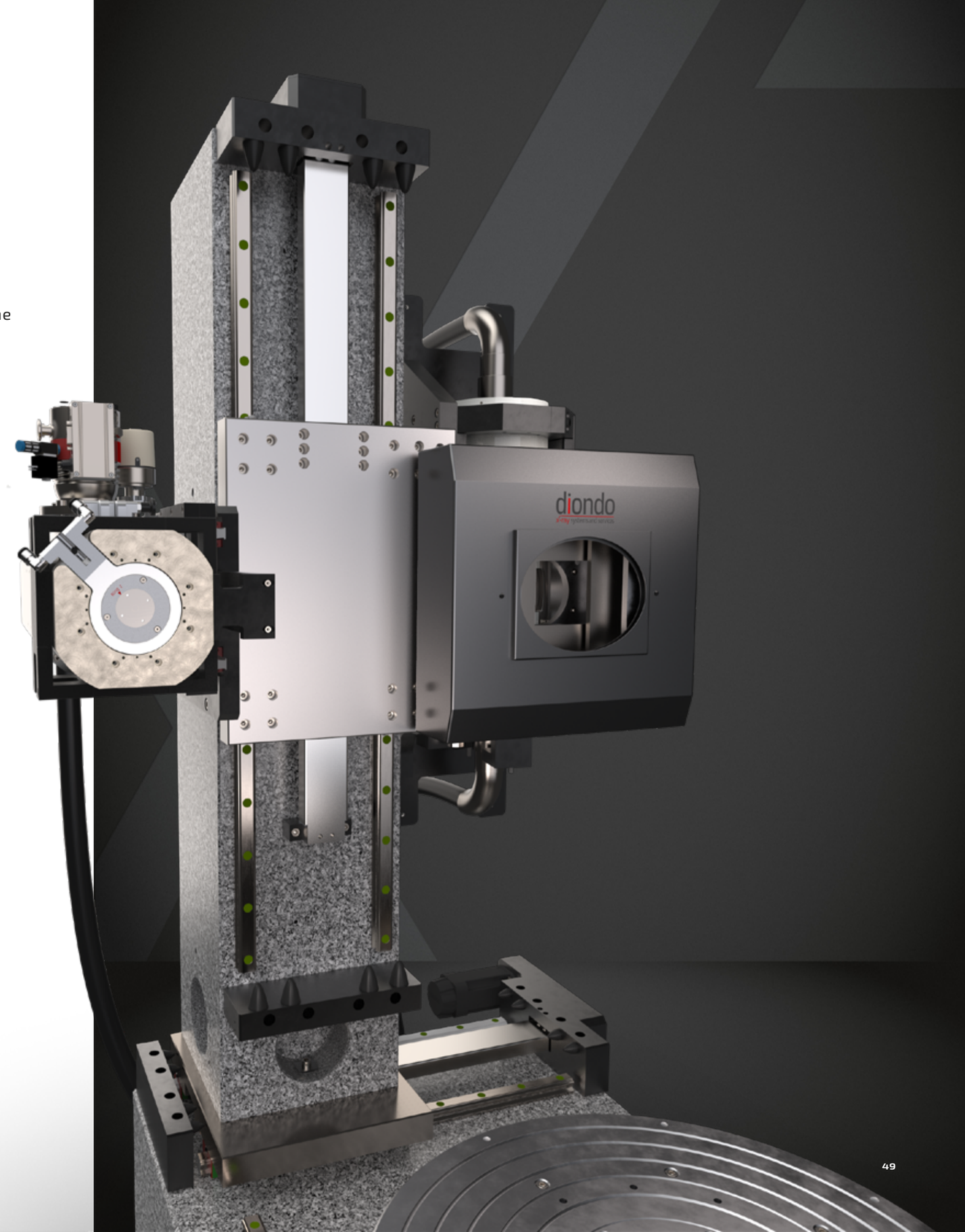
  by diverse field-of-view extensions, helical and dual-helical CT techniques

+ **Multi-Axis Granite Manipulator**

  Maximum versatility through up to 8 manipulation axes on a temperature stable and high precision granite base.

+ **Infinitely variable Source Detector Distance**

  combined with progressive 3K Panel technology for maximum resolution and scan speeds



450 kV High-Power + 450 kV High-Resolution

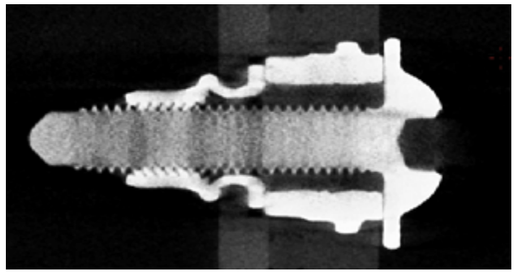
The Best of Both Technologies

Detailed Analysis of Challenging Components

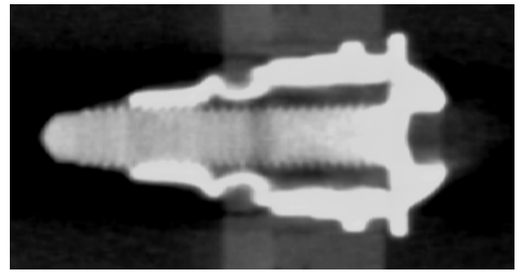
Battery Module

High Resolution and High Object Throughput

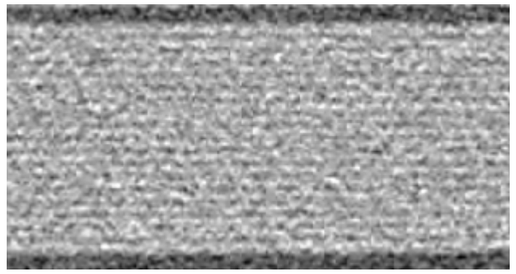
The **d_3** is the first system of its kind to be optimised for the combination of a Meso Focus with a Mini Focus.
The 450 kV combination of high-performance Mini Focus and high-resolution Meso Focus appears to be nothing short of ingenious. This means you can scan your entire component in just a few minutes and then switch to maximum magnification. With a resolution of up to 30 µm, the Meso Focus reliably detects every spot of defect and displays them with crystal-clear, razor-sharp images.



Screw connection | 450 kV Meso Focus

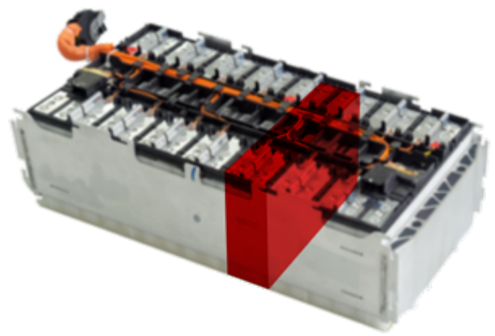


Screw connection | 450 kV High-Power



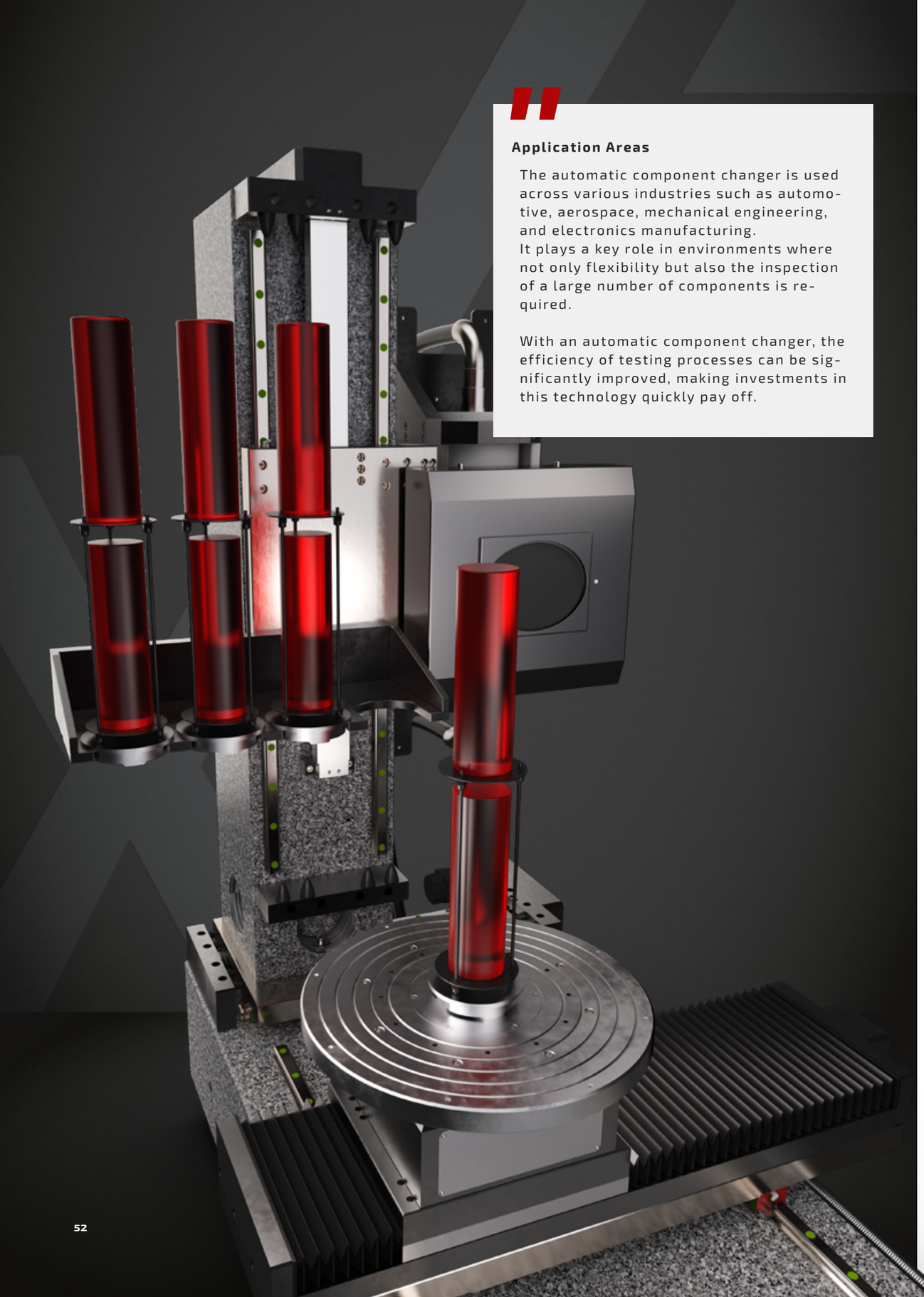
Module Cell | 450 kV Meso Focus

Module Cell | 450 kV High-Power



ROI Scan | Scantime: 05:25 h
Resolution: 50 µm

Overview Scan | Scantime: 02:15 h
Resolution: 200 µm



Application Areas

The automatic component changer is used across various industries such as automotive, aerospace, mechanical engineering, and electronics manufacturing.
It plays a key role in environments where not only flexibility but also the inspection of a large number of components is required.

With an automatic component changer, the efficiency of testing processes can be significantly improved, making investments in this technology quickly pay off.

diondo d_3

Automatic Sample Changer

The automatic sample changer is a powerful extension to make the exchange of test objects more efficient. The sample changer enables test objects to be changed automatically without manual intervention, thus ensuring greater productivity and process reliability.

Features & Advantages

Automatic Exchange Process

The sample changer recognises the end of a CT scan and automatically exchanges the test object for a new, prepared part.

High Precision and Speed

The use of modern sensor and control technology means that the changing process is extremely precise and fast, which optimises machine running times.

Integrated Storage

The storage unit is located inside the radiation protection cabin, which prevents interruption of the safety circuits when changing test objects.

Minimal Maintenance

The use of robust materials and advanced designs means that maintenance requirements are low, maximising uptime.

Cost Efficiency

The automation of the changing process reduces the need for manual intervention and thus cuts labour costs.

Increased Inspection Capacity

As the CT system with sample changer runs without human intervention, testing can be extended to multiple shifts.

Safety Features

The devices are equipped with comprehensive safety features (e.g. automatic detection of occupied placement positions) to ensure smooth and safe operation.

Flexibility

The sample changer can be operated with various stacking devices and fixing elements, allowing customization to accommodate different test part sizes, shapes, and weights.

Improved Process Reliability

Automated changing ensures consistent quality and avoids human error.

from left to right: Reflection Tube, Transmission Tube, Meso Focus Tube, Mini Focus Tube

From Highest Resolution to Highest Energy

Micro Focus X-ray Tubes

For high-resolution applications and pinpoint accuracy the system can be configured choosing from the largest selection of microfocus X-ray sources available on the market.

Besides classic reflection tubes of up to 320 kV and a (target) power of 640 watts, high-powered transmission tubes are available, offering extreme performance of up to 300 kV and 80 watts (target) power.

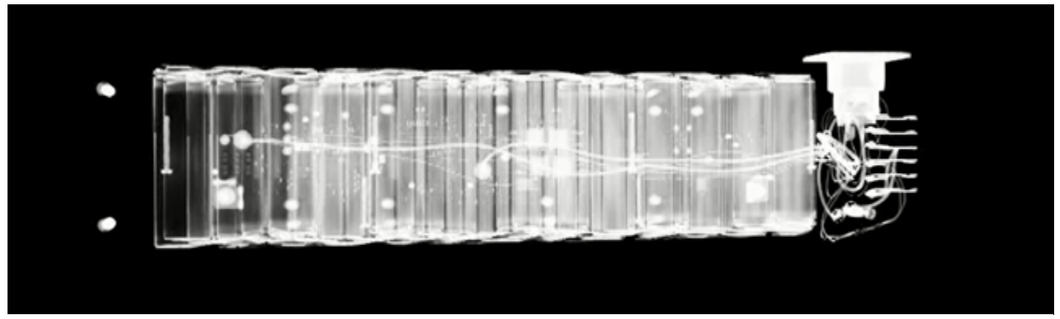
A Congenial Duo

The unequal twins Meso Focus and Mini Focus share a simple metal dress, but their characters complement each other to form a congenial duo.

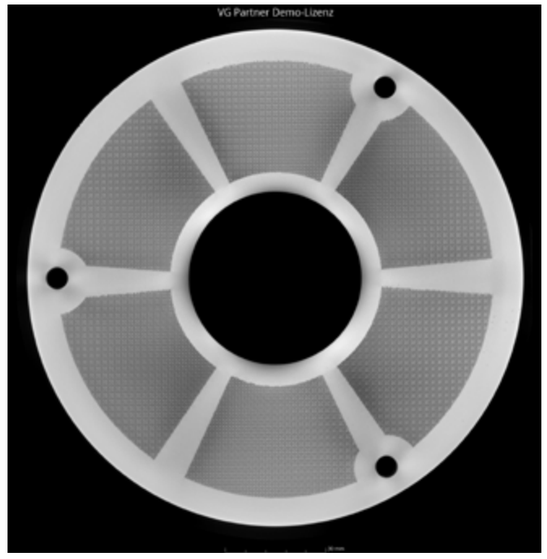
Powerful, enduring and reliable the Mini Focus, sharp and clear its Meso Focus sister. One is a workhorse for speedy full examinations, the other specialises in detail. Together they form the ideal inspection package for highly radiopaque components.

