



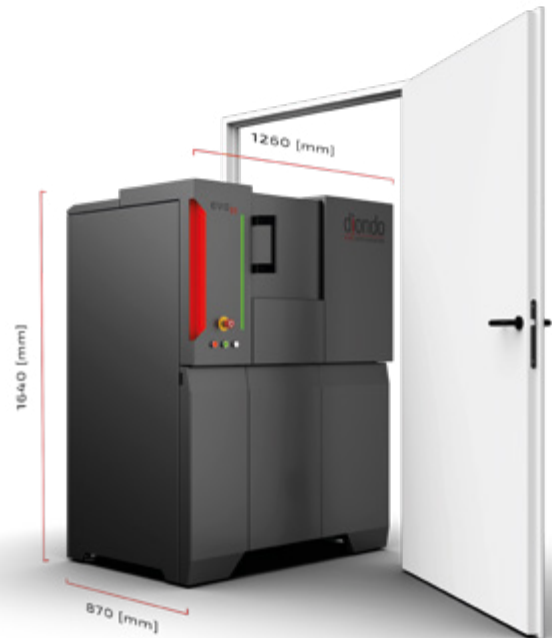
diondo line
Precision CT solutions for highest resolution



diondo evo^{systems}

Entry Level Models

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.





evo 03

User-friendly
Basic CT System



evo 05

User-friendly
Micro CT System

Sample size



Sample density



Resolution



Flexibility



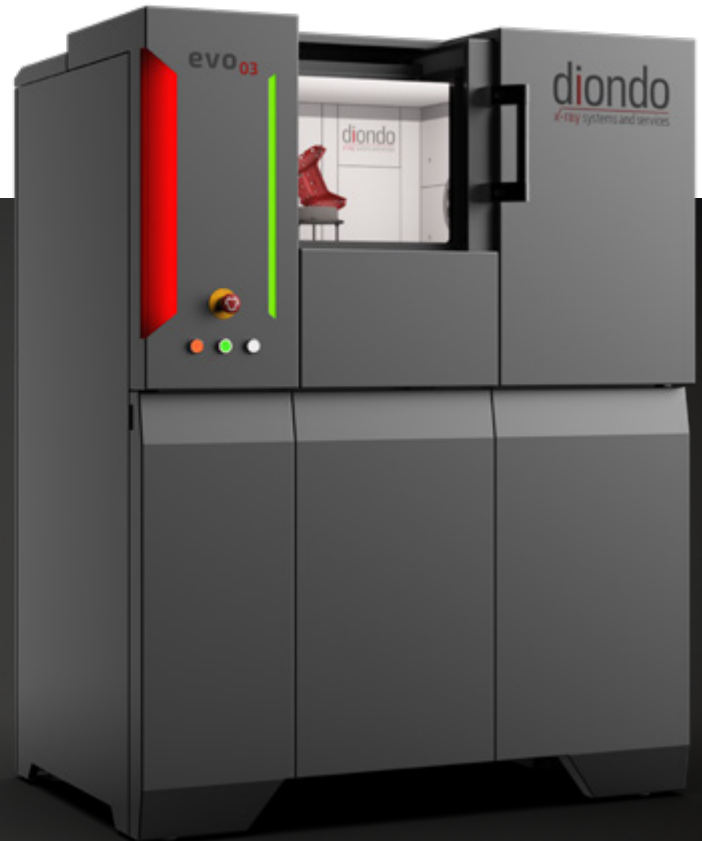
evo⁰³

User-friendly CT System for Basic
Measurement & Inspection Tasks

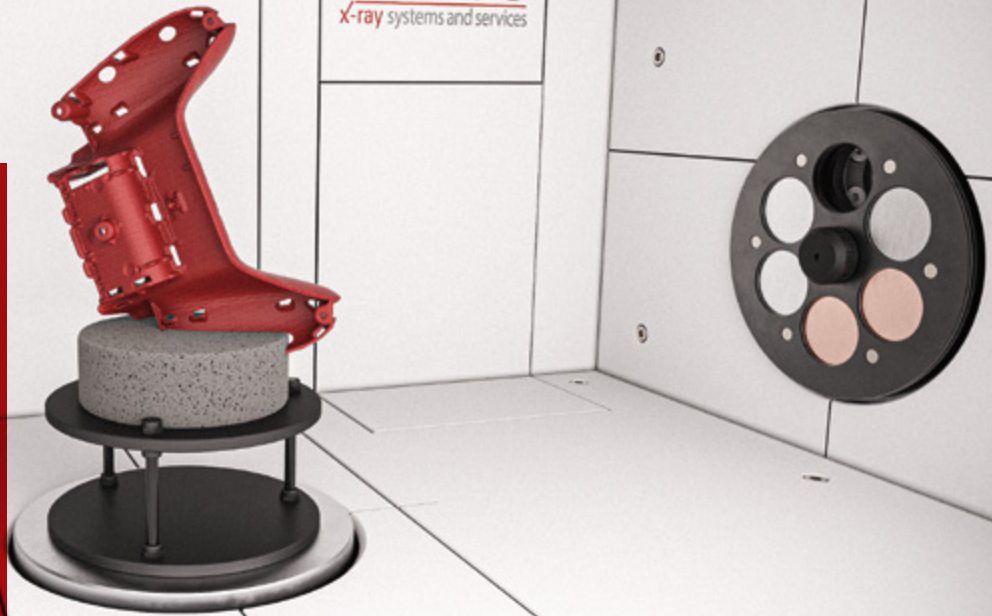
The user-friendly **evo⁰³** CT system has been developed to analyze and enable precise measurements of small to medium-sized parts made of plastic, ceramic or light alloys. The simplicity of the system operation makes it possible for anyone to analyze the internals of a sample, or completely measure contours quickly and efficiently without in-depth knowledge.

This system **is the smallest in our product family** with a footprint of 1,1m², and can easily be positioned in smaller rooms, laboratories or directly next to other production equipment.

Also, 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, as well as the imaging of large samples in one scan. Multiple time-consuming partial scans at the expense of precision are avoided.



- ✓ **High-Precision Detector**
provided to maximize precision performance in a compact space for many metrological tasks.
- ✓ **Easy-to-use filter wheel**
for optimized image quality.
- ✓ **Compact CT System**
even with its small, minimalist design, the system is able to achieve a resolution of up to 56 µm with particularly good repeatability.



X-ray Tube	120 [kV]
MPE (SD)	< 9 µm + L/100
Resolution	56 [µm]
Scan Volume, maximal	Ø 100 x 120 H [mm]
Sample Weight	5 [kg]
System Dimension & Weight	L 1260 x B 870 x H 1640 [mm] – 1,3 [t]

evo⁰⁵

User-friendly Micro CT System for Advanced Measurement & Inspection Tasks

The **evo⁰⁵** 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.

Complete multiple inspection tasks in a single scan

Whether research institute or industrial environment – a detailed image of different materials and the non-destructive testing of structures offer endless potential for the development, analysis and optimization of products. You can digitalize complex surfaces, perform dimensionally accurate reverse engineering, or effortlessly take a look inside.



