diondo
x-ray systems and services

diondo diControl

3D X-ray Computed Tomography Software

Navigate Complexity with Ease

diControl

3D X-ray Computed Tomography Software

Unlock Potential: Seamless, Limitless, Effortless.

Discover a world of diverse possibilities with just one software package – your tailored solution for a variety of needs, whether in the industrial sector or research field.
Our software is noted not only for its versatility but also by its user-friendly design, allowing you to achieve excellent results without significant effort.

Benefit from an ever-expanding range of functions, inspired by close collaboration with our customers. This dynamic enables us to perfectly tailor the software to your individual needs, ensuring you always get the most out of your data. With minimal training, our solution allows you to work effectively and achieve high-quality results. And for the experts among you, the configurable interfaces and open interfaces offer even more possibilities.

But that's not all: our software simplifies your workflows through intelligent automation features. Save valuable time and resources and focus on what really matters.

+ High Efficiency

By combining batch processing with state-of-the-art automation, scan sequences can be executed automatically, seamlessly extending across your system components (e.g. different X-ray sources), guaranteeing significant time savings.

+ Limitless Flexibility

Enjoy unrestricted access to all images and data, and benefit from the possibility to implement custom scanning sequences. Our solution opens the door to a world of possibilities.

+ User-Friendliness

Experience the ultimate in user comfort with our combined imaging and reconstruction software. Our intuitive sequential menu system and numerous automation features eliminate complex processes, enabling excellent scan results even with minimal training effort.

+ Individual Workflows

Integrate different components and create customized scan templates. Our solution also supports a wide range of post-processing and analysis workflows, by offering numerous output data formats (Raw, Tiff and DICONDE) and automatically generating VGL files.

diControl Feature Overview

Many Features, even more Possibilities.

- **+ Combined Imaging and Reconstruction Software**
- **+ Unrestricted Access to all Images and Data**
- **+ Various supported Output Formats (Raw, TiFF, DICONDE)**
- **+ Multilingual User Interface**
- **+ Multiple User Levels**
- **+ Digital Machine Logbook**
- **+ Collision Protection**
- **+ Integrated Webcams**

CT Imaging

- Multipoint Correction
- Automatic Focus Drift Correction
- Multiple Rotation Modes
- Projection Filters
- Field of View Extensions [FoV]
- Limited Angle Scan
- **Helix-CT**
- **Dual-Helix-CT**
- **diPlanar**
- **Ultra Wide FoV Extension**
- **Multi-Line**

Reconstruction

- Preview
- Tomogram Filters
- Data Reduction
- Multi-Recon
- Inline Recon
- Artifact Reduction
- ROI Recon
- Automatic Creation of VGL files
- Scan Enhancement
- diScatter
- Creation of VG-Recon-File

Digital Radiography

- 1:1 Mode
- Crosshair
- Live Image Filtering
- Predefined Filters
- High Dynamic Range [HDR]
- Image Sequence Capture
- Pseudo Colors
- Grayscale Histogram Display
- DR Measurement Toolbox
- CNC Measurement
- DR Stitching
- Statistics Box
- DR Analysis Tool

Quality Control

- Health Monitor
- Scan Report
- Measurement History
- Daily Check
- Metrology Mode
- Temperature Monitor
- Enviromental Monitor
- ASTM & SMPTE Tools

Automation

- CT Batch Processing
- Detector Correction
- Projection Selection
- Tube Power Selection
- Macro Execution
- Time-Controlled Warm-Up
- Smart Collimator Control

User Aids

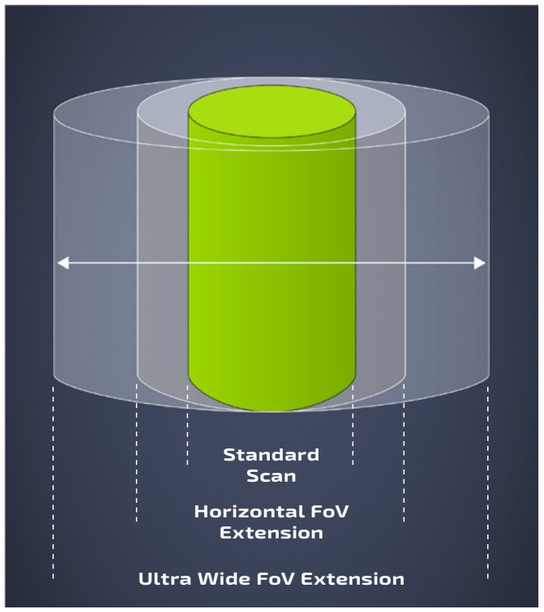
- Target Rotation
- Pre-Filter Traceability
- Beam Centering
- Histogram Display
- Tutorial Button
- Pause Measurement