Applications

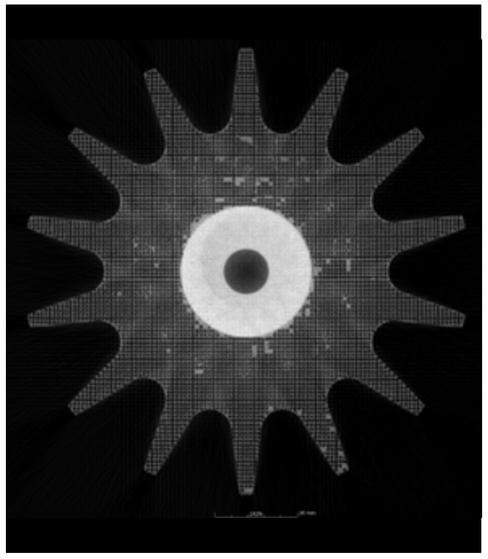
Wide Range of Application Possibilities



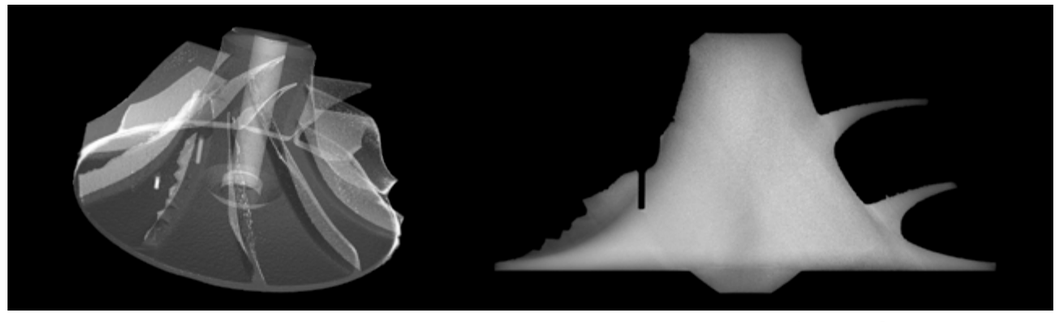
CT scan of a bicycle battery pack



CT scan of an AM Armature disk
of a brake made of steel



Support structure with powder residues
of an inconel AM radial turbine



CT scan of a turbine blade

diondo d3

Technical Data

Selectable X-ray Sources

	Mini Focus Tube		Meso Focus Tube				
X-ray Tube Voltage	450 [kV]		450 [kV]				
Power	700 [W]	1.200 [W]	50 [W]	100 [W]	250 [W]	350 [W]	450 [W]
Minimal Focal Spot Size	400 [µm]	1.200 [µm]	63 [µm]	100 [µm]	250 [µm]	350 [µm]	450 [µm]

Selectable Micro X-ray Sources

	Transmission Tube	Reflection Tube
X-ray Tube Voltage	190 / 225 / 240 [kV]	240 / 300 / 320 [kV]
Target Power	50 / 80 / 120 [W]	300 / 450 / 640 [W]
JIMA resolution	0.5 / 0.9 / 2.0 [µm]	4 / 5 [µm]

Detector

Digital Flat Panel Detector

	3K	4K
Active Area	417 x 417 [mm²]	427 x 427 [mm²]
Active Matrix	3000 x 3000 px	4200 x 4200 px
Pitch	139 [µm]	100 [µm]
Dynamic Range	16 bit	16 bit

Test Sample

Sample Size, maximal	Ø 1200 x H 1200 [mm]
Scan Volume, maximal Micro Focus Tube	Ø 600 x H 870 [mm]
Scan Volume, maximal Mini/Meso Focus Tube	Ø 600 x H 900 [mm]
Sample Weight	100 [kg]

System

System Dimensions	L 3500 x W 2400 x H 2700 [mm]
System Weight	24 [t]
Active Ventilation	yes
Climate Control	optional

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions
Daily Check, Health Monitor, Limited Angle CT,
Metrology VDI/VDE 2630-1.3

Find more information
in our **diControl** brochure.

Manipulation

Number of Axes	7 / 8 axes
Focus-Detector-Distance, Micro Focus Tube	400-1250 [mm]
Focus-Detector-Distance, Mini/Meso Focus Tube	650-1500 [mm]
Manipulator Material	granite base

Additional Options

Collision Protection	included
Positioning Laser	included
Motorised Filter Changer	optional
Motorized Translation Stage	optional
Beam Collimator	optional
Climate monitoring	optional
diPlanar	optional
Ultra Wide Field of View Extension	optional
diScatter Bundle	optional
Metrology package VDI/VDE 2630-1.3 - MPE_{SD}: 5 µm + L /100	optional
in situ Module (temperature)	optional
in situ Module (tension/compression)	optional

* All dimensions are nominal and may vary depen
ding on system configuration.
Customized adjustments are available on request.

diondo d4

Powerful CT System for Medium-Sized & Large Parts with Higher Densities

Sample Size	
Sample Density	
Accuracy	
Resolution	
Footprint	

X-Ray Source	450 - 600 [kV]
Source Type	Mini Focus
Focus Detector Distance	970 - 1630 [mm]
Detector	FPD | LDA
Scan Volume, maximal	Ø 750 x 900 H [mm]
Sample Weight	50 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

diondo d4

Powerful CT System for Medium-Sized & Large Parts with Higher Densities

The powerful computed tomography system **diondo d4** has been optimized for high-resolution 3D measurements of medium-sized to large components such as cylinder heads or crankcases, but also for analyses of high-density test objects such as turbine blades. The small space requirement of the computed tomography system makes it easy to integrate into an existing production or laboratory environment. Due to its plug&play the system is ready for operation shortly after the installation.

Efficient Throughput
Dual Detector Configurations

Thanks to the combination of a high-resolution line detector and a large flat panel detector, the diondo d4 satisfies the highest demands concerning image quality as well as part throughput.

Users benefit of innovative software functions such as diScatter, a filter technology to automatically reduce disturbing scattered radiation.

Highlights

+ **High-Performance Tubes**

  choose between 450 / 500 / 600 kV tubes for sufficient power reserves even for highly absorbent test objects

+ **Robust 3K Detector**

  for higher detail detectability at short measurement times

+ **Granite Based Manipulator**

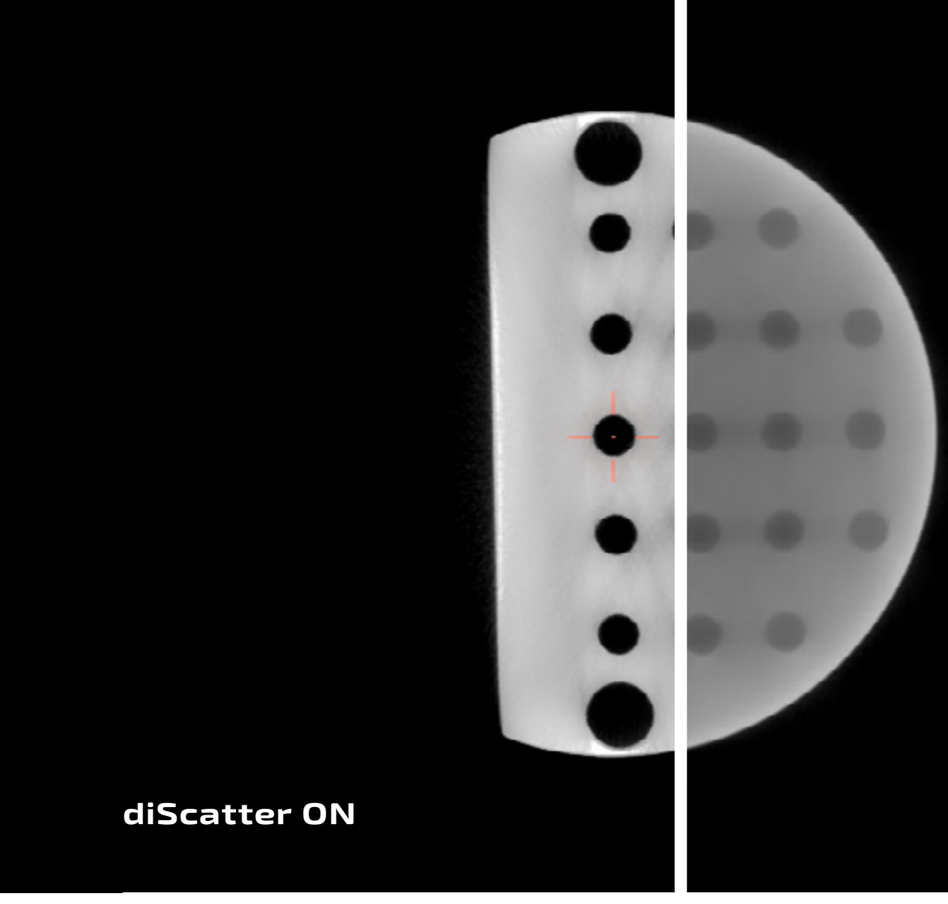
  for precise measurements and long-term stability.

+ **Dual Detector Configurations**

  Thanks to the combination of a high-resolutionline detector and a large flat panel detector, the diondo d4 satisfies the highest demands concerning image quality as well as part throughput.

+ **Variable Focus Detector Distance & Magnification Axis**

  maximum flexibility for resolution, scan time and penetration power



Steel test piece provided by the Manufacturing Technology Centre, UK

diScatter

Top level automated scattered radiation correction

Especially in CT scans at >300 kV scattered radiation causes a significant impairment of the image quality.
Using a line detector, this is avoided by strong pre-collimation. However, this is at the expense of measurement time, since only a single layer of the test object can be tomographed during one revolution of the object.

In terms of measuring time, flat panel detectors are clearly superior to due to their large surface. Because of the lack of collimation the impact of the scatter is unrestricted, complicating or undermining a reliable detection of defects.Our novel feature is capable of compensating for impairment almost completely. After carrying out a fully automatic calibration, an entire measurement series of similar test objects can be imaged with high quality and in a very short time.

Impressive Range of Functions

Fully Software and Hardware integrated Batch Mode

enables automatic change between fan- and conebeam CT

Motorized Source Collimator

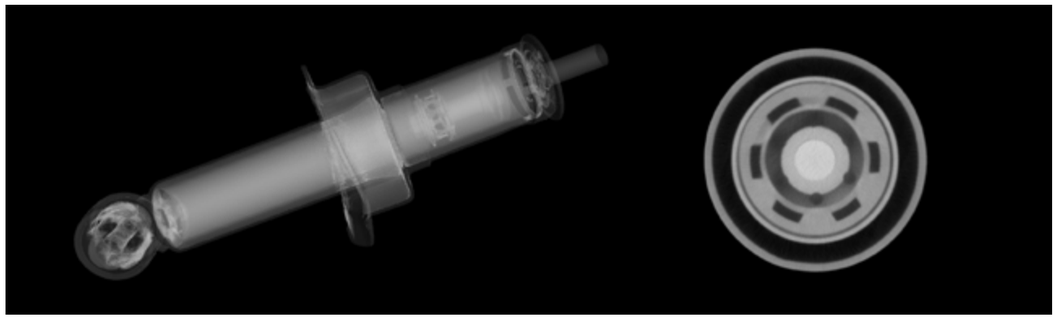
for minimum scattered radiation depending on the selected focus detector distance

Comfortable and Save Sample Setup

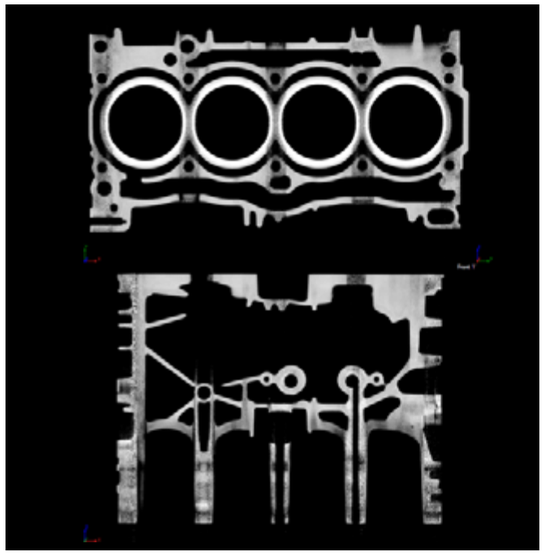
the high class safety PLC enables to operate the manipulator from the control panel located in the door area with direct eye contact and door open

Applications

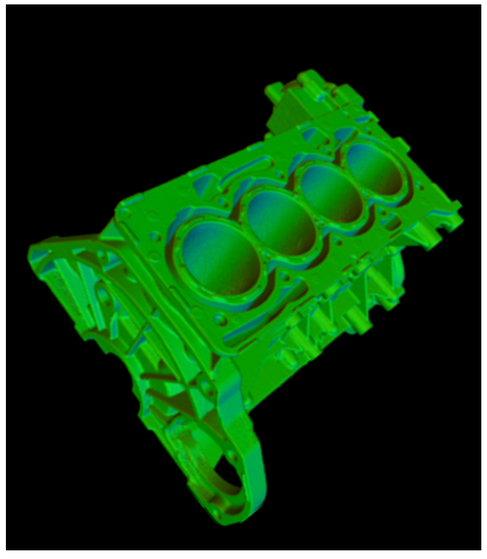
Wide Range of Application Possibilities



CT scan of Shock Absorber



CT scan of a Cylinder Body



CT scan of a Cylinder Body

Applications

The CT System diondo d4 is ideally suited for measuring and testing of medium-sized to large inspection parts with high density such as:

- Cylinder heads
- Engine housings and gearboxes
- Steel and cast iron
- Aluminum and steel components
- Electric motors
- Pistons

diondo d4

Technical Data

Selectable X-ray Source

Mini Focus Tube		
X-ray Tube Voltage	450 / 500 [kV]	600 [kV]
Target Power	700 / 1500 [W]	700 / 1500 [W]
Minimal Focal Spot Size	400 / 1000 [µm]	700 / 2000 [µm]

Detector

	3K Digital Flat Panel Detector	**Line Detector**
Active Area	417 x 417 [mm²]	614 [mm]
Active Matrix	3000 x 3000 px	3070 px
Pitch	139 [µm]	200 [µm]
Dynamic Range	16 bit	16 bit

Test Sample

Sample Size, maximal	Ø 670 x H 1,000 [mm]	
Scan Volume, maximal	Ø 600 x H 900 [mm]	Ø 750 x H 800 [mm]
Sample Weight	50 [kg]	

Manipulation

Number of Axes	5 / 6 axes	
Focus-Detector-Distance	970 - 1500 [mm]	1100 - 1630 [mm]
Manipulator Material	granite base	

System

System Dimensions	L 2800 x W 2100 x H 2800 [mm]
System Weight	27 [t]
Active Ventilation	yes
Climate Control	optional

Additional Options

Collision Protection	included
Positioning Laser	included
diScatter Bundle	included
Climate monitoring	optional
diPlanar	optional
Ultra Wide Field of View Extension	optional
Metrology package VDI/VDE 2630-1.3 - MPE_{SD}: 5 µm + L /100	optional

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3

Find more information in our **diControl** brochure.

* All dimensions are nominal and may vary depen ding on system configuration.
Customized adjustments are available on request.