- ✓ **Versatility**
Variable magnification and height: The evo05 adapts to your test objects, giving you flexibility. Motorized axes make it easier to position objects and magnify to the point.
- ✓ **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.
- ✓ **Return on Investment**
The entire system is designed to be maintenance-free over its entire service life - no annual service costs for you!



X-ray Tube	150 [kV]
Detector	3.000 x 3.000 px, 139 [μm]
Focus-Detector-Distance	600 [mm]
Scan Volume, maximal	Ø 270 x 200 H [mm]
Sample Weight	5 [kg]
System Dimension & Weight	L 1260 x B 870 x H 1640 [mm] – 1,3 [t]
diControl Features	DR-Function, Daily Check, Health Monitor, Limited Angle
Manipulation	3 axes

High Performance Models



From Highest Resolution to Highest Energy

- ✓ Innovative CT systems for non-destructive testing
- ✓ Individual configuration of the system components suited to the customer's application
- ✓ Incredible accuracy due to Granite machine base, high precision drives and encoders



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. 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.

Our models



diondo d_{sub}μ

Highest Resolution Sub-Micron
CT System



diondo d1

High Performance
Micro CT System



diondo d2

Powerful Micro
CT System

Sample size



Sample density



Accuracy

—



Resolution



Footprint





diondo d3

Ultimate Flexibility in a Compact Footprint



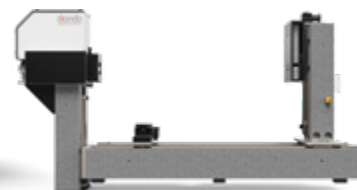
diondo d4

Compact CT System for High-Density Parts



diondo d5

Universal CT System with a Large Variety of Applications



diondo d7

High Energy Linac CT



diondo d_{sub}μ

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

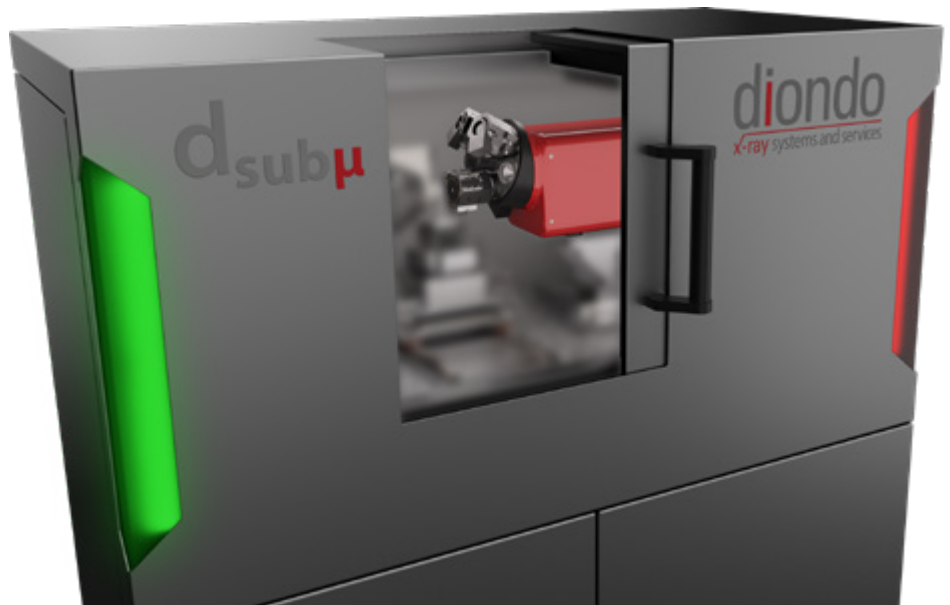
The compact Sub-Micro CT System has been developed for analyzing three-dimensional structures in materials research.

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.

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).



- ✓ **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.



X-Ray Source	20-90 kV, max. 8 Watt		
Detector	4 Megapixel sCMOS Chip, 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 Dimension & Weight	L 1170 x B 645 x H 1615 [mm] – 890 [kg]		
Manipulation	granite based, 6 piezo-based linear axes, air bearing rotary axis		

diondo d₁

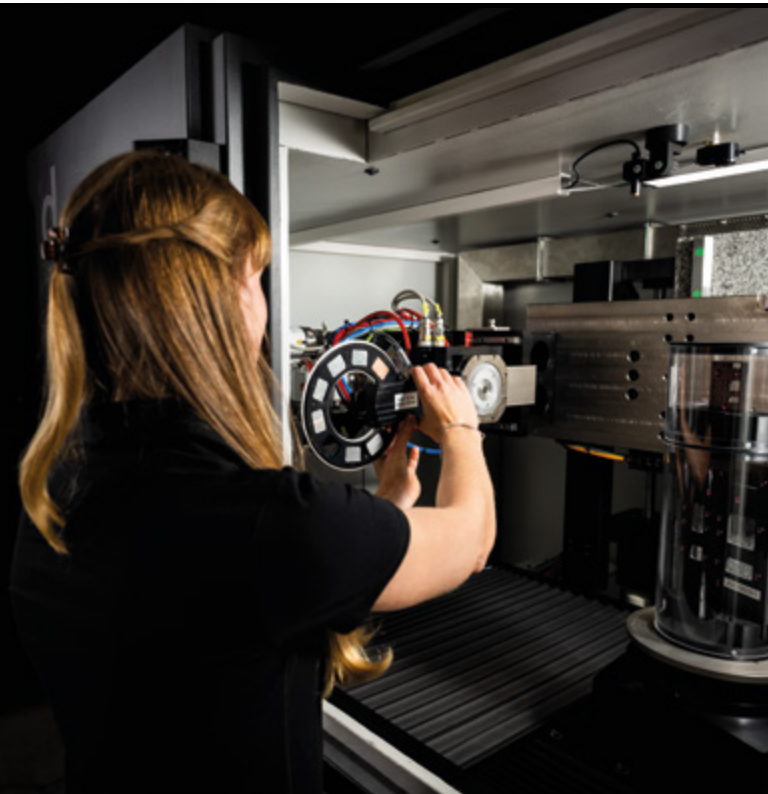
Compact High Performance Micro CT System

The high-resolution micro CT system **diondo d1** has been perfected for the analysis and measurement of small-to-medium-sized components. By using a high-power transmission X-ray source, a four-fold higher resolution is achieved in the same measuring time compared to conventional systems. The extremely high transmission power also enables the analysis of challenging material combinations.



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.

As well, 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.



- ✓ **High-Precision Granite Manipulator**, its inherent rigidity, and temperature stability guarantee highest precision.
- ✓ **Coordinate Measuring Technology**, for highest demands according to VDI/VDE 2630-1.3.
- ✓ **Advanced scanning modes**, including helical scanning for high flexibility.