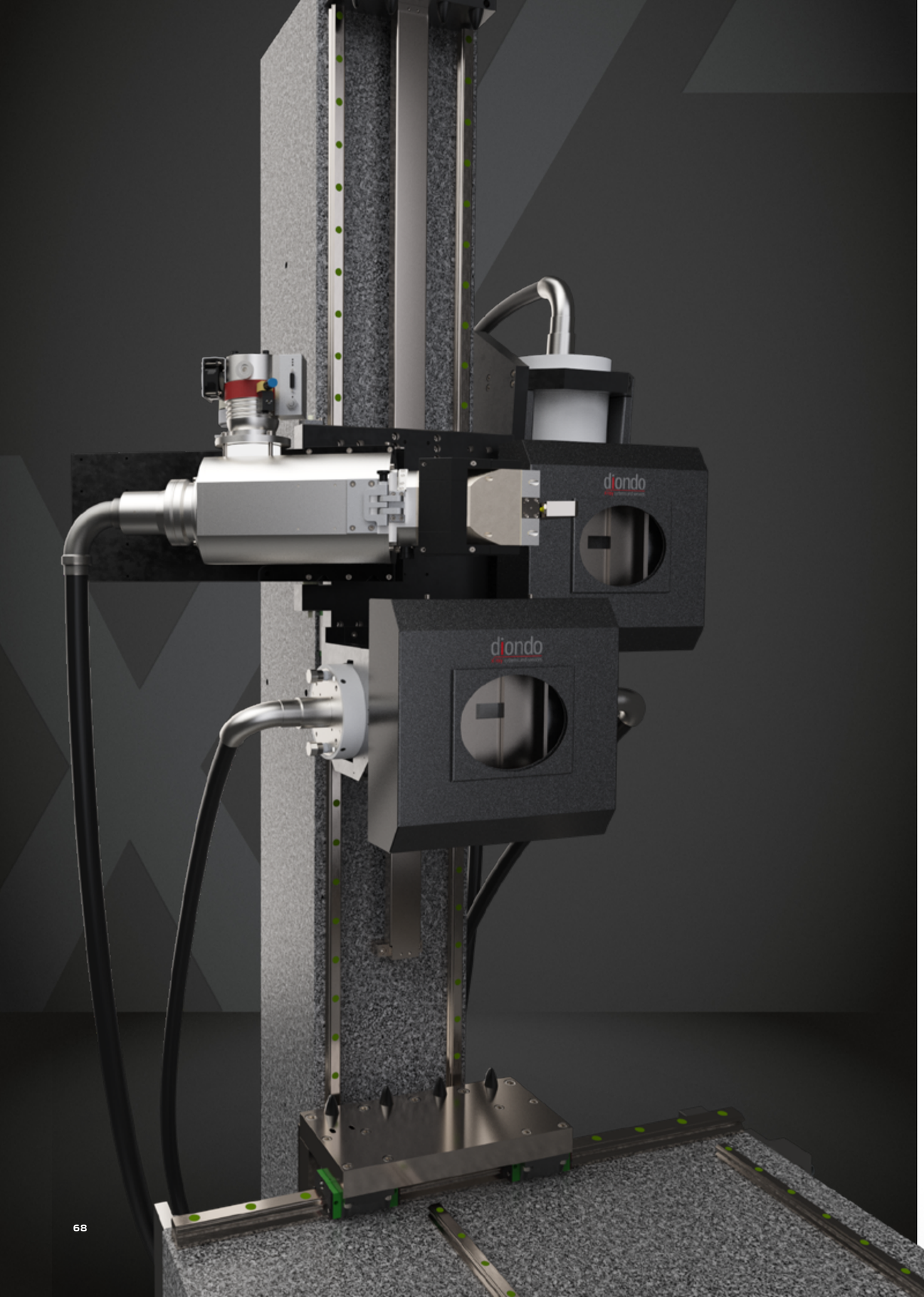
diondo d5

Multifunctional & Freely Configurable CT System

Sample Size	●●●●●
Sample Density	●●●●●
Accuracy	●●●●○
Resolution	●●●●○
Footprint	●●●●●

X-Ray Source	190 - 600 [kV]
Source Type	Micro | Mini | Meso Focus
Focus Detector Distance	400 - 2700 [mm]
Detector	FPD | LDA
Scan Volume, maximal	Ø 1100 x 1500 H [mm]
Sample Weight	350 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.



diondo d_5

Multifunctional & Freely Configurable CT System

The multifunctional computed tomography system **diondo d_5** is designed for all customers, who do not wish to compromise in terms of performance, size and equipment. The wide range of high-performance x-ray sources and high-resolution detectors combined with an adaptable precision manipulator with up to 9 axes constitutes an innovative leap in terms of flexibility and performance.

Top level automated scattered radiation correction

Especially in CT scans at >300 kV scattered radiation causes a significant impairment of the image quality.
Using a line detector, this is avoided by strong pre-collimation.

diScatter is capable of compensating this impairment almost completely. After carrying out a fully automatic calibration, entire measurement series of structurally identical and similar test objects can be tomographed in high image quality and in very short time.

Highlights

+ **A Multitude of Combinations**

  to suit your specific testing requirements with up to three tubes & two detector variants

+ **Coordinate Measuring Technology**

  Reproducible 3D measurement technology for highest demands in accordance with VDI/VDE 2630-1.3

+ **Granite Manipulator**

  with up to 9 motorized axes for maximum flexibility

+ **in situ Enhancements**

  individual solutions for scientific analyses under test conditions

+ **Innovative Software Package**

  for optional test methods, e.g. Helix CT, diScatter, diPlanar

diondo d5

Multifunctional & Freely Configurable CT System

Mini & Meso Focus Tubes

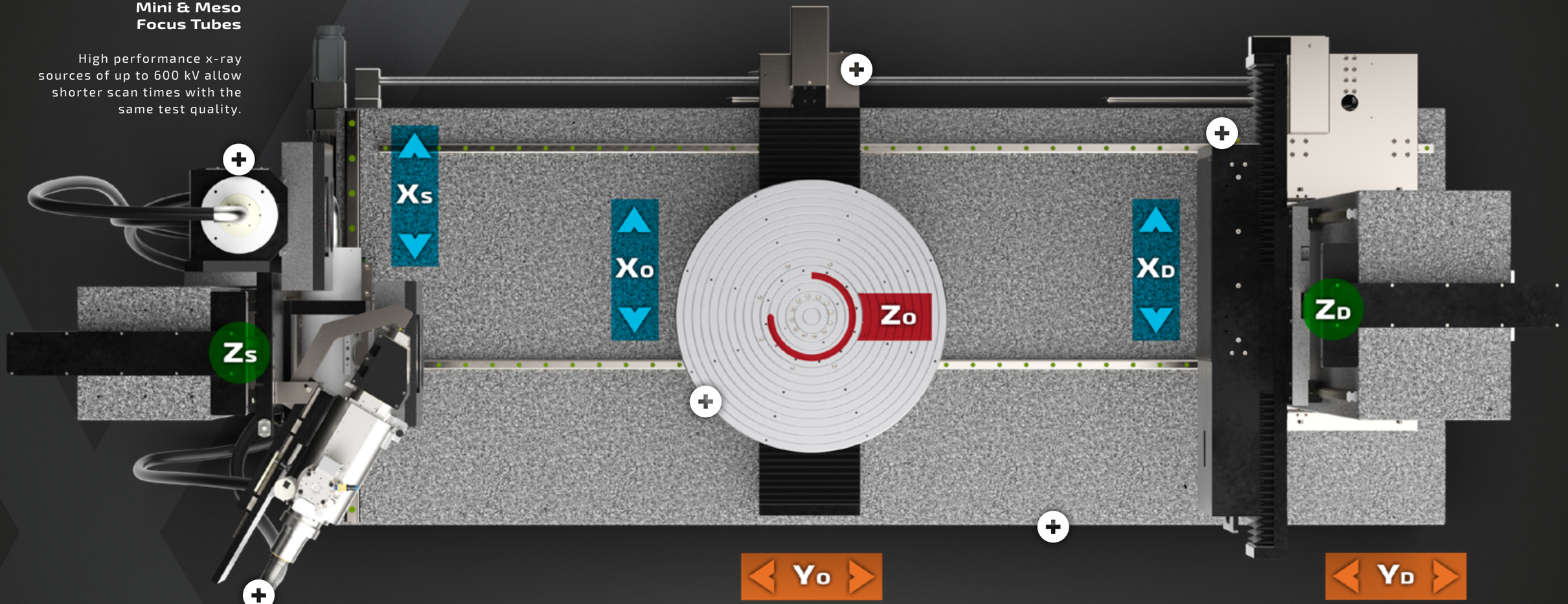
High performance x-ray sources of up to 600 kV allow shorter scan times with the same test quality.

Scalable & Future-Proof

Choose between up to nine axes and scale them according to your needs and preferences. Each system can be expanded with function modules or retrofitted anytime.

Line Detector & Flat Panel Detector

Tailored precisely to your specific applications. Benefit from the advantages of both fan beam and cone beam CT to optimize your test processes.



Reflection & Transmission Tubes

High-resolution of tubes up to a maximum of 300 kV enable very high resolution and short measurement times.

Scan Volume

Everything is possible from complex measurements of tiny components up to classic testing of voluminous objects.

Manipulator

The granite manipulator guarantees the highest levels of inherent stability, temperature insensitivity, while precision encoders ensure exact positioning.

diondo d5

Unparalleled Testing Capabilities

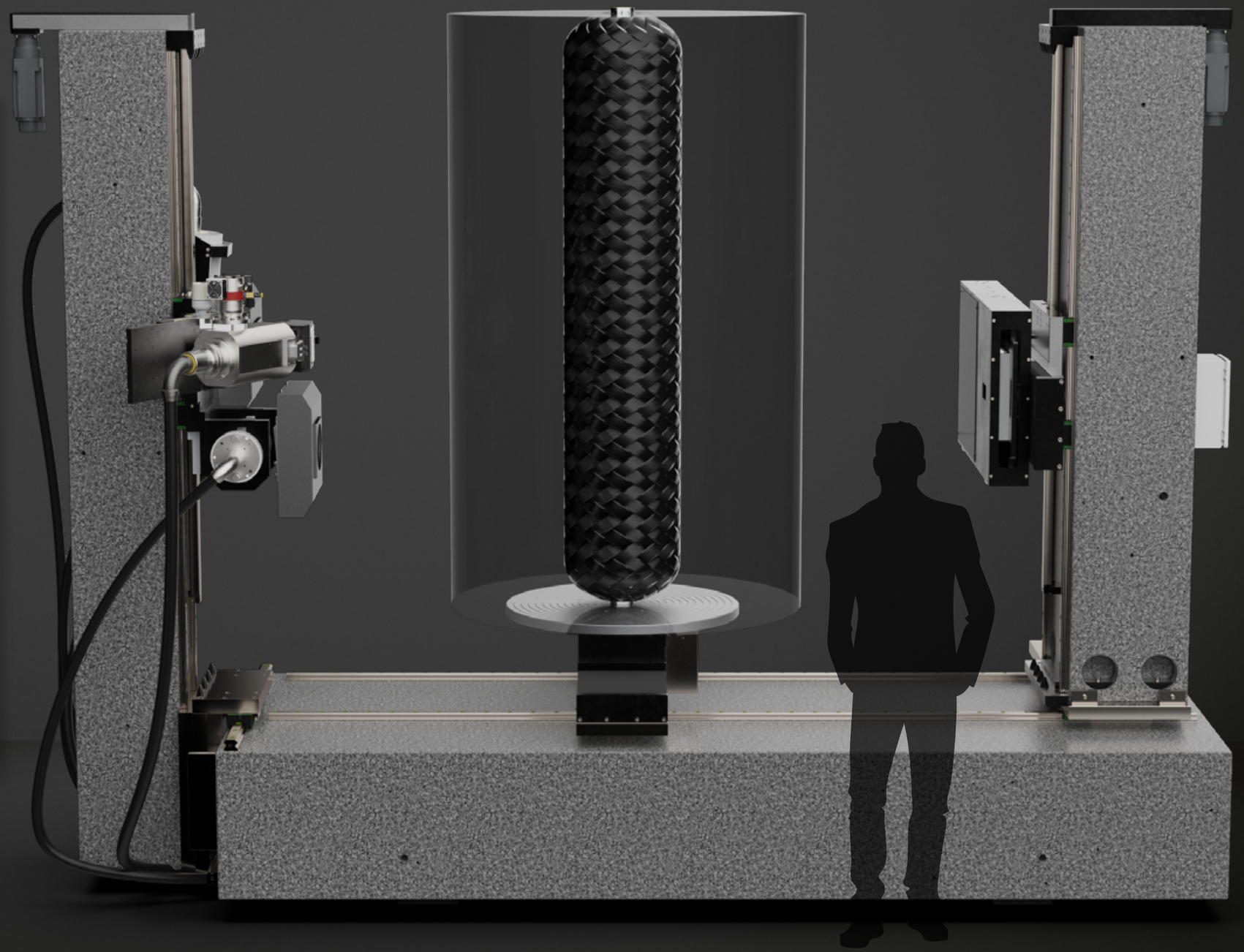
Experience Unlimited Testing Scope

The substantial granite manipulator is designed to accommodate nearly any test part, providing generous space for diverse testing needs.
With a sample diameter exceeding one meter and an impressive scanning height of 1,5 m, these generous standard features set a high benchmark in the industry.
However, the customized development by diondo pushes these boundaries even further, delivering solutions for objects that exceed 3 meters in height.

To ensure optimal performance, the system is equipped with up to three different X-ray sources, offering beam power up to an impressive 600 kV. This robust power is effectively captured by matching detectors available in both flat-panel and line detector designs, ensuring precise and reliable results.

Moreover, the system features a modular range of options, allowing for extensive customization.

This flexibility creates an unrivalled 3D inspection system that meets diverse requirements without compromise, making it an ideal choice for comprehensive and advanced testing applications.



CFRP hygrogen tank

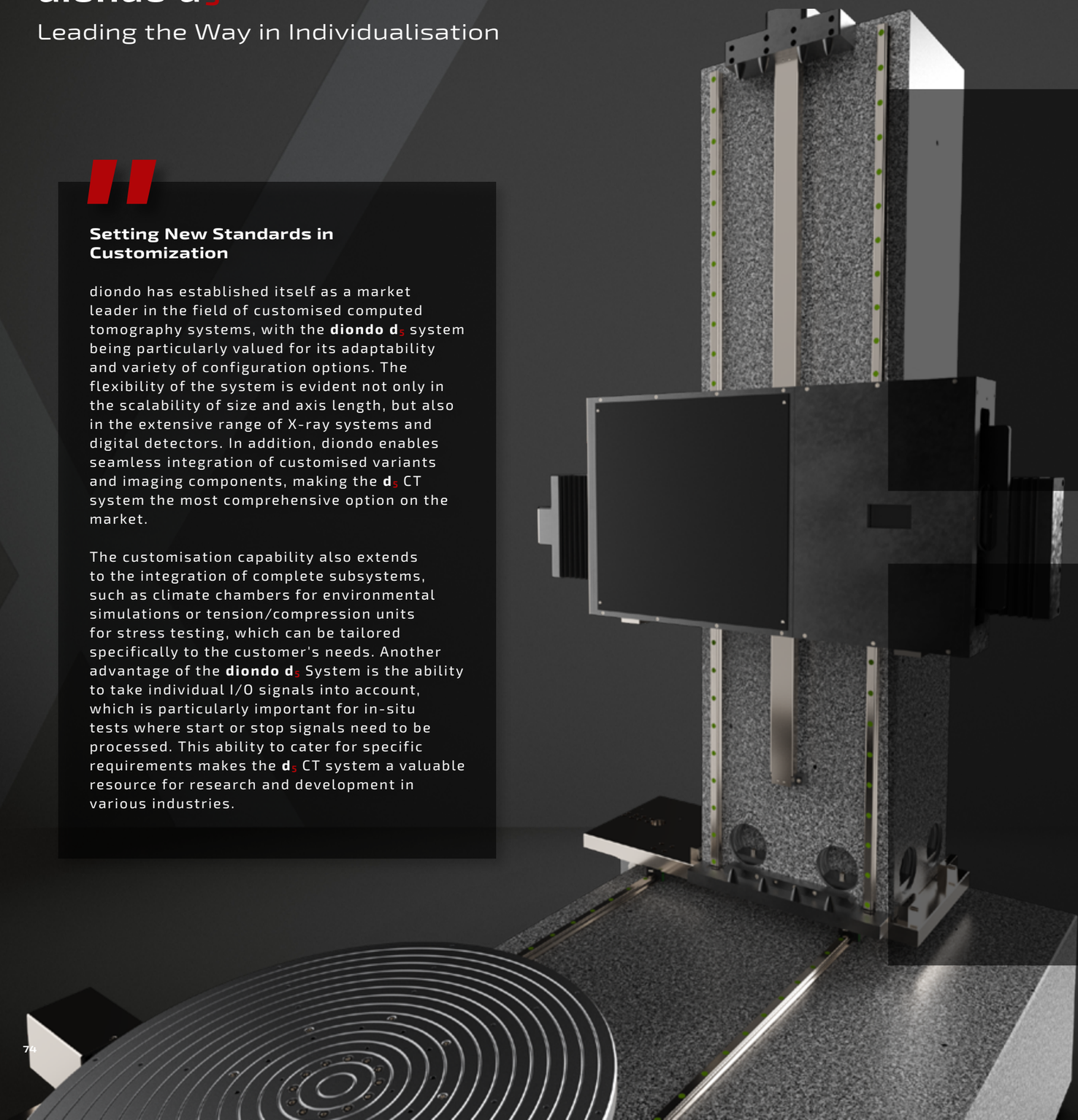
diondo d5

Leading the Way in Individualisation

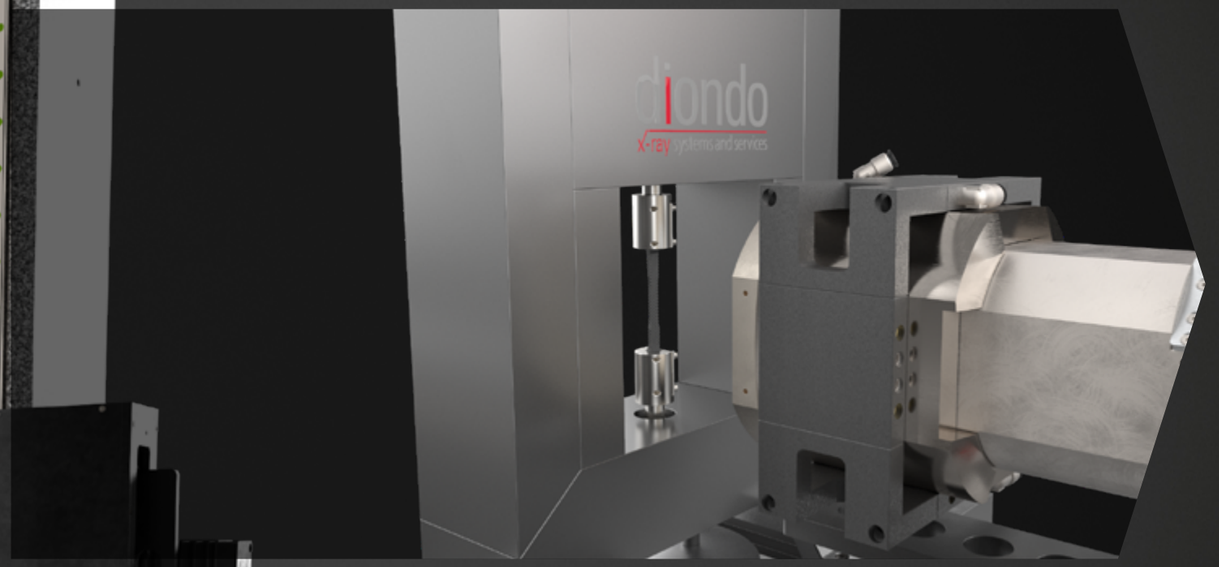
Setting New Standards in Customization

diondo has established itself as a market leader in the field of customised computed tomography systems, with the **diondo d5** system being particularly valued for its adaptability and variety of configuration options. The flexibility of the system is evident not only in the scalability of size and axis length, but also in the extensive range of X-ray systems and digital detectors. In addition, diondo enables seamless integration of customised variants and imaging components, making the **d5** CT system the most comprehensive option on the market.

The customisation capability also extends to the integration of complete subsystems, such as climate chambers for environmental simulations or tension/compression units for stress testing, which can be tailored specifically to the customer's needs. Another advantage of the **diondo d5** System is the ability to take individual I/O signals into account, which is particularly important for in-situ tests where start or stop signals need to be processed. This ability to cater for specific requirements makes the **d5** CT system a valuable resource for research and development in various industries.

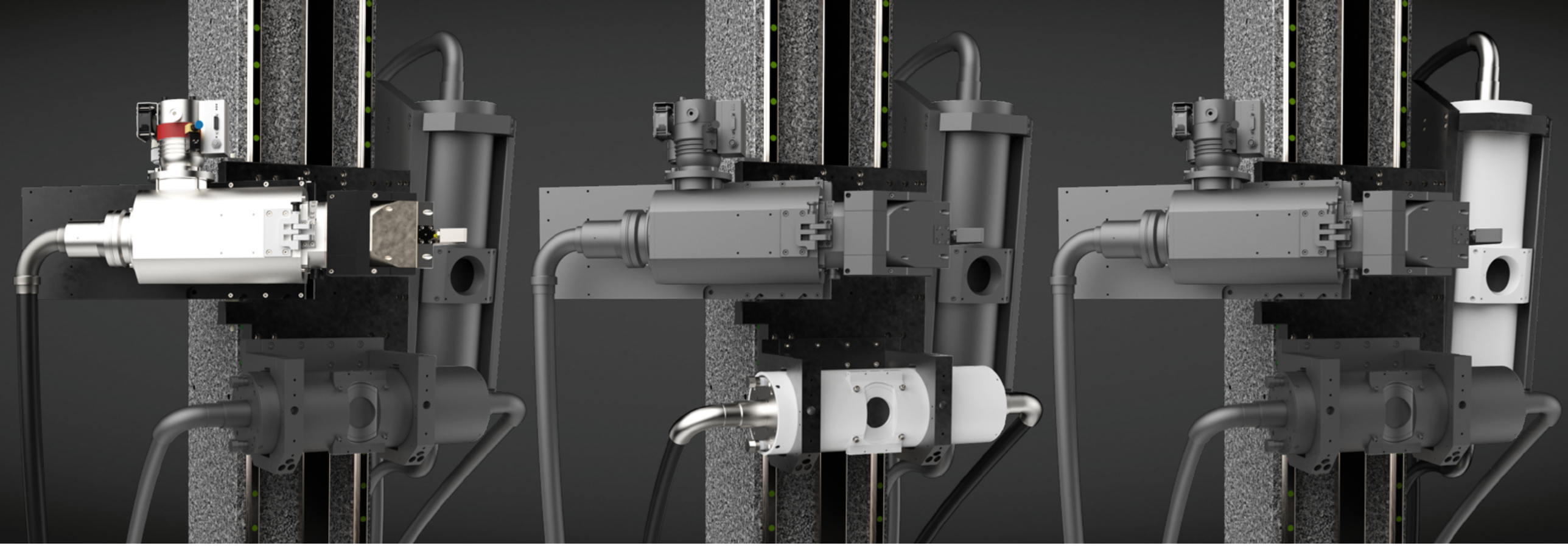


Custom dual detector configuration including photon-counting detector



Tensile / Compression module

Climate chambers for environmental simulations

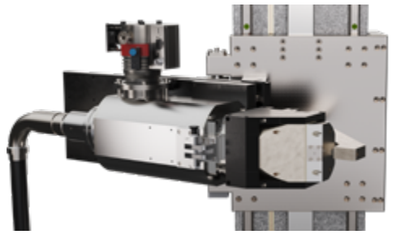


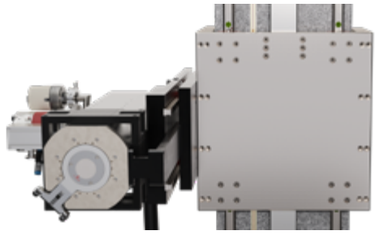
from left to right: Micro Focus Tube, Meso Focus Tube, Mini Focus Tube

From Highest Resolution to Highest Energy

Micro Focus X-Ray Tubes

For high-resolution applications and pinpoint accuracy the system can be configured choosing from the largest selection of microfocus X-ray sources available on the market.





Besides classic reflection tubes of up to 320 kV and a (target) power of 640 watts, high-powered transmission tubes are available, offering extreme performance of up to 300 kV and 80 watts (target) power.

Meso Focus X-Ray Tubes

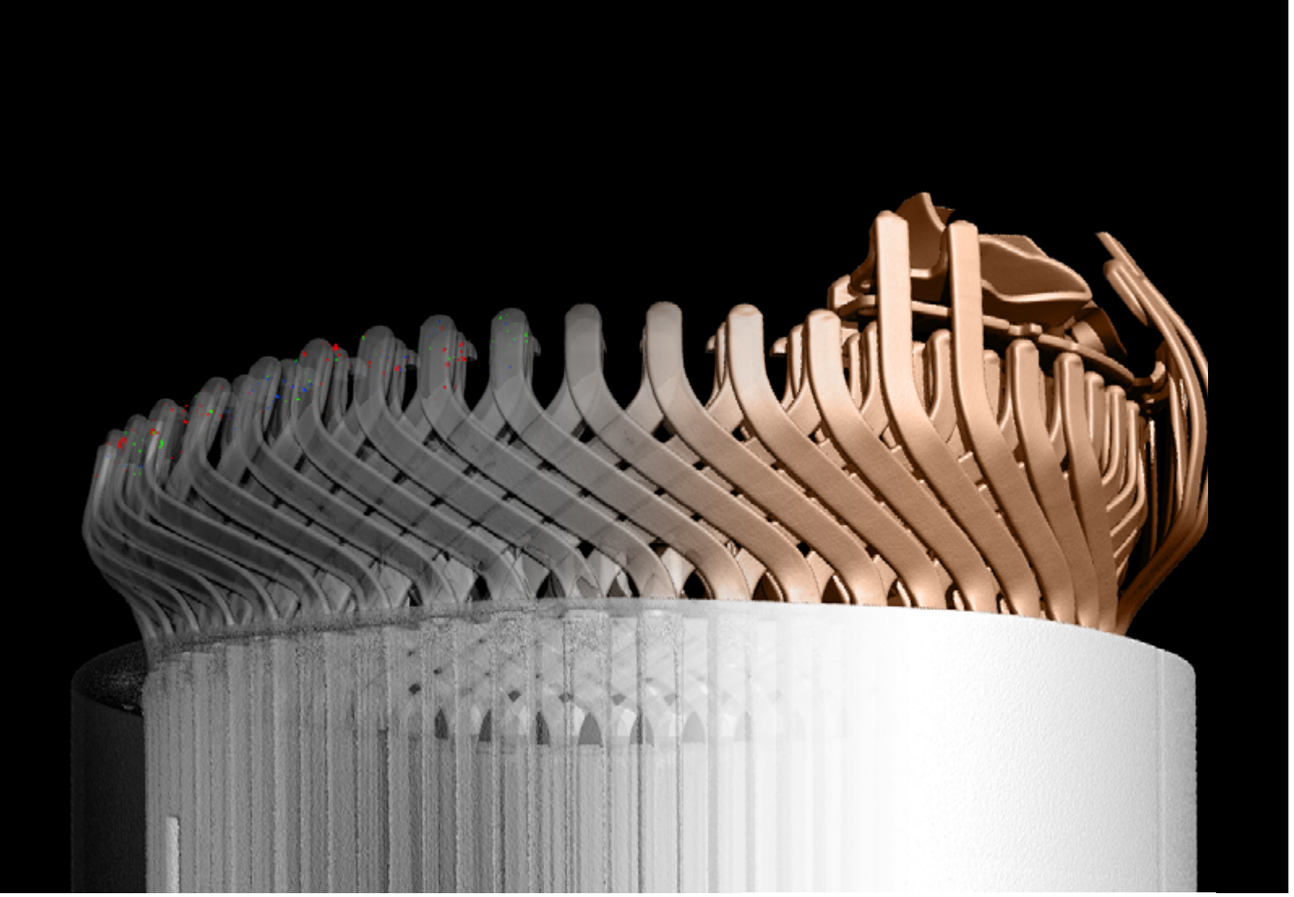
Combining high-resolution [30 µm] and high-penetration power [450 kV] with highest reliability makes the Meso Focus X-ray source ideal for challenging applications. The Meso Focus X-ray source has no restrictions in X-ray on time compared to standard open microfocus X-ray sources and thus achieve an image quality over the scanning time that was previously unrivalled.

The source enables highly stable dose rate without the need for recalibration during the CT scan. The result is consistent image quality and reproducibility, which is critical for long-term CT scans. In addition, no unscheduled filament change is required and the X-Ray tube can be serviced twice a year according to a fixed (plannable) schedule.

Mini Focus X-Ray Tubes

Today's market standard and proven in industrial applications for many years, Mini Focus X-Ray tubes have become indispensable due to their reliability and power.

diondo offers a wide range of high-performance tubes from 450 kV to 500 kV and up to 600 kV.v This ensures that customers always have the optimum configuration for the overall system.
Today and in the future.



CT scan of a E-mobility stator

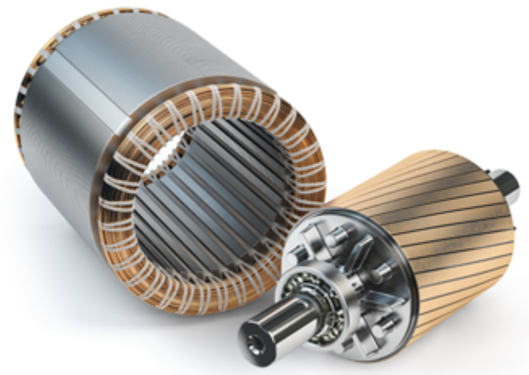
diondo d5

An Essential Component of Electric Motors

Hairpin Inspection

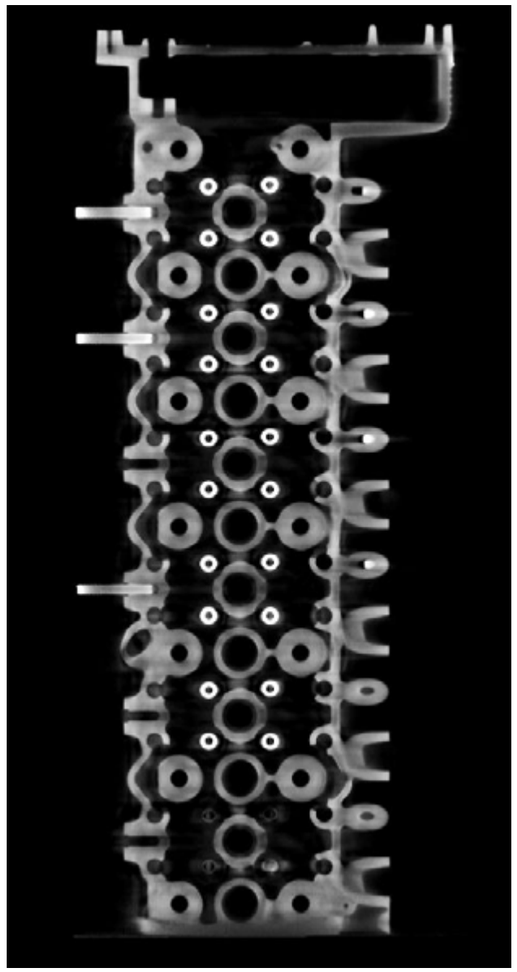
The core of these consists of numerous layers of electrical steel on which windings of resin-coated copper wire protrude from the top and bottom. Due to the easy deformability of the copper wires, the glossy reflection and the slight transparency of the resin, tactile and optical measuring technology for quality assurance reach their limits.

Another difficulty is the post-processing of the 100 hairpins after positioning in the sheet stack due to the change in shape and therefore difficult accessibility.