Transmission Tube	190 up to 240 [kV]
Detector	3.000 x 3.000 px, 139 [µm]
Focus-Detector-Distance	800 [mm], variable
Scan Volume, maximal	Ø 400 x 400 H [mm]
Sample Weight	20 [kg]
System Dimension & Weight	* L 2350 x B 1450 x H 2035 [mm] – 5,5 [t]
diControl Features	DR-Function, Helix CT, Batch Mode, Offset CT, Daily Check, Health Monitor, Limited Angle CT, Metrology VDI/VDE 2630-1.3
Manipulation	granite based, 4/5 axes

*All dimensions are nominal and may vary depending on system configuration

diondo d₂

Powerful Micro CT System for Small to Medium-Sized Components

The versatile Micro CT System **diondo d₂** 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 by VDI/VDE 2630 1.3 up to production control inspections.



Reproducible 3D measurements for highest demands via the long-term stability and high-precision positioning of the granite manipulator. VDI/VDE 2630-1.3 Metrology; MPESD of $5 + L/100 \mu\text{m}$.

Configurable radiation sources for different material densities and a measuring volume varying from micro-scan to large components.



- ✓ **Multi-Axis Granite 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.
- ✓ **Numerous Function Modules**, for autonomous measuring operation, in situ analyses and much more.
- ✓ **Optional Dual-Tube Configuration**, Micro and Nano Focus tube options provide exceptional flexibility, while a maximum of X-ray energy of 300 keV guarantees excellent material penetration.

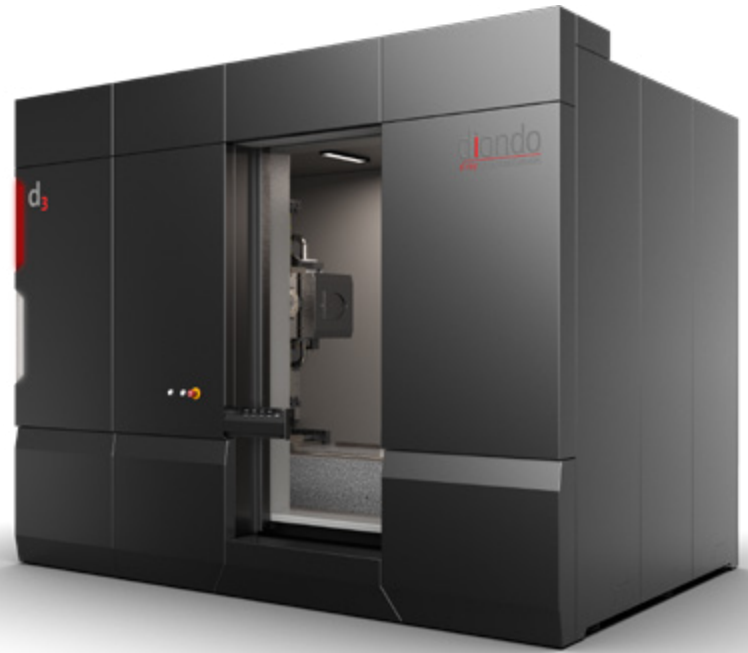
Transmission Tube	160 up to 300 [kV]
Reflection Tube	190 up to 300 [kV]
Focus-Detector-Distance	400 – 1200 [mm], variable
Scan Volume, maximal	Ø 520 x 650 H [mm]
Sample Weight	50 [kg]
System Dimension & Weight	* L 2900 x B 2050 x H 2180 [mm] – 10,5/15 [t]
diControl Features	DR-Function, Helix CT, Batch Mode, Offset CT, Daily Check, Health Monitor, Limited Angle, Metrology 5 µm + L /100, VDI/VDE 2630-1.3
Manipulation	granite based, 5/6 axes

*All dimensions are nominal and may vary depending on system configuration

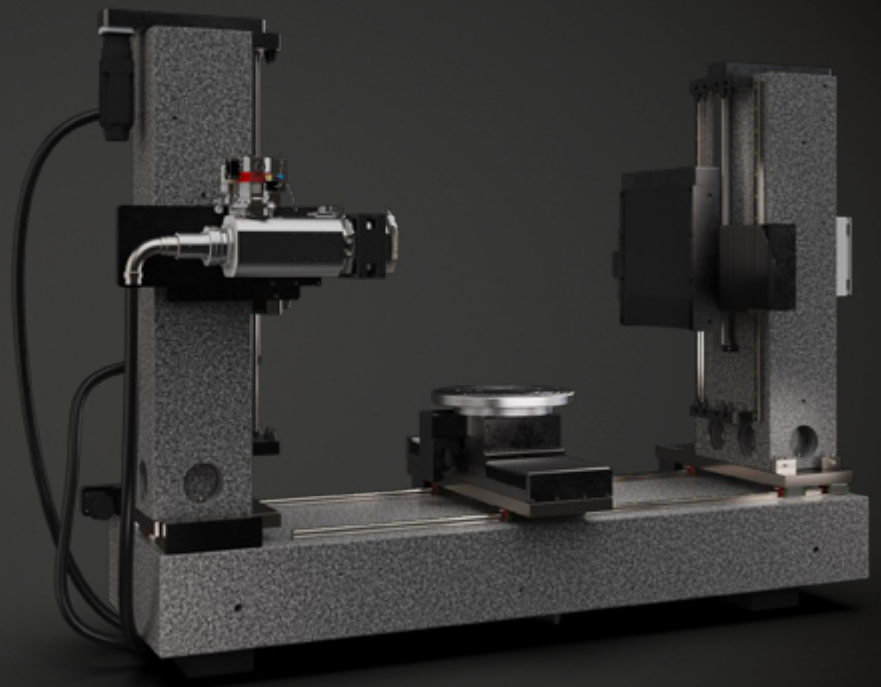
diondo d₃

Ultimate Flexibility in a Compact Footprint

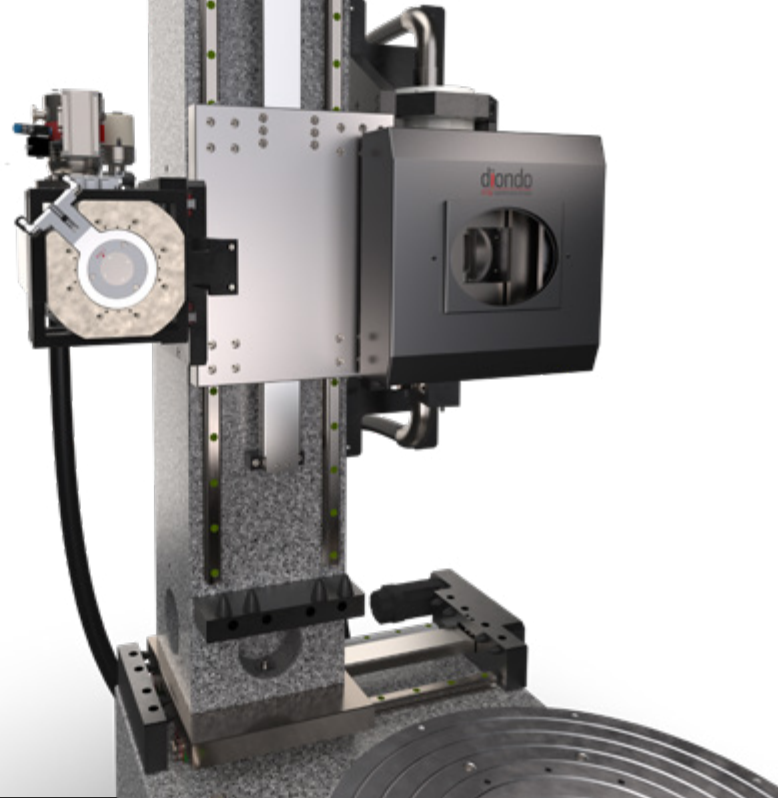
The **diondo d₃** provides a market leading flexibility and versatility to footprint ratio. The selection of X-ray sources in combination with up to 8 axis manipulation including the infinitely variable Source Detector Distance lead to unprecedented range of options.



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.



- ✓ **High energy High resolution High versatility**
Extensive range of applications from micro CT to high-energy CT due to dual tube configuration
- ✓ **Infinitely variable Source Detector Distance**
combined with progressive 3K Panel technology or maximum resolution and scan speeds
- ✓ **Granite Manipulator**, Maximum versatility through up to 8 manipulation axes on a temperature stable and high precision granite base.
- ✓ **Large inspection envelope** by diverse field-of-view extensions, helical and dual-helical CT techniques



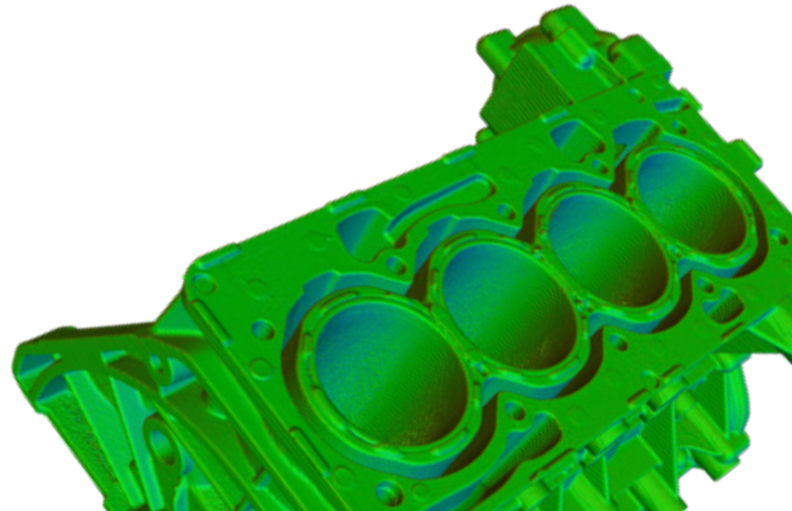
Micro Focus Tube	225 / 240 / 300 / 320 [kV]
Mini Focus Tube	450 [kV]
Meso Focus Tube	450 [kV]
Detector	Flat Panel Detector 3.000 x 3.000 px, 139 [μm]
Scan Volume, maximum	Ø 600 x 870 H [mm]
FDD Micro Focus Tube	400 – 1250 [mm]
FDD Mini / Meso Focus Tube	650 – 1500 [mm]
Sample Weight	100 [kg] / 250 [kg]
System Dimensions & Weight	* L 3500 x B 2300 x H 2700 [mm] – 24 [t]
diControl Features	DR-Function, diScatter, Scan Enhancement, Multiline CT, Daily Check, Health Monitor, Helix CT, Batch Mode, Offset CT, Limited Angle CT, diPlanar
Manipulation	granite based, 7/8 axes

*All dimensions are nominal and may vary depending on system configuration

diondo d₄

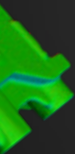
Compact CT System for High-Density Parts

The powerful **diondo d4** CT System has been optimized for high-resolution 3D measurements of medium-sized to large, high-density test objects. The small space requirement of the CT System makes it easy to integrate into an existing production or laboratory environment, and due to its plug and play configuration, the system is ready for operation shortly after the installation.



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

Users can also benefit from innovative software functions such as diScatter – a filter technology that automatically reduces disturbing scattered radiation effects.



- ✓ **High-Performance X-ray up to 600 kV**, for sufficient power – even for the most dense test objects.
- ✓ **Compact Design**, due to the integration of all peripherals.
- ✓ **Robust 3K Detector**, for higher detail detectability in shorter measurement times.



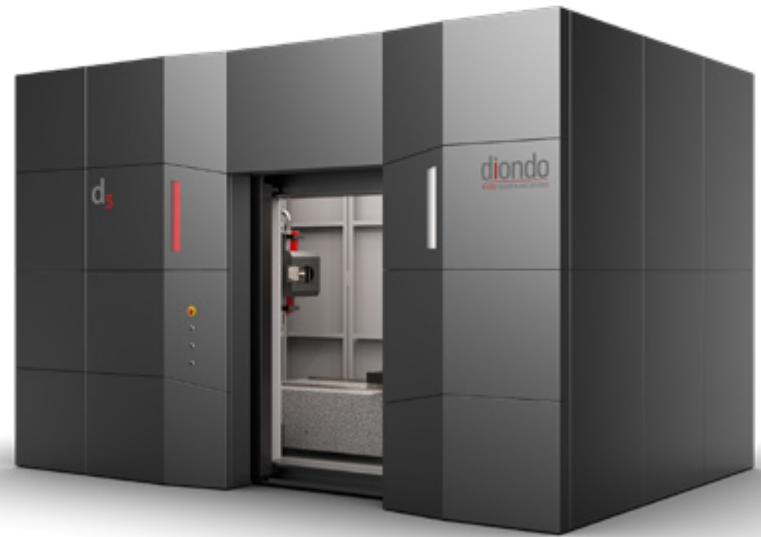
X-Ray Source	450 / 600 kV	
Detector	Flat Panel Detector 3.000 x 3.000 px, 139 [µm]	Line Detector 3.070 px, 200 [µm]
Scan Volume, maximum	Ø 530 x 820 H [mm]	Ø 670 x 800 H [mm]
Focus-Detector-Distance	1350 [mm]	
Sample Weight	70 [kg]	
System Dimensions & Weight	* L 2500 x B 2500 x H 2800 [mm] – 15/20 [t]	
diControl Features	DR-Function, diScatter, Scan Enhancement, Multiline CT, Daily Check, Health Monitor, Helix CT, Batch Mode, Offset CT, Limited Angle CT	
Manipulation	granite based, 5/6 axes	