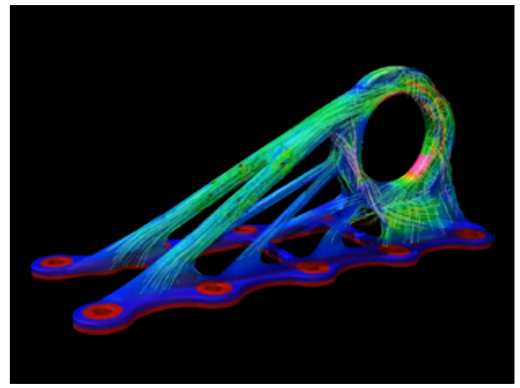


Applications

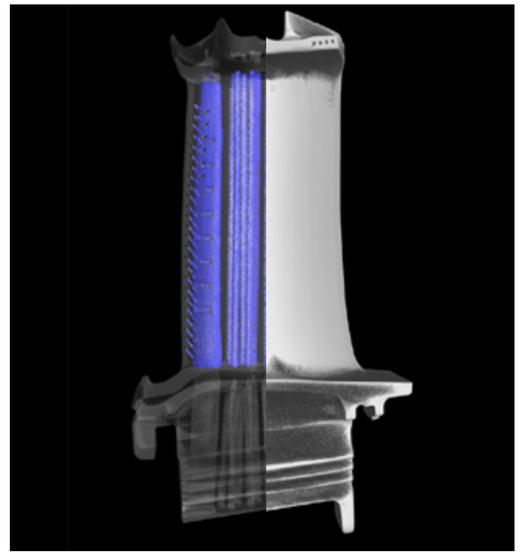
Wide Range of Application Possibilities



CT scan of a cylinder head



Structural mechanics simulation of aerospace part



CT scan of a Inconel turbine blade

Applications

The range of applications includes everything from complex measurements of tiny components up to classical non-destructive testing of voluminous objects.
The diondo d5 is used for measuring and analyzing very different test parts and materials such as:

- Cylinder heads, gearboxes
- Cast parts made from steel, aluminum
- Additively manufactured parts
- Injection-molded plastic parts
- Geological samples
- Mechatronic assemblies
- Fiber composites
- Metal alloy components

diondo d5

Technical Data

Selectable X-ray Sources

	Mini Focus Tube		Meso Focus Tube				
			450 [kV]				
X-ray Tube Voltage	450 / 500 [kV]	600 [kV]					
Target Power	700 / 1500 [W]	700 / 1500 [W]	50 [W]	100 [W]	250 [W]	350 [W]	450 [W]
Minimal Focal Spot Size	400 /1000 [µm]	700 / 2000 [µm]	63 [µm]	100 [µm]	250 [µm]	350 [µm]	450 [µm]

Selectable Micro X-ray Sources

	Transmission Tube	Reflection Tube
X-ray Tube Voltage	190 / 225 / 240 / 300 [kV]	240 / 300 / 320 [kV]
Target Power	50 / 80 / 120 [W]	450 / 640 [W]
JIMA resolution	0.5 / 0.9 / 2.0 / 3.0 [µm]	4 / 5 [µm]

System

System Dimensions	L 5000 x W 3200 x H 3500 [mm]
System Weight	45 [t]
Active Ventilation	yes
Climate Control	optional

Additional Options

Collision Protection	included	Climate monitoring	optional
Positioning Laser	included	diPlanar	optional
Motorised Filter Changer	optional	Ultra Wide Field of View Extension	optional
Motorized Translation Stage	optional	diScatter Bundle	optional
Metrology package VDI/VDE 2630-1.3 - MPE_{SD}: 5 µm + L /100	optional	Beam Collimator	optional
in situ Module (temperature)	optional		
in situ Module (tension/compression)	optional		

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3

Find more information in our **diControl** brochure.

* All dimensions are nominal and may vary depen ding on system configuration. Customized adjustments are available on request.

Detector

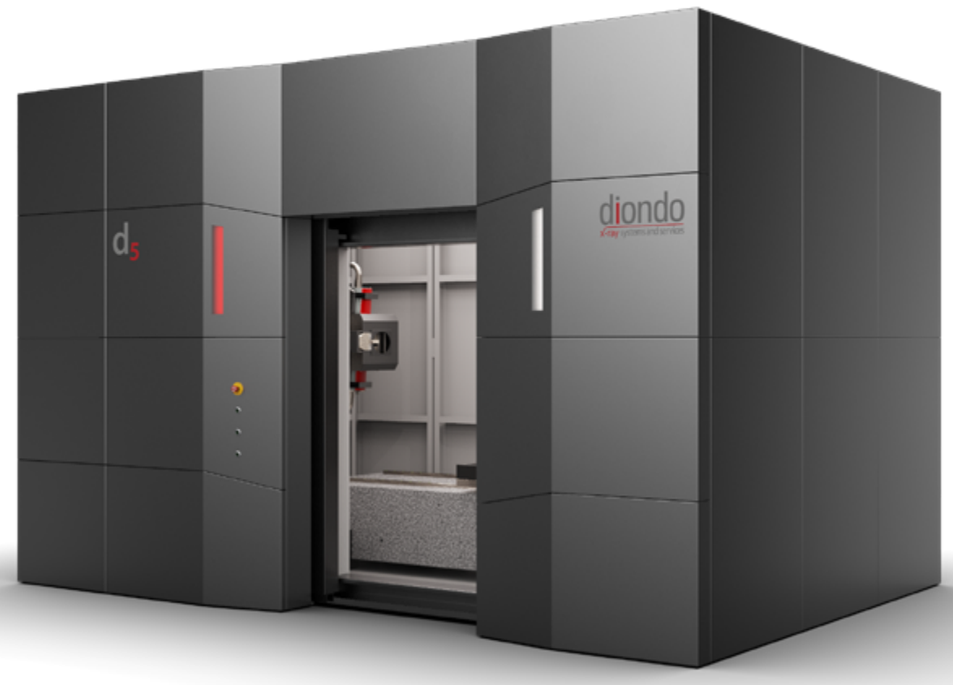
	Digital Flat Panel Detector		Line Detector
	3K	4K	
Active Area	417 x 417 [mm²]	427 x 427 [mm²]	820 [mm]
Active Matrix	3000 x 3000 px	4200 x 4200 px	4100 px
Pitch	139 [µm]	100 [µm]	200 [µm]
Dynamic Range	16 bit	16 bit	16 bit

Test Sample

Sample Size, maximal	Ø 1200 x H 2000 [mm]	
Scan Volume, maximal Micro Focus Tube	Ø 1000 x H 1500 [mm]	-
Scan Volume, maximal Mini/Meso Focus Tube	Ø 1100 x H 1500 [mm]	
Sample Weight	100 / 250 / 350 [kg]	

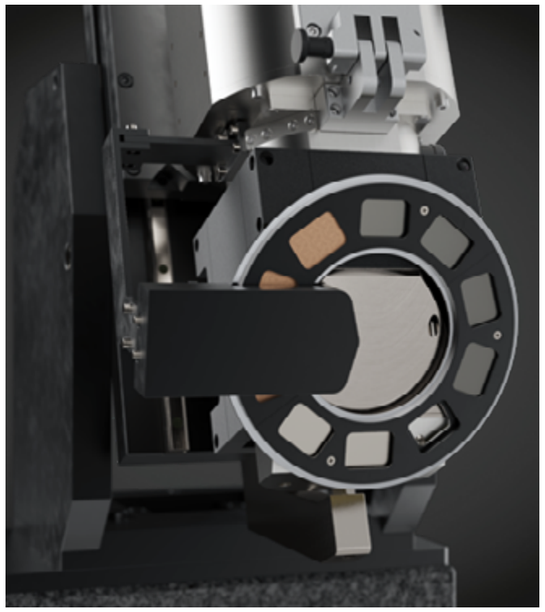
Manipulation

Number of Axes	7 / 8 axes	
Focus-Detector-Distance, Micro Focus Tube	400 - 2150 [mm]	-
Focus-Detector-Distance, Mini/Meso Focus Tube	900 - 2700 [mm]	900 - 2650 [mm]
Manipulator Material	granite base	



diondo Modules

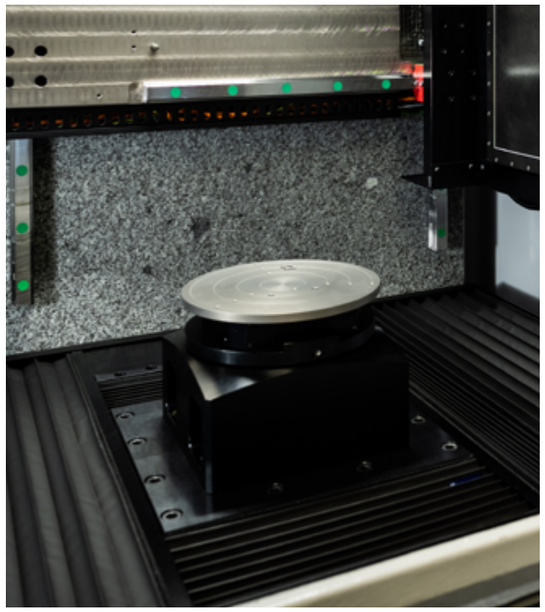
Choose your Optional Function Module or
Equipment Module



Motorized Filter Changer

diondo's motorized filter changer provides a comfortable and automatable change of pre-filters. The operator can easily load a predefined scan template and the right pre-filter will be chosen automatically. Wrong/ low quality scan results omitted through the operator can be avoided.

Included Prefilteration:
Al 1.0 mm, Al 2.0 mm, Al 1.0 mm + Cu 0.5 mm, Al 1.0 mm + Cu 1.0 mm, Al 2.0 mm + Cu 2.0 mm, Cu 0.5 mm + Sn 0.5 mm, Cu 1.0 mm + Sn 0.5 mm, Cu 1.0 mm + Sn 1.0 mm, Cu 2.0mm + Sn 1.0 mm



Motorized Translation Stage

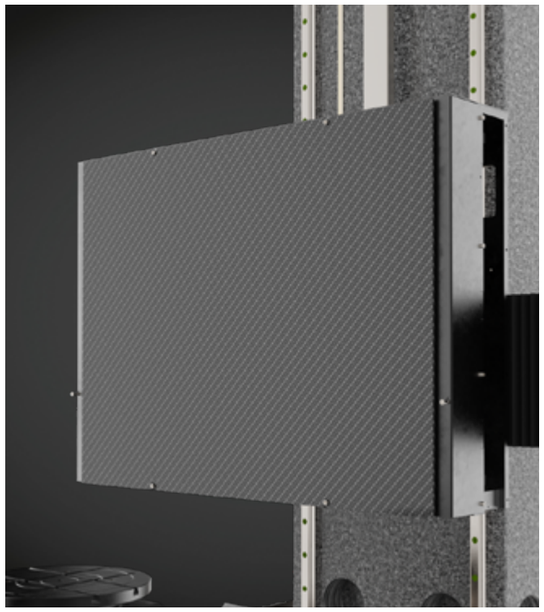
If the test object is not positioned exactly in the centre of rotation by the user, this leads to a loss of resolution or the test object "running out" during a rotation. Diondo's motorized translation stage is a solution for accurate and effective test object centering.

Detachable stage
The translation stage can be removed if heavy objects are scanned.

- Payload 10 kg
- Travel length +/- 20 mm

Permanently stage
The motorized translation stage is a fixed component of the overall manipulator.

- Payload max 100 kg [centric load]
- Travel length +/- 50 mm

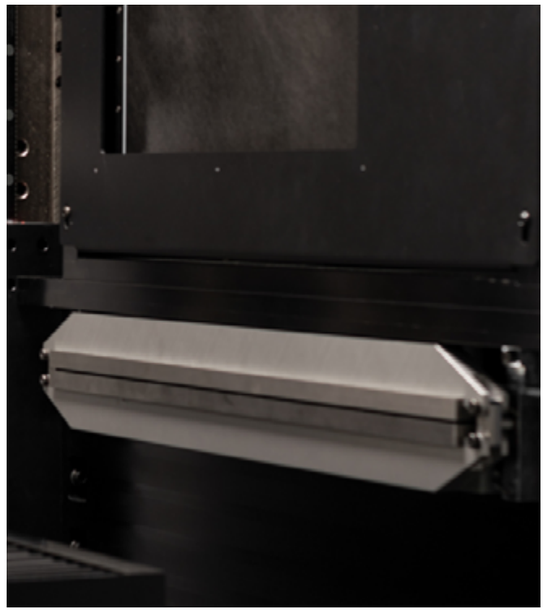


Anti-Collision Devices

PLC
The PLC program prevents a collision between x-ray tube, detector and turntable.
Furthermore, the operator can store the maximum test specimen diameter for centric loading in the software in order to virtually extend the collision protection.

Sensor
A non-contact optical sensor prevents a collision between x-ray tubes and specimen. The sensor could be deactivated by use of a key switch for applications that require shortest focus object distances.

Passiv
A plate made of low-density material (e.g. carbon fibre composite) will be mounted in front of the detector to protect it from damage in the event of a collision with an object.



Line Detector Collimator

The line collimator is highly effective in eliminating scattered beam artifacts by restricting the angle at which X-rays can enter. This is achieved through the use of two solid tungsten elements, which can be adjusted in distance relative to each other to optimize performance.
These collimators are available in both manual and fully automatic versions, providing flexibility to suit various operational needs and preferences.

diondo Modules

Choose your Optional Function Module or
Equipment Module

Motorized Source Collimator

The innovative motorized 4-field collimator improves the image quality of CT results during the inspection of dense scan objects. By reducing scatter radiation, it ensures clear edges and sharp images.

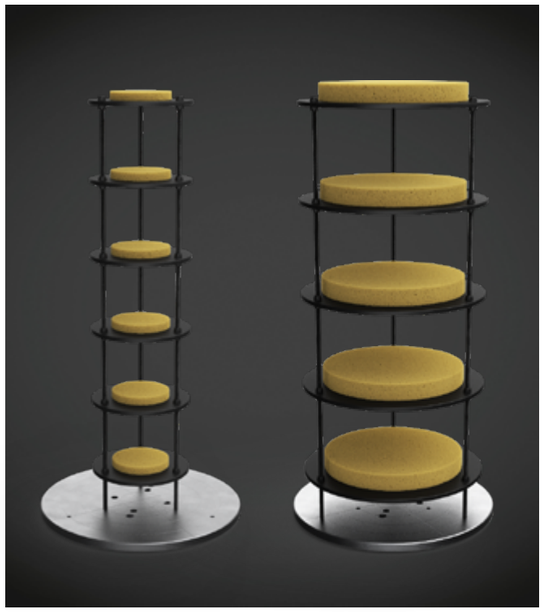
Fully integrated into the software, the four highly absorbent tungsten jaws automatically adjust to the active area of the flat panel or line detector, depending on the focus-detector distance and the scan mode (e.g., Multiline). This allows for an effortless sequence of various scans to be started, making processes more efficient – fully automatic without manual assistance.

Ruby Ball Phantom

Thanks to their stable and precisely manufactured granite manipulators, all d-series systems can be qualified for metrological applications in accordance with VDI/VDE 2630.

The special calibration routine from diondo guarantees maximum accuracy in accordance with VDI/VDE 2630 1.3 and can be carried out easily with the special diondo ruby ball artefact.

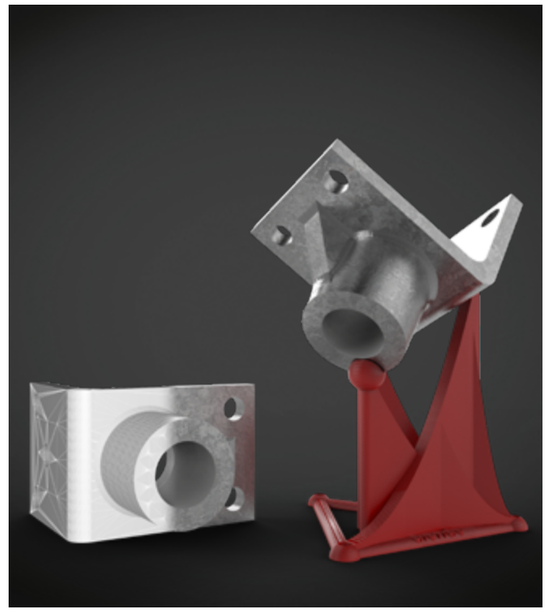
Two ball plates made of easily penetrable CFRP in a housing, each with highly resistant ruby balls for the adjustment of CT systems. The housing of the ball plates is designed to protect against external influences and signs of wear, so that the high-precision ball plates deliver reliable measurement results over the long term.



Multi-Plate Component Mounts

diondo stacking towers enable CT scans of several (even different) parts without the presence of an operator and significantly reduce the supervision efforts of your system.

The batch scan mode enables the system to automatically process one test part after another. The Multi-Plate Component Mounts are solidly constructed from carbon fibre reinforced polymers and are available in different sizes.