*All dimensions are nominal and may vary depending on system configuration

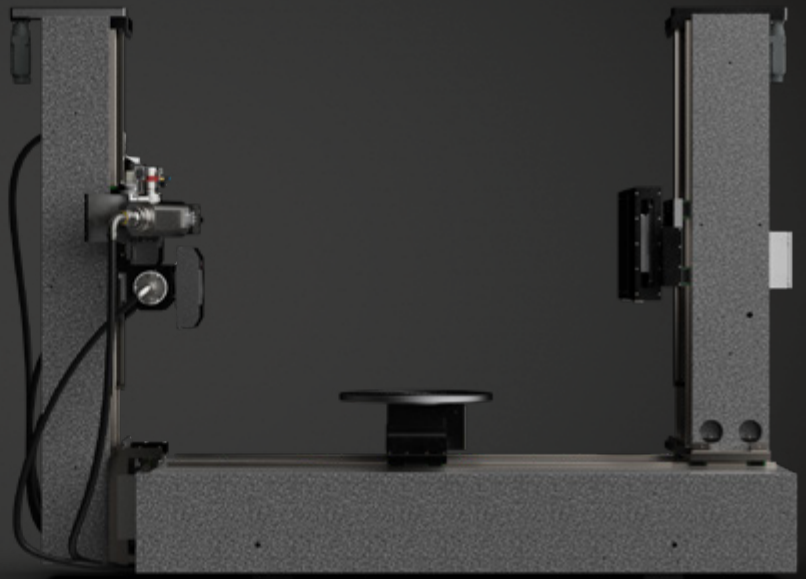
diondo d₅

Multifunctional & Freely configurable
CT System

The multifunctional CT System **diondo d₅** 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.



The granite manipulator guarantees the highest levels of inherent stability, and temperature insensitivity, while precision encoders ensure exact positioning. High performance x-ray sources of up to 600 kV allow shorter scan times with the same test quality. Everything is possible from complex measurements of tiny components up to classic testing of large, challenging objects.



- ✓ **A Multitude of Combinations**, to suit your specific testing requirements.
- ✓ **Innovative Software Package**, advanced test methods, e.g. Helix CT, diScatter, diPlanar.
- ✓ **Coordinate Measuring 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 specific test conditions.



Micro Focus Tube	225 / 240 / 250 / 300 / 320 [kV]	
Mini Focus Tube	450 / 500 / 600 [kV]	
Meso Focus Tube	450 [kV]	
Detector	Flat Panel Detector 3.000 x 3.000 px, 139 [μm]	Line Detector 4100 px, 200 [μm]
Scan Volume, maximum	Ø1000 x 1500 [mm]	Ø1100 x 1500 [mm]
Focus-Detector-Distance	400 – 2150 [mm]	900 – 2650 [mm]
Sample Weight	100 [kg] / 250 [kg] / 350 [kg]	
System Dimensions & Weight	* L 5000 x B 3200 x H 3500 [mm] – 45 [t]	
diControl Features	DR-Function, diScatter, Scan Enhancement, Multiline CT, Daily Check, Health Monitor, Helix CT, Batch Mode, Offset CT, Limited Angle CT, diPlanar	
Manipulation	granite based, 9 axes	

*All dimensions are nominal and may vary depending on system configuration

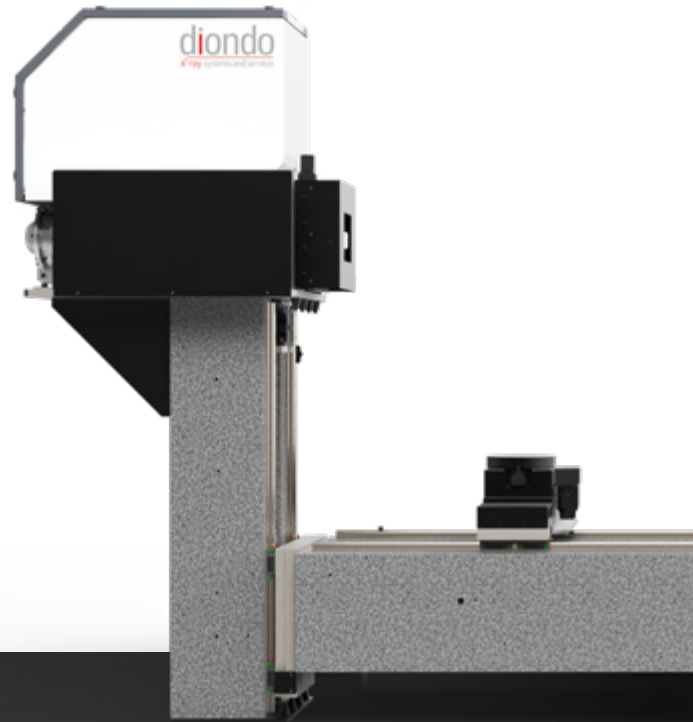
diondo d7

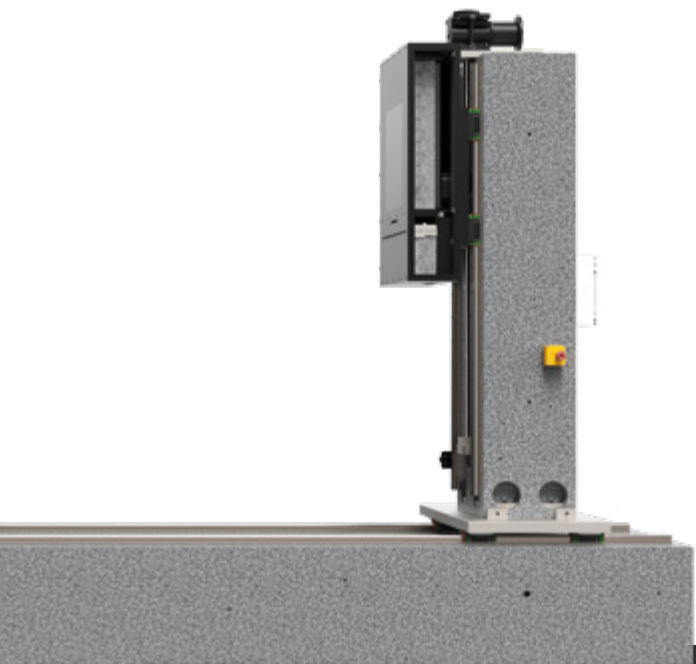
High-Performance Linear Accelerator CT System
for Imaging High-Density Components

The linear accelerator **diondo d7** CT System is the most powerful CT system of the product family, and is suited for analyses of high-density components including titanium, copper, steel, or thick-walled aluminum. The focus of the application of such powerful CT systems is predominantly component analyses to detect any manufacturing or material defects, as well as the review of the contour and internal wall thicknesses of the test objects.

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.





- ✓ **Performance classes**, 3 MeV, 6 MeV, and 9 MeV, infinitely adjustable work areas.
- ✓ **A Multitude of Combinations**, manipulators adapted to customer requirements are available in many different sizes.
- ✓ **High-resolution (140 μm) flat panel** detector optimized for Linac CT.
- ✓ **High-resolution (200 μm) Line Detector** optimized for Linac CT.