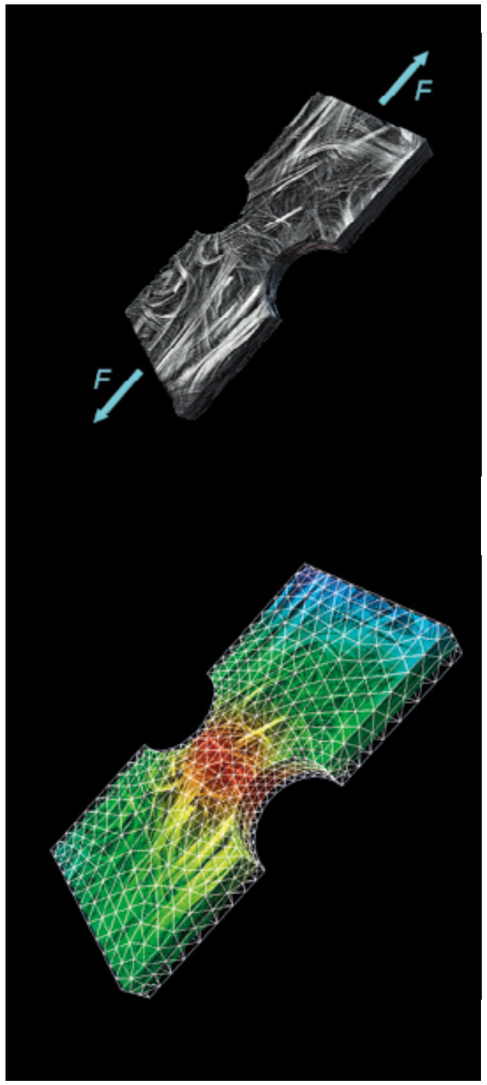
Customised Component Mountings

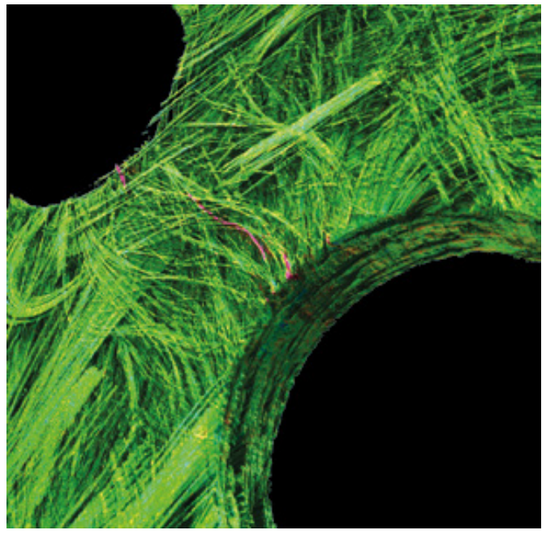
This groundbreaking tool generates a custom 3D-printable fixture based on the STL file of a test part. First, the optimal pose for CT scanning is computed, accounting for the complete geometry of the test part and potentially a user-defined specific region of interest (ROI). Then a fixture design is calculated to enable the test part to be reliably fixtured in this optimal pose. The fixture therefore enables CT imaging quality to be maximized, for instance by reducing artifacts that can arise from long penetration lengths, and ensures a reproducible inspection.

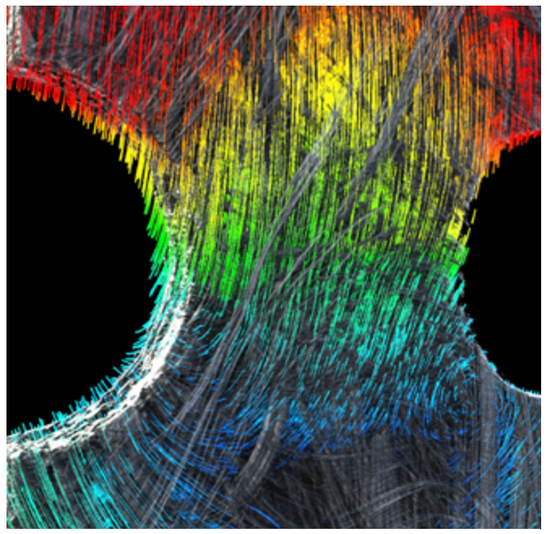
Simply send us the STL file of a test part, and we will deliver the fixture to you (either as a file for you to print yourself, or a polymer 3D print), allowing you to achieve even better results quickly and easily. Note that whilst the fixture calculation is tuned to diondo CT systems, generated fixtures will also be usable on most other CT systems.

diondo Modules

in situ Computed Tomography







Digital volume correlation (DVC)

Dimensional Measurement & Material Testing under Specific Test Conditions

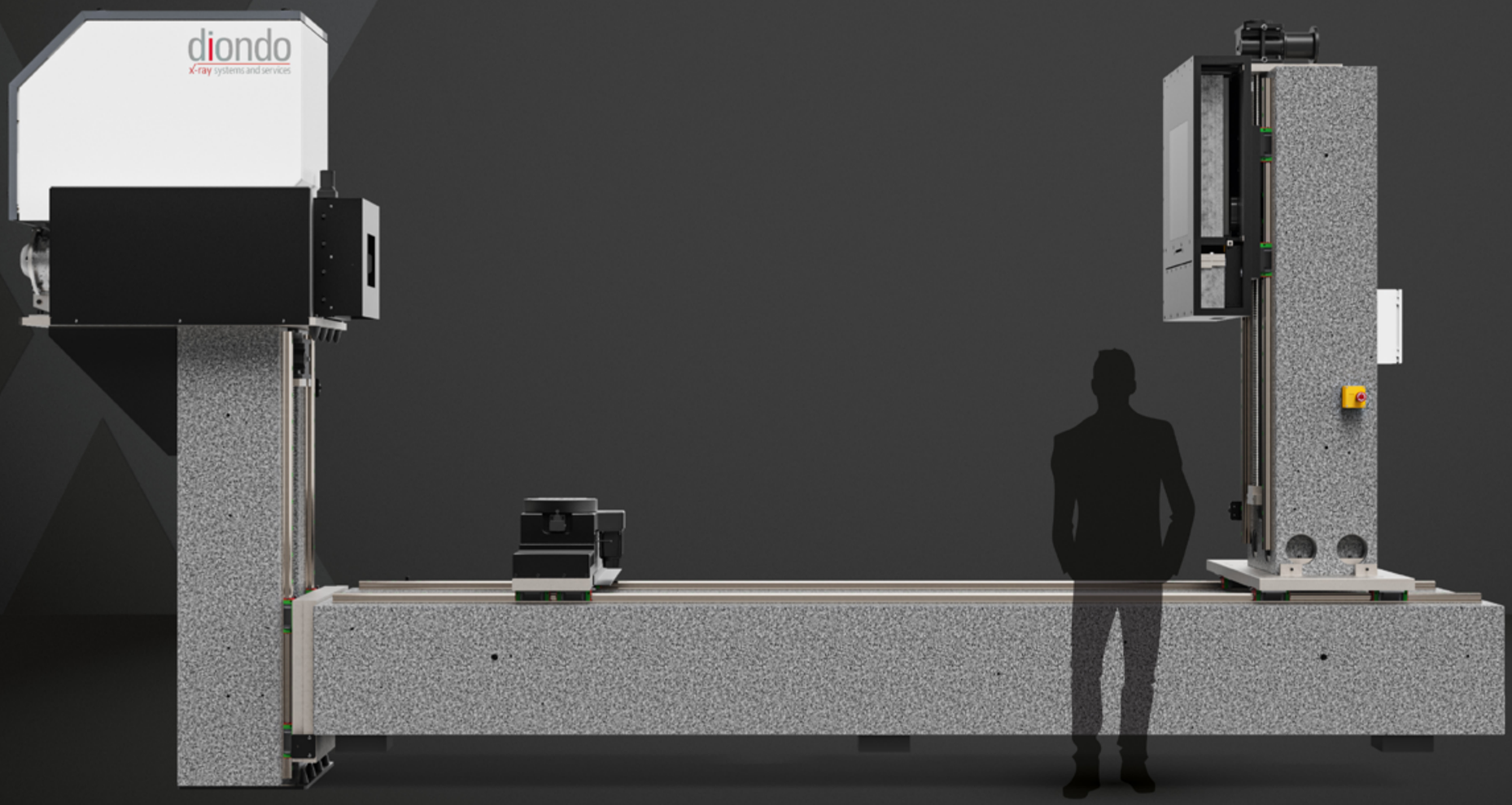
The diondo in situ inspection technology allows for the 3D visualization of test objects under the influence of tension, pressure, bending and/or temperature. This provides time-based thermal and mechanical testing of materials such as composites and additively manufactured components. The special design allows maximum flexibility and a resolution optimized for the size of the component. Available as tension unit up to 10 kN.

The **diondo d_5** and **diondo d_3** system can be equipped with additional functional modules in order to apply close-to representative load conditions such as mechanical, thermal or chemical stresses onto the sample - while observing the impact in the CT image.

Among these are tensile and pressure testing machines, multiaxial tire constraining units, climate chambers, etc.

diondo d7

High-Performance Linear Accelerator CT System for Imaging High-Density Components



Sample Size	
Sample Density	
Accuracy	
Resolution	
Footprint	

X-Ray Source	3 / 6 / 9 [MeV]
Source Type	Linac
Focus Detector Distance	variable
Detector	various
Scan Volume, maximal	Ø 2000 x H 2200 [mm]
Sample Weight	1000 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.

diondo d$_7$

High-Performance Linear Accelerator CT System for Analyzing & Testing of High-Density Components

The linear accelerator CT system **diondo d$_7$** is the most powerful CT system of the product family and suited for analyses of high-density components (engine, crankcases, stators, turbine blades, etc.) from titanium, copper, steel or thick-walled aluminium. The focus of the application of such powerful CT systems are predominantly component analyses to detect any manufacturing or material defects, as well as the review of shape and wall thickness of the test objects.

High-speed DR analyses

High-speed DR analyses and new fields of application are now available due to the extremely high pulse rate and penetration power of the linac. As an example, high-speed recordings of running motors, triggering airbags, and combusting fuels are possible in combination with special detectors.
In cooperation with Siemens and the Fraunhofer Institute various experimental setups regarding short-term dynamics have been implemented successfully.

Highlights

+ **Linac**

  Performance classes 3 MeV, 6 MeV and 9 MeV,infinitely adjustable work areas

+ **Manipulator**

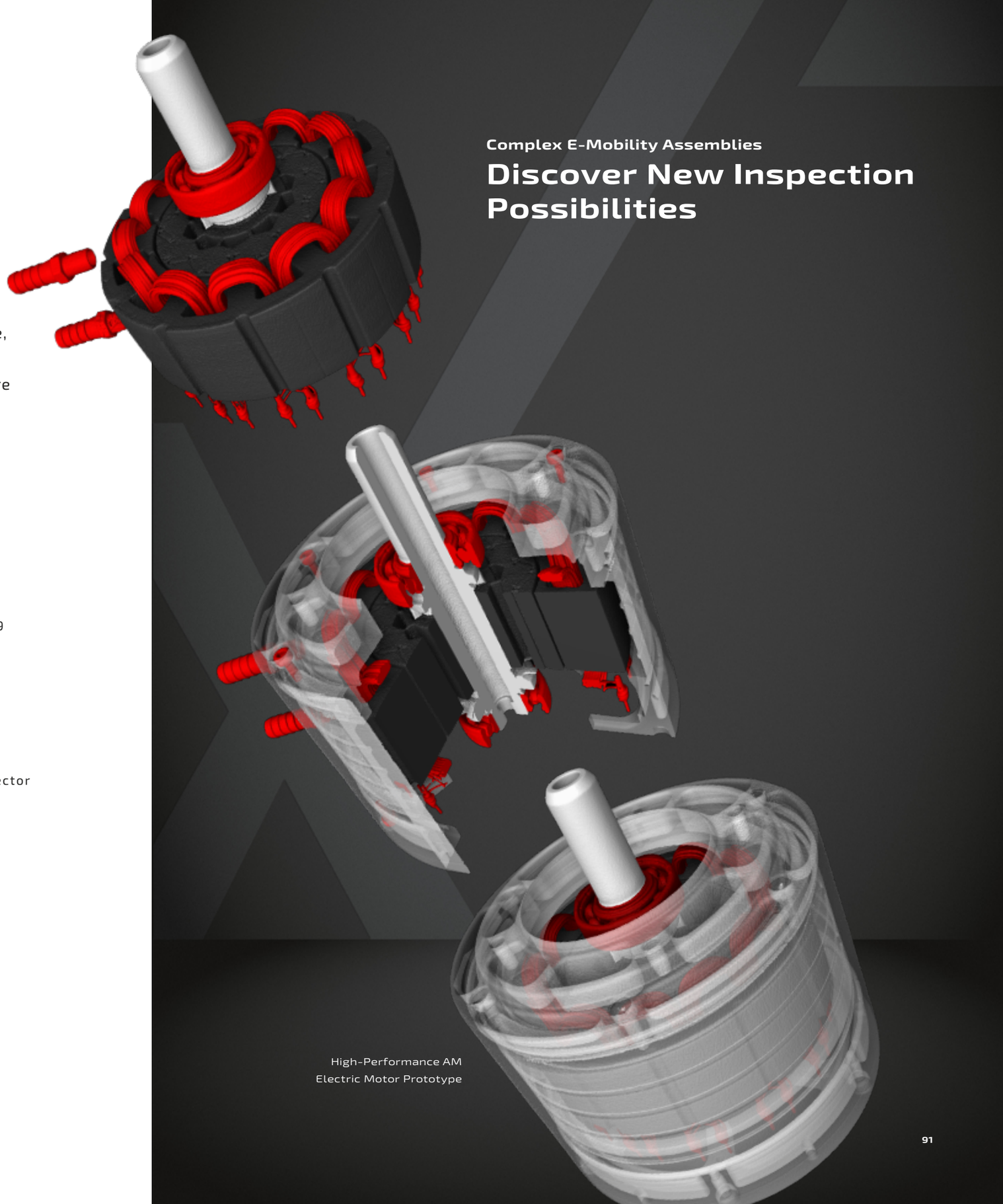
  Adapted to customer requirements and available in different sizes

+ **Flat Panel Detector**

  High-resolution [139 µm] flat panel detector optimized for Linac CT

+ **Line Detector**

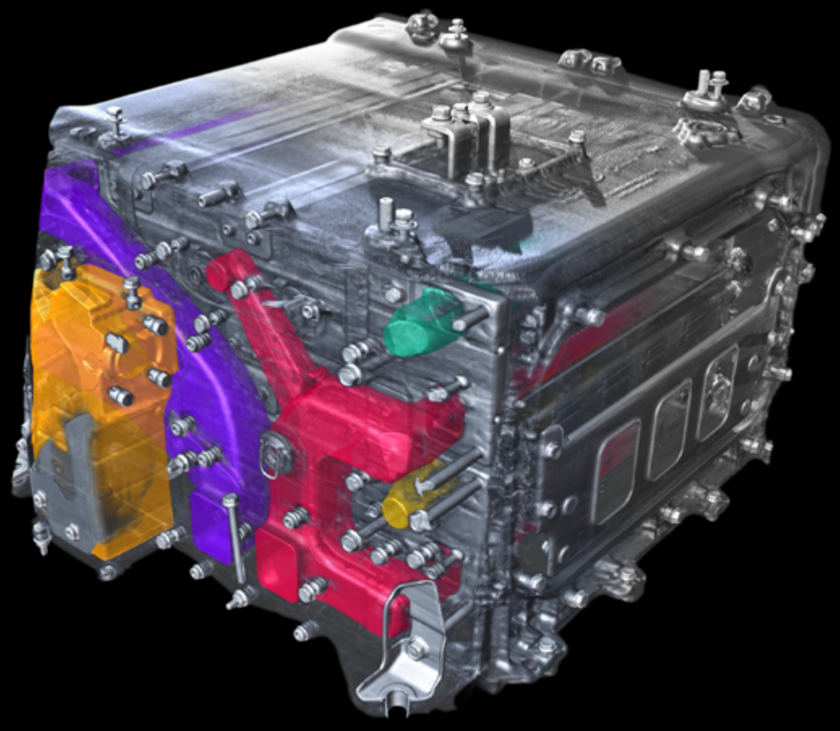
  High-resolution [200 µm] Line Detector optimized for Linac-CT