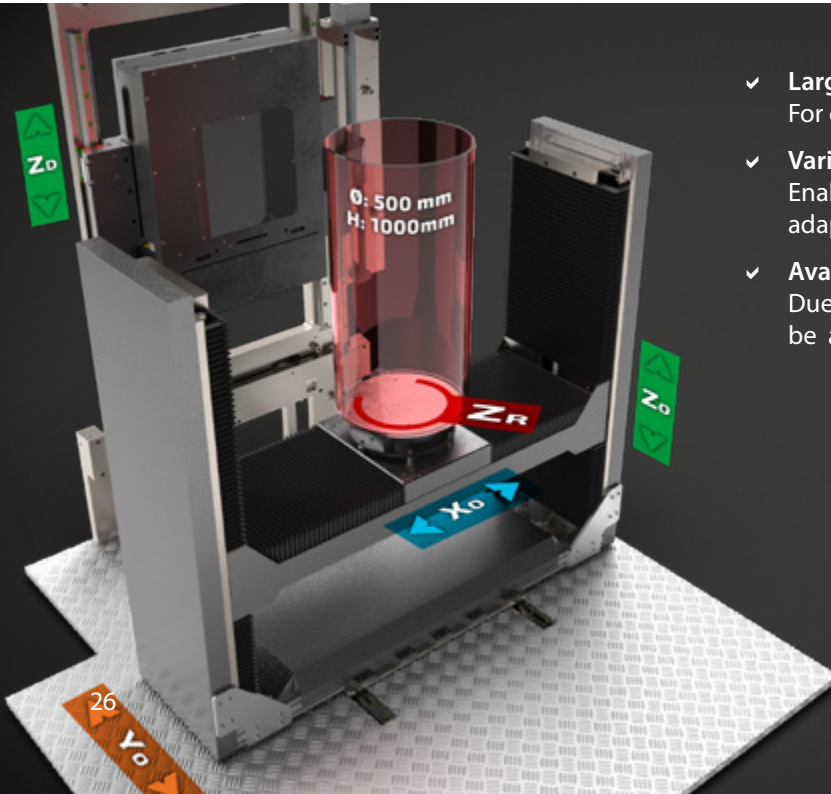
X-Ray Source	3 / 6 / 9 [MeV]	
Detector	Flat Panel Detector 3.000 x 3.000 px, 140 [μm]	Line Detector 3.070 px, 200 [μm]
Scan Volume, maximum	Ø 700 x 1000 H [mm]	Ø 1000 x 1000 H [mm]
Focus-Detector-Distance	4000 [mm]	
Sample Weight	200 [kg]	
System Dimensions & Weight	L 5900 x B 1500 x H 2900 [mm] – 17 [t]	
diControl Features	DR-Function, diScatter, Scan Enhancement, Multiline CT, Daily Check, Health Monitor, Helix CT, Batch Mode, Offset CT, Limited Angle CT	
Manipulation	granite based, 6/7 axes	

*All dimensions are nominal and may vary depending on system configuration

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.



- ✓ **Large, motorized loading door**
For comfortable part handling.
- ✓ **Variable magnification axes**
Enables the best possible resolution adapted to the object geometry
- ✓ **Available for different sample sizes**
Due to the modular design, the concept can be adapted to different component sizes.

✓ **Exceptionally small footprint**

Facilitates the use of existing infrastructure

✓ **Short installation time**

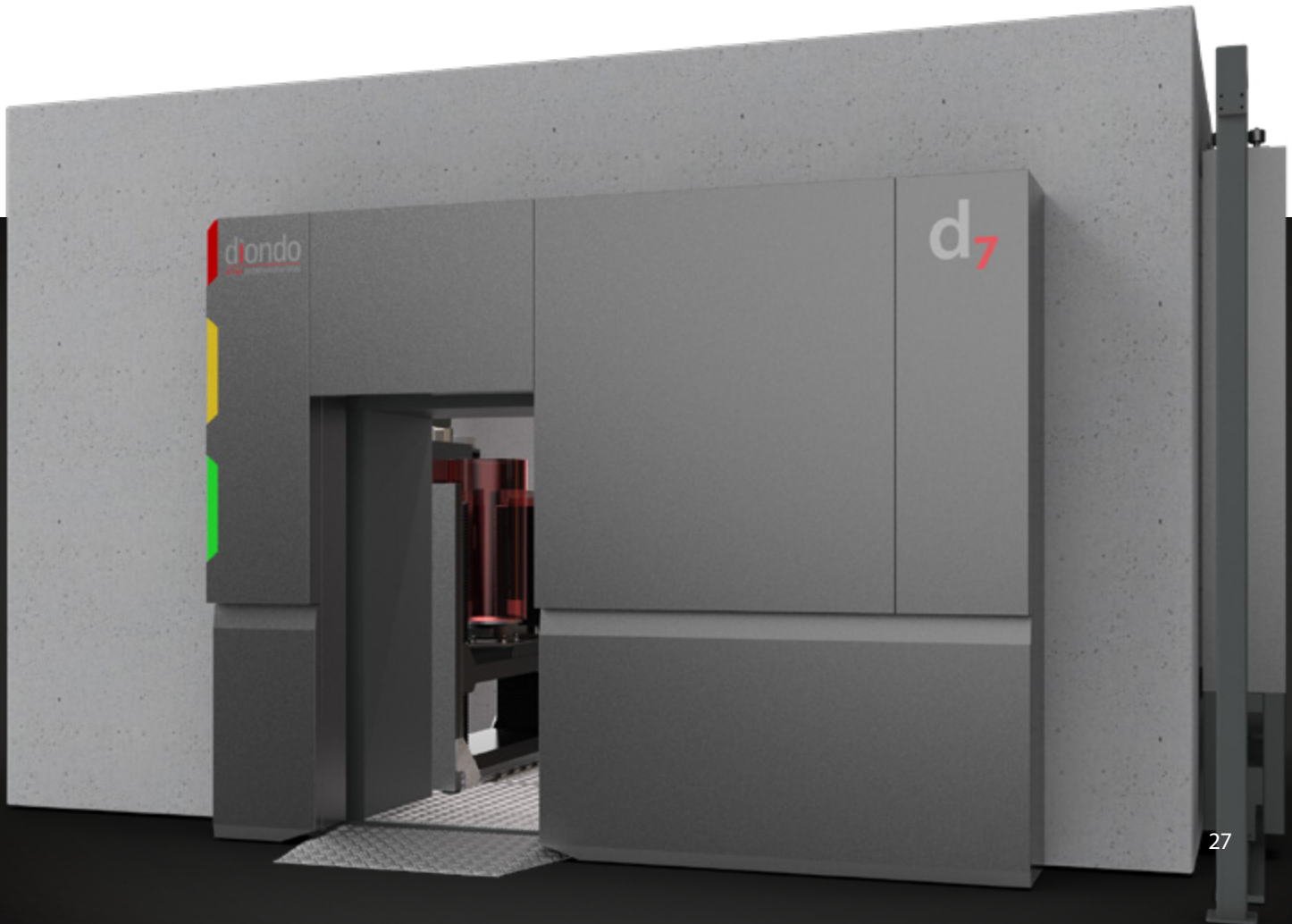
No construction of a new building is necessary and drying times for concrete are eliminated by the diondo specific construction process.

✓ **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 utilization of the system.



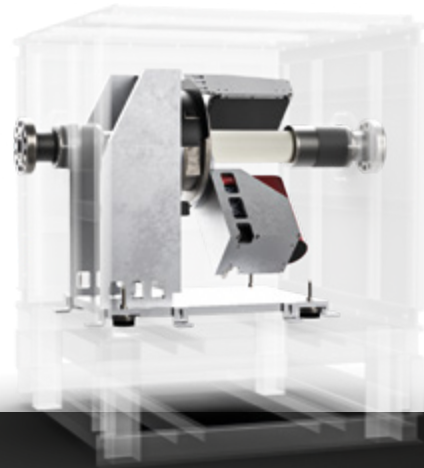
diondo d!

Special solutions: X-ray and CT Systems
for individual applications

diondo has established itself
as market leader in the field of
innovative special solutions and
customer-specific test systems.



More information about d! line



**Inspection System For
Drilled Cores**



**Mobile CT for a Site-Independent
Inspection Capacity**



**Highest penetration power
for large inspection parts**

In situ CT

Dimensional Measurement & Material Testing under specific test conditions

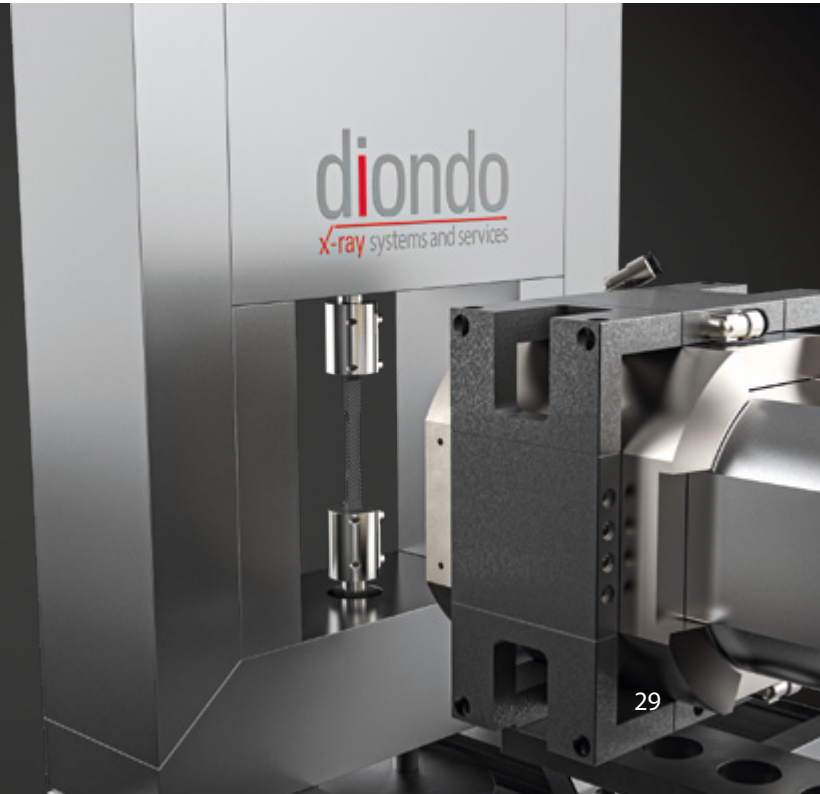
The diondo in situ inspection technology allows for the 3D visualization of test objects under the influence of tension, pressure, bending and/or temperature. This provides time-based thermal and mechanical testing of materials such as composites and additively manufactured components. The special design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

optimized for the size of the component. Available as tension/pressure unit of 1 kN up to 10 kN, as well as special solutions for up to 50 kN.

Available temperature module from -40°C to +200°C, as well as additional special solutions for up to 1.300°C.

The **diondo d5** 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, multi-axial tire constraining units, climate chambers, etc.



CT Inspection Service

Non-destructive examination of all details by means of 2D radioscopy & 3D computed tomography

In addition to the development and construction of industrial computed tomography and x-ray systems diondo also offers a wide range of non-destructive testing services (CT Services). Our many years of experience make diondo your strong partner for the implementation of your quality objectives.



Europe's Largest Industrial Scan Service Portfolio

240 kV Nano CT | Micro CT

3D Micro-CT examinations with extremely high precision by a 240 kV Micro Focus X-ray source, 3K area detector and granite manipulator for electronics, light metals and plastics. You can analyze test objects of up to 800 mm in diameter and a height of 2000 mm



450 kV High-power CT | High-resolution CT | XXL CT

Flexible combination of a 450 kV X-ray source with a 3K area detector and a 4K Line detector to effectively test dense materials or larger components of up to 5000 mm of height and 1000 mm in diameter.

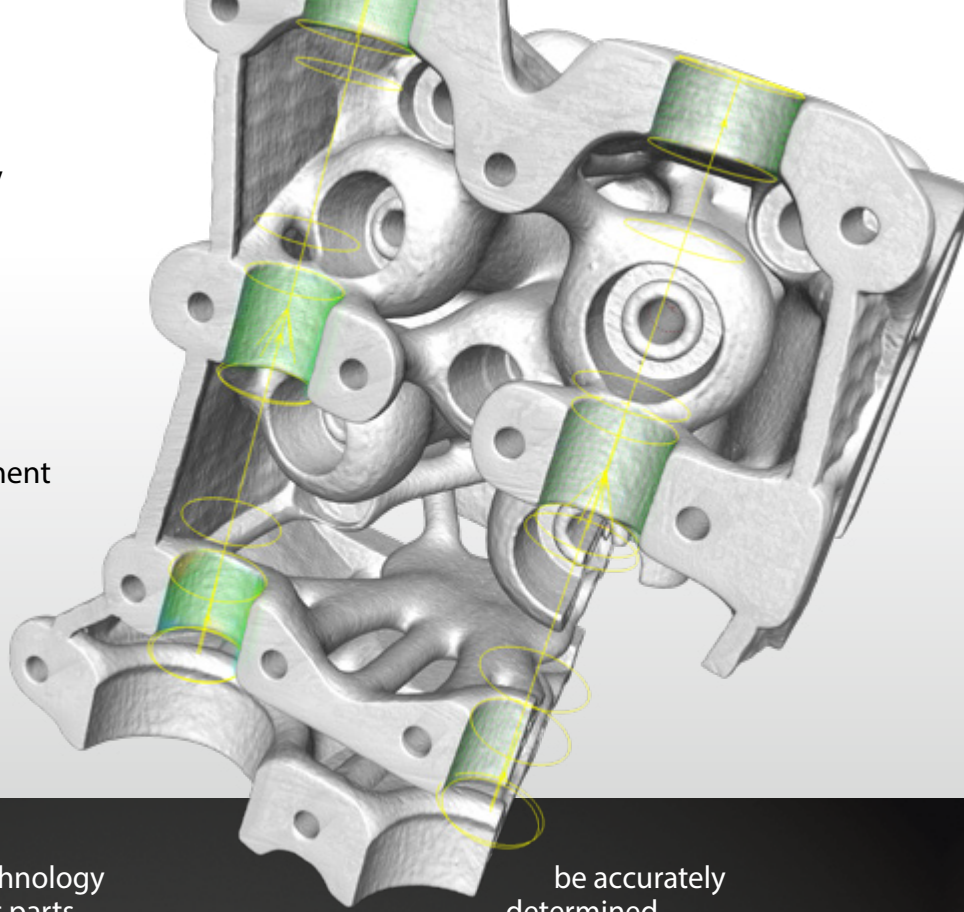


6 MeV Linac CT

The 6 MeV linear accelerator CT system. Due to the high dose rate the Linac CT is perfectly suited for analyzing test parts with very high density.