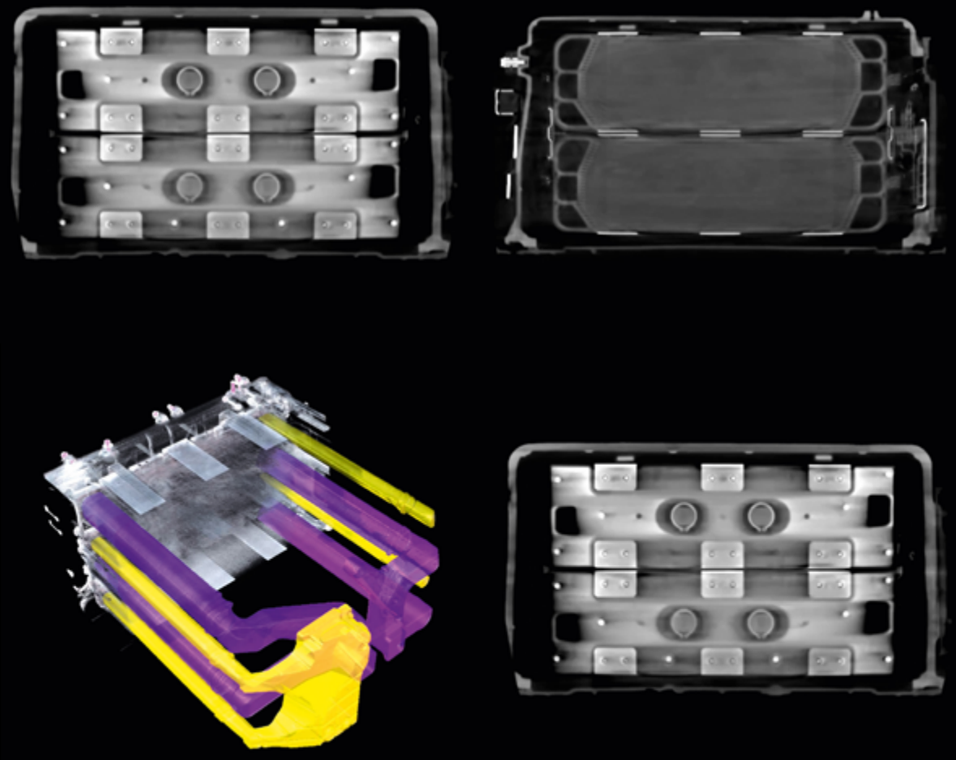


Complex E-Mobility Assemblies

Discover New Inspection Possibilities

High-Performance AM
Electric Motor Prototype





CT scan of a hydrogen fuel cell

diondo d7

A Comprehensive Package of Benefits

Analyse Components Holistically in one Scan Analyse and Inspect

Regardless of whether you are involved in the product development phase, quality assurance or damage analysis, CT technology offers you many advantages.
Its speed and ease of use allow you to analyse your products in depth in order to optimise their properties based on the manufacturing process and ensure consistently high quality.
The fuel cell shown here, consisting of a large number of individual components made of different materials can only be analysed in part once it has been assembled.

With the help of the Linac, you can also analyse large and high-density components and use numerous possibilities at the same time:

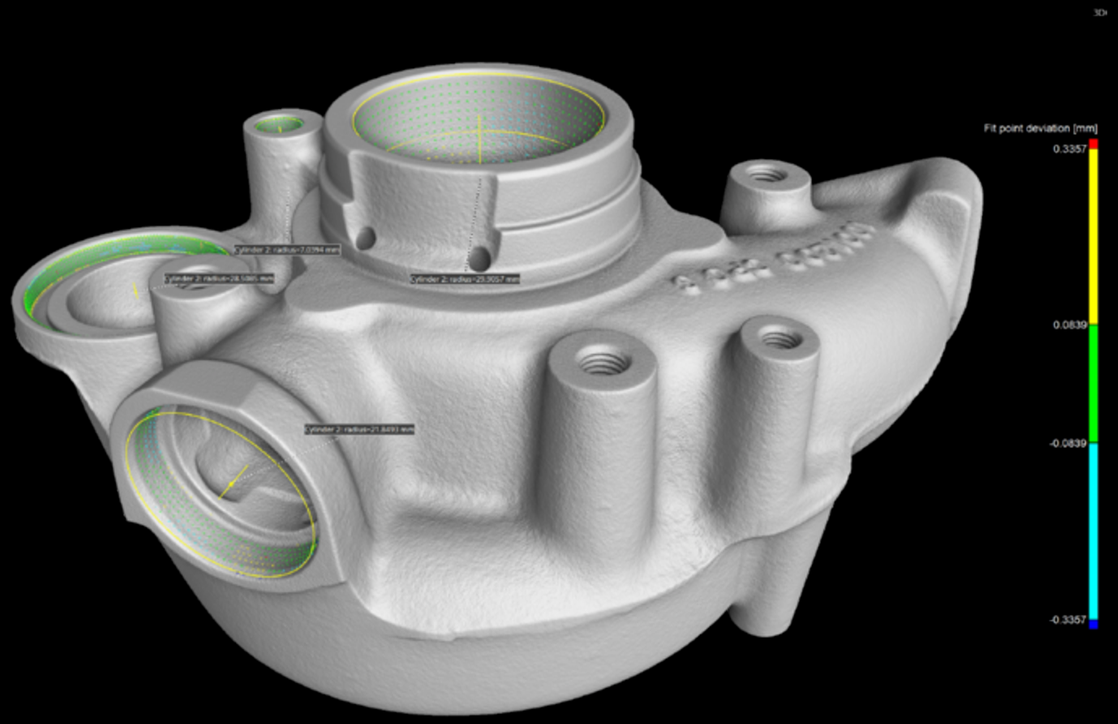
Measurements of membrane layer thicknesses, investigations for leaks and deviations from shape and position tolerances can be carried out simultaneously using a CT scan and do not have to be carried out using time-consuming individual measurements.

High-energy CT considerably expands the range of CT applications. The MeV power range makes it possible to analyse materials that are difficult to scan.
Even with difficult material combinations, the high-energy CT delivers voxel models with clear contrasts, as the fuel cell example shows. This means that the user benefits from a double time advantage:

High radiation energy minimises both the scanning time and the time required for subsequent analyses thanks to the higher data quality.

Advantages of High-Energy CT

- Complex assemblies and dense materials can be scanned
- shorter scanning times
- higher data quality than with lower radiation power, i.e:
  - fewer artefacts and scattered radiation
  - Time savings during evaluation



CT scan of a cast iron pump housing

diondo d7

A Comprehensive Package of Benefits

Quality and Safety Requirements in the Aerospace Industry

Conventional inspection methods make it difficult to detect internal defects in additively manufactured parts and cast components due to a lack of accessibility.

CT technology can usually detect such defects without any problems, but most CT systems reach their limits with large volumes and wall thicknesses, as is the case with the cast component of a pump shown here.

The radiographic lengths can quickly reach 30 cm, meaning that the components can only be completely scanned and good scan quality achieved with very high energies, for example with the Linac. With the help of CT technology, we enable our customers to detect several types of defects simultaneously with just one CT scan.

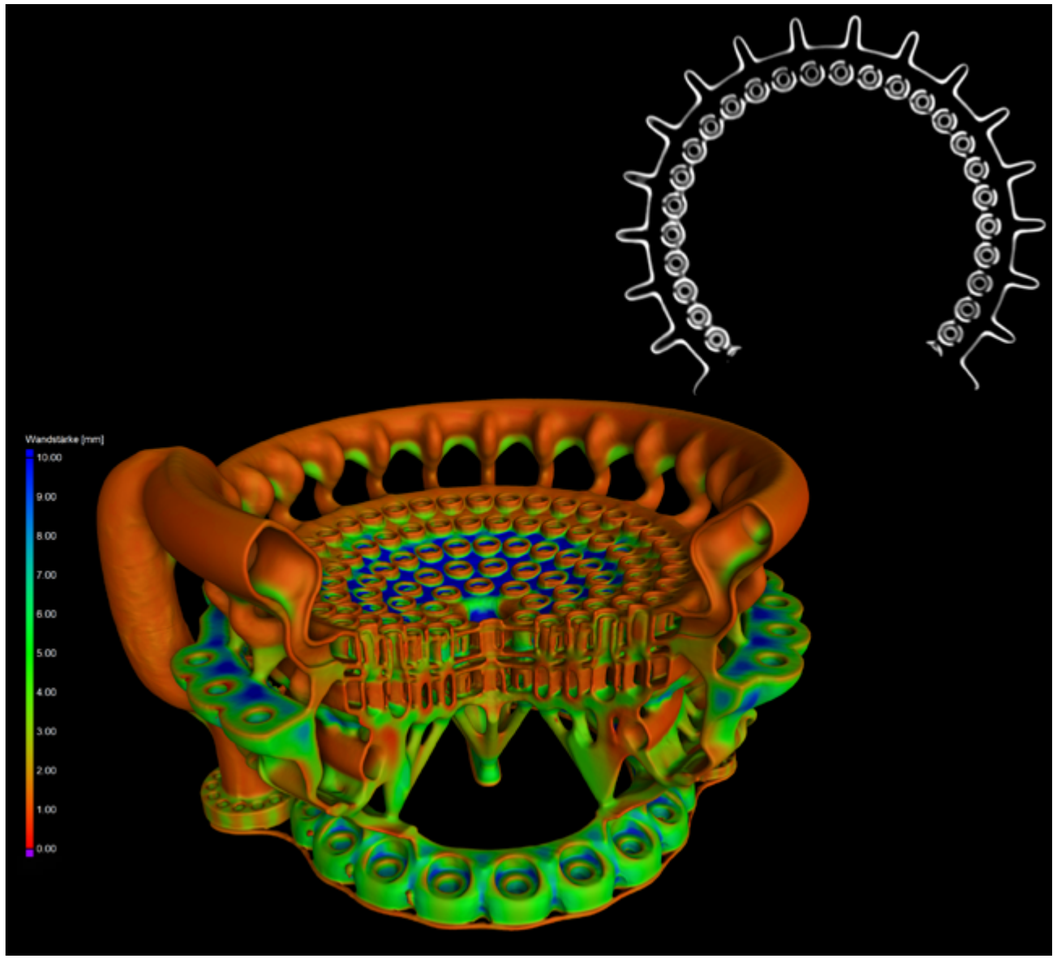
CT scan of a rocket combustion chamber

In the case of the part of a rocket engine shown here, which was made from a copper alloy (10% more dense than steel), the Linac was able to optimally image the fine contours inside despite the 20 cm diameter.

This enables wall thickness analyses and the internal cooling channels can be examined for powder residues from the manufacturing process. In addition to deviations in internal contours, pores, for example, which also occur in cast components, can occur and significantly weaken components. analyses thanks to the higher data quality.

Applications

Wide Range of Application Possibilities



CT scan of a copper heat exchanger

Applications

The range of applications includes everything from complex measurements of tiny components up to classical non-destructive testing of voluminous objects.
The **diondo d$_7$** is used for inspecting a diverse set of samples from a range of industries:

Industries

- Electric mobility
  [rotors, stators]
- Automotive
  [engine blocks, cylinder heads]
- Energy [turbine blades]
- Air & Aerospace
  [power unit components]
- Mechanical engineering
  [high-alloy steels, cast-iron components]

diondo d$_7$

Technical Data

X-ray Source

Linac	
X-ray Tube Voltage	3 / 6 / 9 [MeV]
Focal Spot	1.0 - 2.5 [mm]
Dose Rate	up to 32 [Gy/min]

Detector

	3K FPD	**XXL FPD**	**Line Detector**	**Stripe Detector**
Active Area	417 x 417 [mm²]	430 x 1208 [mm²]	820 [mm]	115 x 788 [mm²]
Active Matrix	3000 x 3000 px	3064 x 8696 px	4100 px	750 x 5100 px
Pitch	139 [µm]	139 [µm]	200 [µm]	154 [µm]
Dynamic Range	16 bit	16 bit	16 bit	16 bit

Test Sample

Sample Size, maximal	*acr*
Scan Volume, maximal	Ø 2000 x H 2200 [mm]
Sample Weight	1000 [kg]

Manipulation

Focus-Detector-Distance	variable, 3000 - *acr* [mm]
Manipulator	multi axes granite base

System

System Dimensions	L 6000 x W 3500 x H 4400 [mm]
System Weight	approx. 38 [t]
Active Ventilation	yes
Climate Control	optional

Additional Options

Collision Protection	included
Positioning Laser	included
diScatter Bundle	included
Climate monitoring	optional
diPlanar	optional
Ultra Wide Field of View Extension	optional

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3

Find more information in our **diControl** brochure.

* All dimensions are nominal and may vary depending on system configuration.
Customized adjustments are available on request.

acr
according to customer requirements

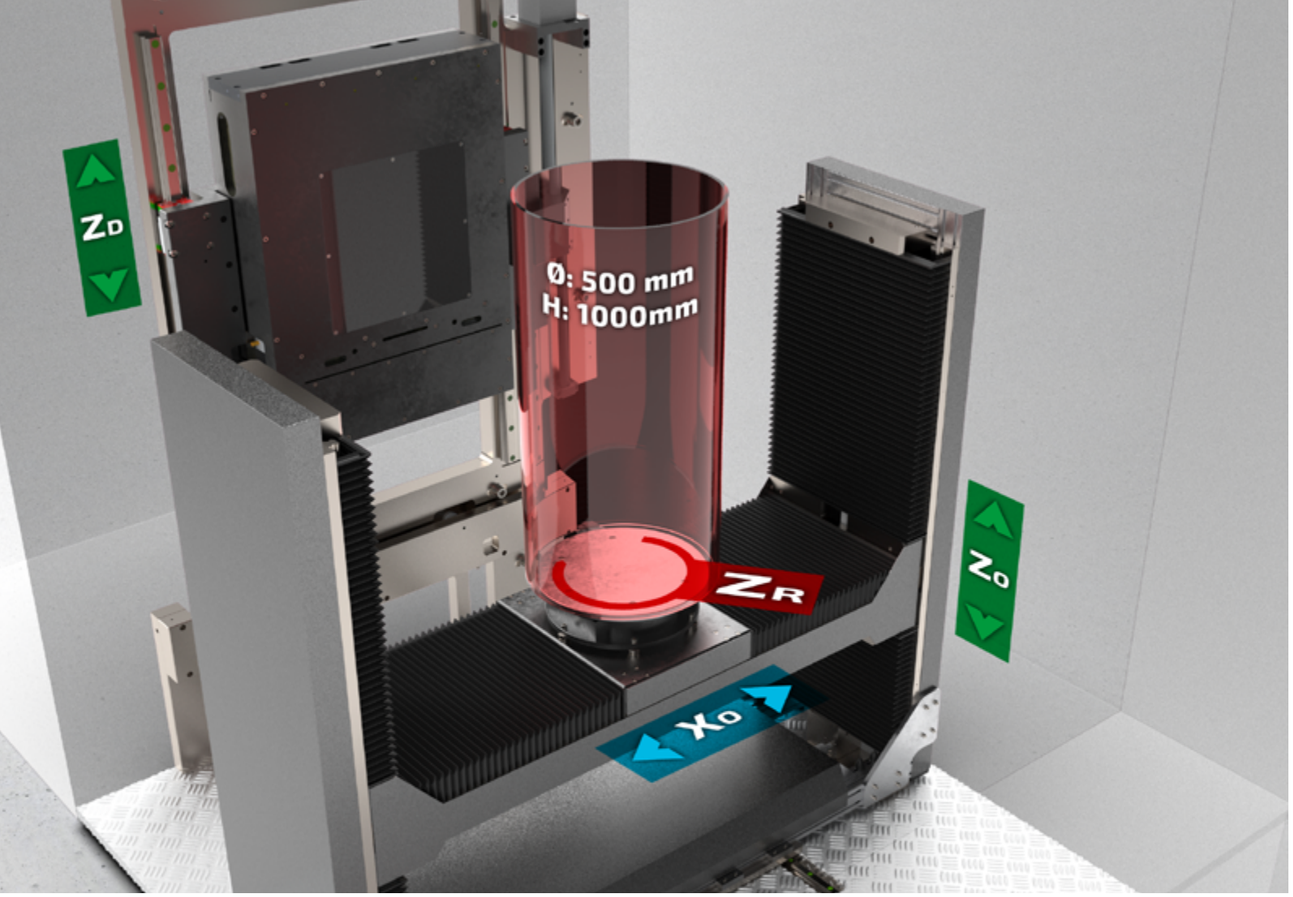
diondo d7smart

A Comprehensive Package of Benefits

Sample Size	●●●●●
Sample Density	●●●●●
Accuracy	●○○○○
Resolution	●○○○○
Footprint	●●●●●

X-Ray Source	3 / 6 [MeV]
Source Type	Linac
Focus Detector Distance	3200 [mm]
Detector	FPD
Scan Volume, maximal	Ø 500 x H 1000 [mm]
Sample Weight	200 [kg]

* All dimensions are nominal and may vary depending on system configuration. Customized adjustments are available on request.



diondo d7smart

A Comprehensive Package of Benefits

Linear accelerator CT systems have a reputation for placing extreme demands on the infrastructure:

New buildings with gigantic wall thicknesses, construction times of several months and investments beyond those of conventional CT systems.