➤ Computed Tomography

- ✓ Dimensional Measurement and Reporting
- ✓ Assembly Verification and Visualization
- ✓ External and internal Measurement
- ✓ Form Analysis
- ✓ Defect Detection
- ✓ Fiber Flow Analysis
- ✓ Failure Analysis



Computed Tomography (CT) is a technology that allows 3D reconstruction of test parts. This allows advanced analyses of the error shape, position and distribution.

Often, classic digital radiography (DR) cannot deliver accurate depth information of defects in X-ray images.

As it is a purely two dimensional technology, anomalies can be detected but the depth and location of these discoveries can often not

be accurately determined.

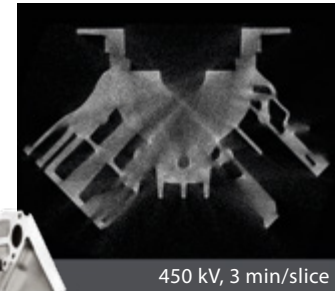
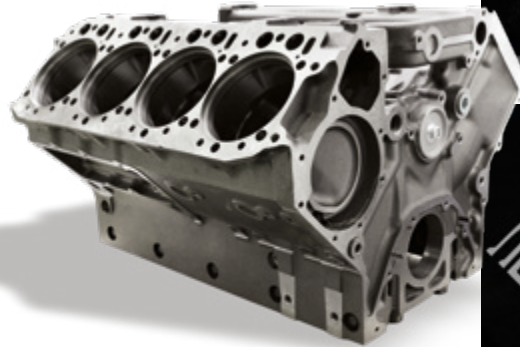
Nevertheless, in some applications it is a big difference if the error is close to the surface or deep inside the part.

Another interesting metric is the exact defect-volume, which is impossible to determine in 2D images.

Depending on the application, various acquisition speeds, trajectory paths and even reconstruction techniques can be utilized.

➤ Why Linac CT? Comparison between 450 kV and 6 MeV

- ✓ 450 kV: Due to the immense material thickness a reliable defect detection is not possible
- ✓ 6 MeV: Thanks to the high penetration power, not only the measurement time is drastically reduced, but also the test result allows a reliable defect analysis. Additionally, the excellent contrast values and clear object outlines allow measurement analyses.



450 kV, 3 min/slice



6 MeV, 1 min/slice

➤ Metrology

The high precision granite manipulation system of diendo's CT systems with their inherent rigidity and temperature stability guarantee highest precision even after many years of intense use.

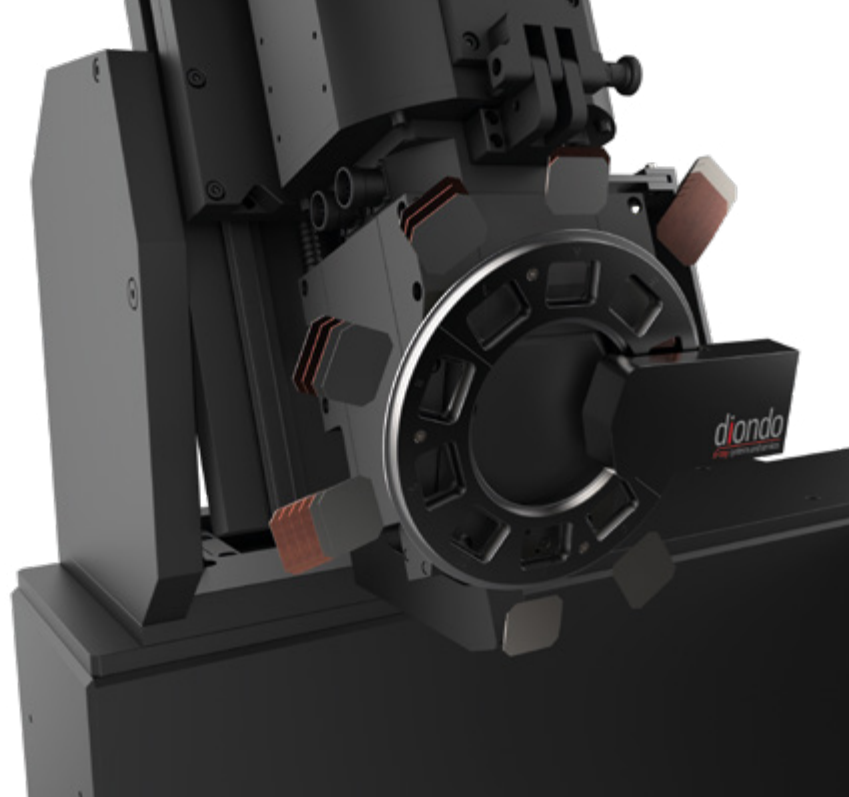
These same features enable metrology applications such as nominal-actual comparison, wall thickness measurements, and geometric dimensioning and tolerancing (GD&T) - including an MPE certificate and measurement process according to current standards

established in the metrology industry. Other system features include temperature management, system health monitor, and the daily check routines that combine to help ensure reproducible 3D measurement technology for highest demands according to VDI/VDE 2630-1.3.

- ✓ Accurate and repeatable measurements
- ✓ Reliable results
- ✓ Insightful and elucidating analysis

➤ 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.



➤ Storage Area with Automatic Part Changer

- ✓ Storage area inside the radiation protection cabinet
- ✓ Enables the CT scan of multiple (even different) parts without operator presence by diondo's batch-scanmode
- ✓ Inclusive 6 CFC etageres



➤ Metrology Bundle

Length measurement systems on relevant axes with a repeatability of $\pm 1 \mu\text{m}$.

Factory system calibration.

For metrology applications according VDI/VDE Guideline 2630-1.3.: MPESD : $5 \mu\text{m} + L/100$.

diondo's special calibration routine ensures the highest accuracy acc. VDI/VDE 2630 1.3 and remains valid until any mechanical alteration / exchange of filament or target.

The metrology bundle includes the diondo ruby ball artefact.

Two sphere plates made of easily penetrable CFRP enclosed in a housing, each with 15 highly resistant ruby spheres for the adjustment of CT systems.

The high-precision measurement of the sphere plates is carried out by the DAkkS or, in the case of a factory calibration (WK), by a certified test

laboratory, depending on the requirements. The test certificate issued for this purpose is also supplied.

The housing of the ball plates is designed to protect against external influences and prevent signs of wear, so that the highly accurately measured ball plates provide reliable measurement results in the long term.





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