With the proprietary design and concept of the **d7smart**, diondo shows that there is another way, making the technology accessible to a wide range of industrial customers.

+ **Exceptionally Small Footprint**

  Facilitates the use of existing infrastructure

+ **Short Installation Time**

  No construction of a new building is necessary and drying times for concrete are eliminated by the diondo specific construction process.

+ **Attractive Price / Performance Ratio**

  The special design of the radiation protection cell leads to considerable savings.

+ **Short Working Distances for Operators**

  Avoiding complex radiation protection labyrinths and large rooms not only reduces costs, but also leads to a much higher degree of utilisation of the system.

+ **Variable Magnification Axes**

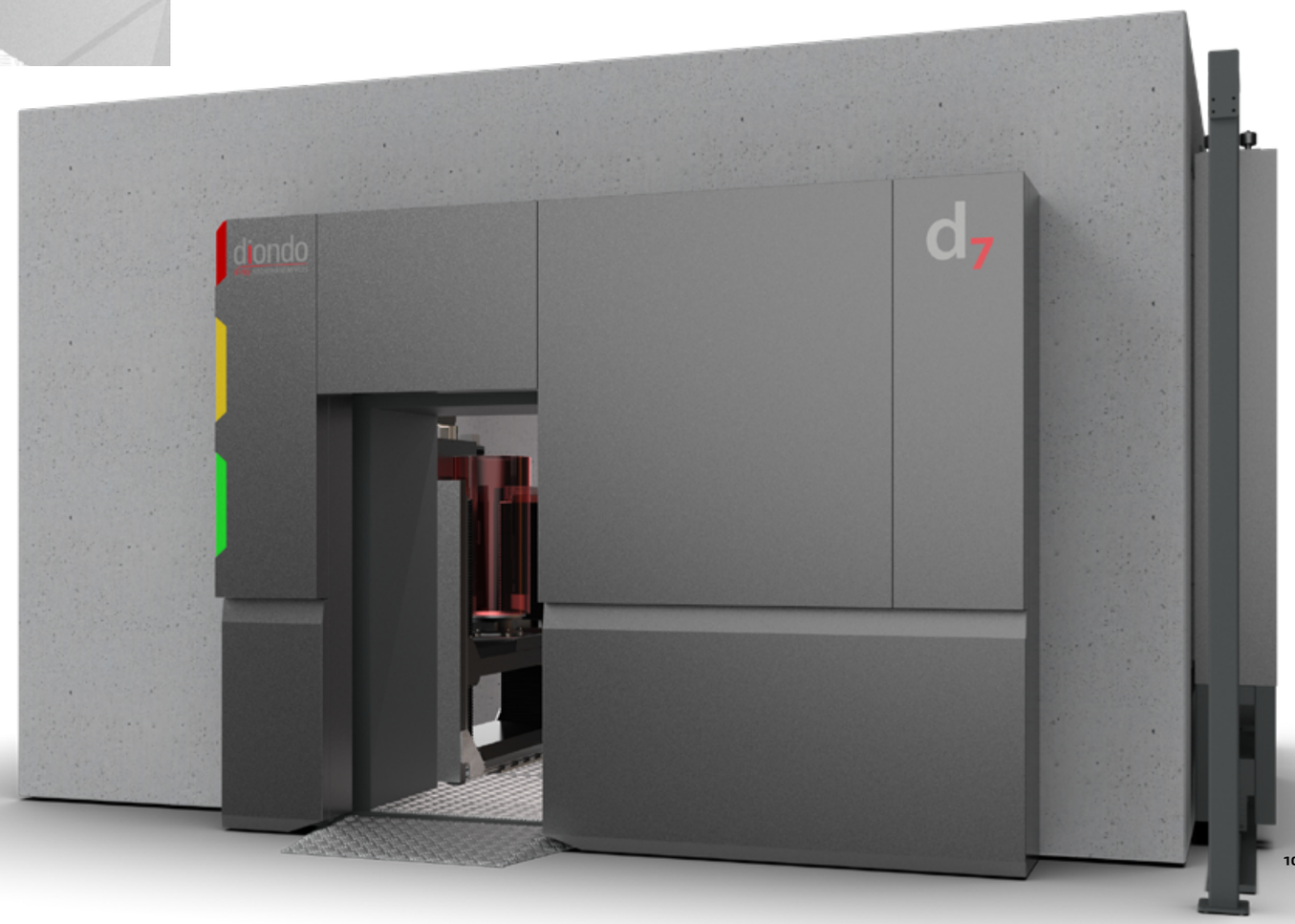
  Enables the best possible resolution adapted to the object geometry

+ **Large, Motorized Loading Door**

  Barrier free access with transport trolleys.

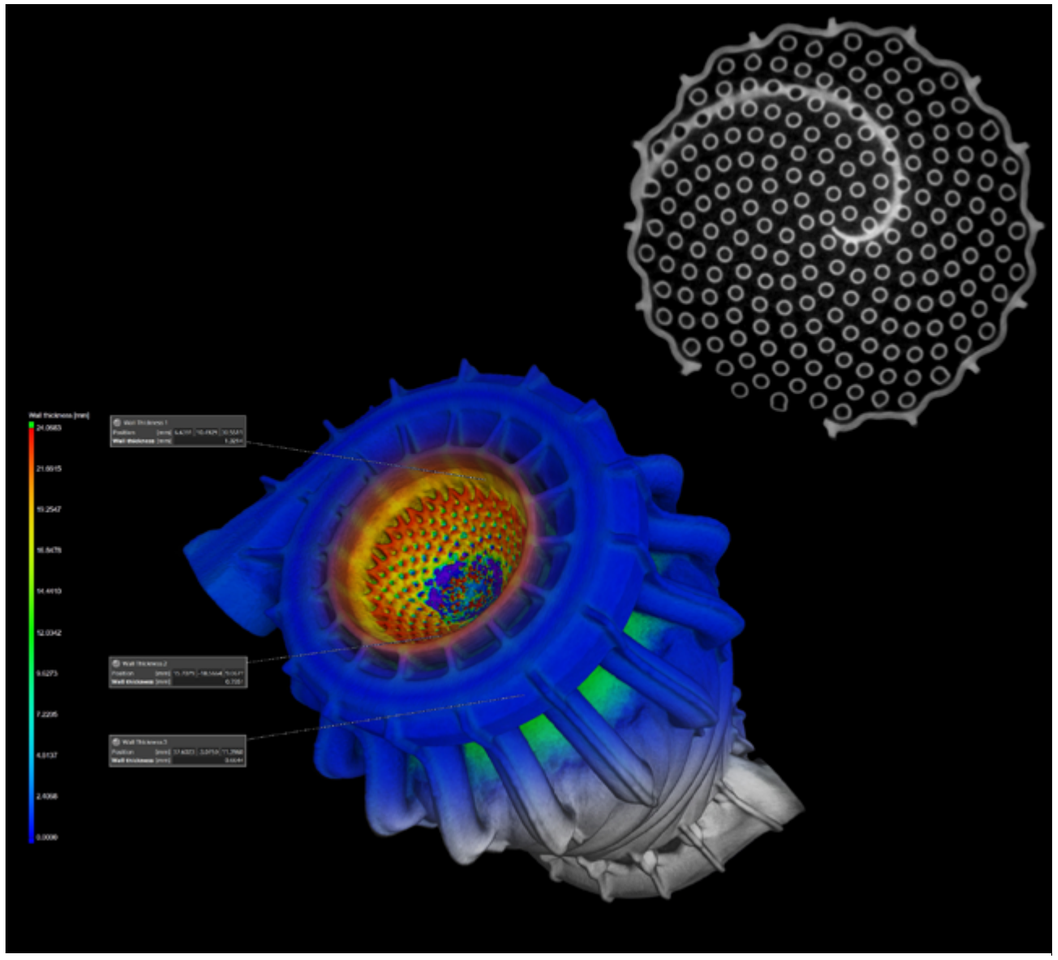
+ **Available for Different Sample Sizes**

  Due to the modular design, the concept can be adapted to different component sizes.



Applications

Wide Range of Application Possibilities



CT scan of an injector head for rocket combustion chamber

diondo d7 smart

Technical Data

X-ray Source

Linac

X-ray Tube Voltage	3 / 6 [MeV]
Focal Spot	1.3 - 2.5 [mm]
Dose Rate	up to 10 [Gy/min]

Detector

	3K Digital Flat Panel Detector
Active Area	417 x 417 [mm²]
Active Matrix	3000 x 3000 px
Pitch	139 [µm]
Dynamic Range	16 bit

Test Sample

Sample Size, maximal	Ø 700 x H 1300 [mm]
Scan Volume, maximal	Ø 500 x H 1000 [mm]
Sample Weight	200 [kg]

Manipulation

Number of Axes	4 axes
Focus-Detector-Distance	3200 [mm]

System

System Dimensions	L 7000 x W 5000 x H 4000 [mm]
System Weight	approx. 350 [t]
Active Ventilation	yes
Climate Control	optional

Additional Options

Collision Protection	included
Positioning Laser	included
diScatter Bundle	included
Climate monitoring	optional
Multiline Bundle	optional

diControl Features

DR-Function, Helix CT, Batch Mode, Field of View Extensions, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3

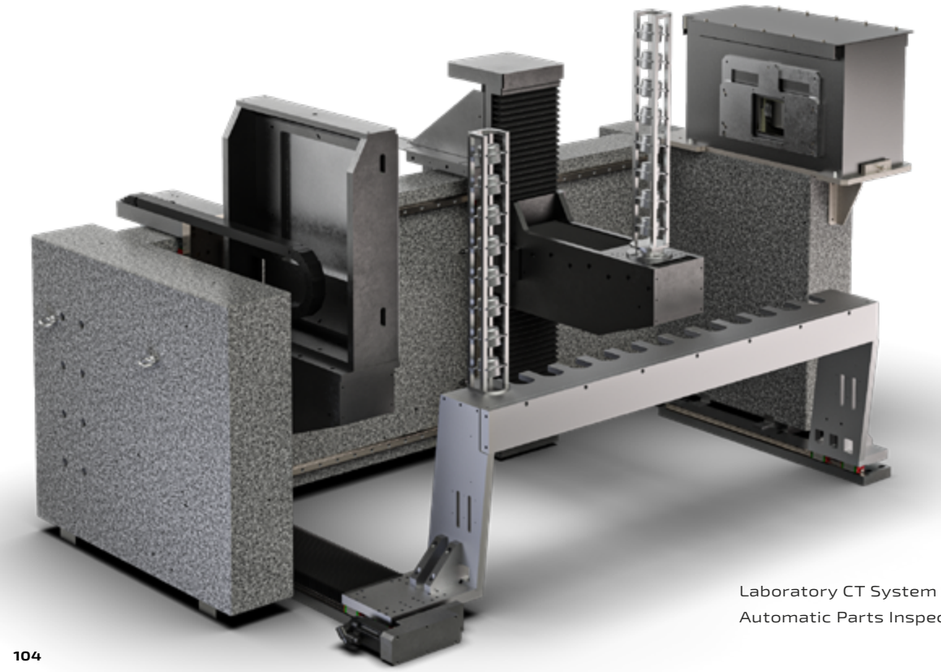
Find more information in our **diControl** brochure.

* All dimensions are nominal and may vary depen ding on system configuration.
Customized adjustments are available on request.

diondo d!

Special Solutions: X-ray and CT Systems for Individual Applications

Due to the 30-years of experience in the field of industrial computed tomography, diondo has established itself as market leader in the field of innovative special solutions and customer-specific test systems. This does not only refer to the dimensions of the testing system, the x-ray source(s) and detector(s), but also to specific sequences of movements and analysis algorithms. Thanks to a continuously growing choice of function modules even large and complex computed tomography systems can be developed and produced in short time and with manageable development effort.



Laboratory CT System Semi-Automatic Parts Inspection

diondo d!

More information about special solutions

Highest penetration power for large inspection parts

diondo d!

Special Solutions: X-ray and CT Systems for Individual Applications

The system offers a fully thought-out complete solution that has been developed for an optimised workflow. The innovative design of the radiation protection cabin includes an „L“ shaped double sliding door with partial opening of the roof and, in combination with the column-mounted slewing crane, enables safe, ergonomic and barrier-free loading of the modules.
Users benefit from the latest technologies and access to the most innovative X-ray sources, which not only combine high resolution and high energies in one CT system, but also make this possible at the same time.

Battery Module Handling
Prepare Modules Precisely and Easily

We start where others don't even think about it: handling your modules. Our innovative approach optimizes processes right from the start so that you benefit from safety and efficiency.

The innovative tilting device enables easy handling and relocation of modules with a length of around 1.250 mm and a weight of around 200 kg.

diondo d module

Compact Complete Solution for Testing Battery Modules

diondo d!

Special Solutions: X-ray and CT Systems for Individual Applications

Collaboration MBRAUN & diondo

In the development of new technologies, sophisticated materials often require a highly pure inert atmosphere with less than 1ppm of oxygen and moisture. Additionally, special protection for operators is frequently necessary due to the health and environmental risks posed by these materials.

Addressing this need, MBRAUN, in collaboration with diondo, has developed an X-ray CT scanner system that allows materials to be examined in an inert atmosphere. This innovative setup merges a diondo CT system with an MBRAUN glovebox, creating a highly sealed environment.

With a leakage rate of Class 1 according to ISO 10684-2, the glovebox functions as an ultra-tight containment, ensuring the integrity and safety needed for handling and analyzing sensitive materials.

diondo d glovebox

Testing under Special Environmental Conditions

diondo d!

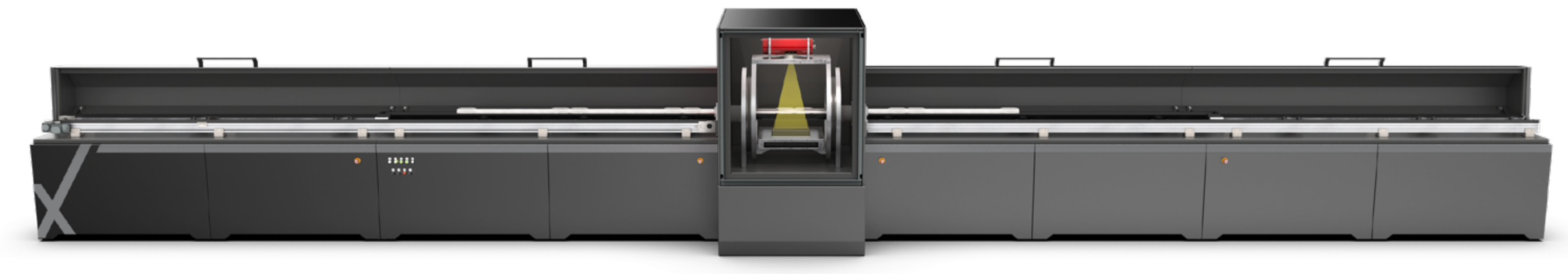
Special Solutions: X-ray and CT Systems for Individual Applications

diondo d core I

High-Power Gantry-CT Solution for Very Long Samples

For a civil nuclear power application a bespoke system was designed to cope with the challenge of very long but narrow and dense samples.

The final system uses a high-powered X-ray source in a rotating gantry configuration, and is modular, enabling adaptability and simplifying installation. The design is also ideally suited to the inspection of samples such as bore cores.



Laboratory CT System Semi-Automatic Parts Inspection

diondo
x-ray systems and services

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