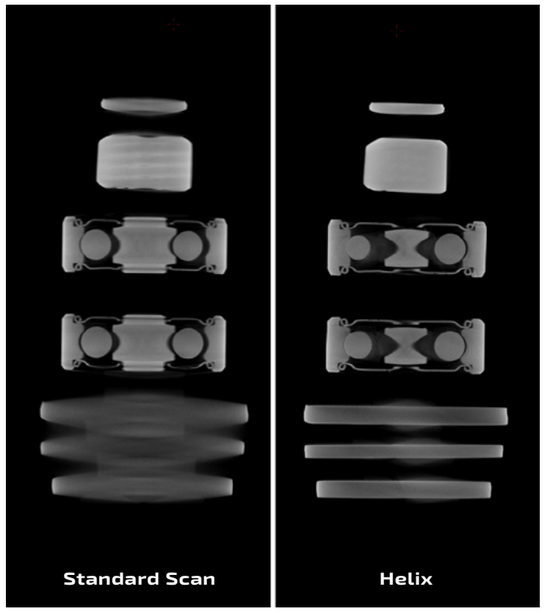
Special Tools

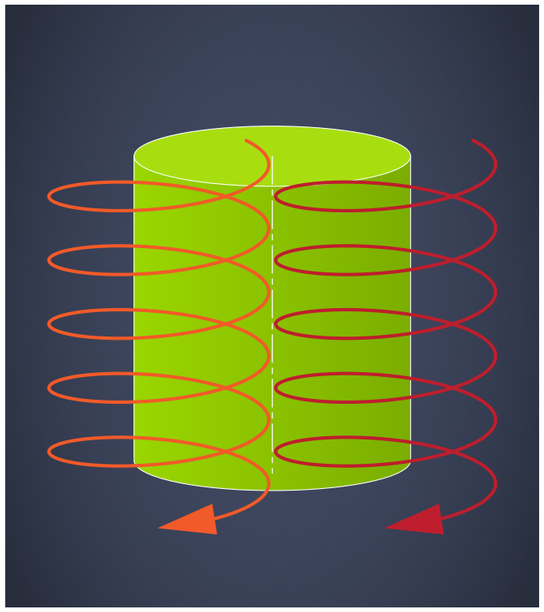
- External Trigger
- User-Defined Trajectories
- Batch Parameter Studies
- di4D
- diZoom
- diAspect

CT Imaging Features

Revolutionize Quality and Efficiency.







+ Field of View Extensions

This innovative function breaks through the limits of conventional methods, allowing for the seamless capture of even the largest objects at the desired magnification.

The vertical extension allows you to effortlessly scan the full height of extensive objects across various measuring positions, creating a single reconstructed volume without any visible transitions between individual scans.

The horizontal extension opens up the possibility to cover the entire width of expansive objects, potentially exceeding the detector width.

+ Helix-CT

Revolutionize the way you scan longer or taller objects by capturing them in a single continuous scan. The combination of rotational movement and height adjustment enables to seamlessly capture your inspection objects, eliminating the need for multiple scans.

Furthermore, our Helix-CT effectively eliminates Feldkamp artifacts, thereby not only improving image quality but also enhancing the reliability of your results.

+ Dual-Helix-CT

The dual-Helix mode is the ideal solution for high-resolution imaging of large and wide objects. By combining the advantages of horizontal FoV Extension and Helix-CT, two continuous Helix scans with different rotation centers are performed and seamlessly merged.

The result is a single volume without visible transitions and without Feldkamp artifacts. Even if the object extends beyond the image frame, the dual-Helix mode enables scanning of components with the desired resolution.

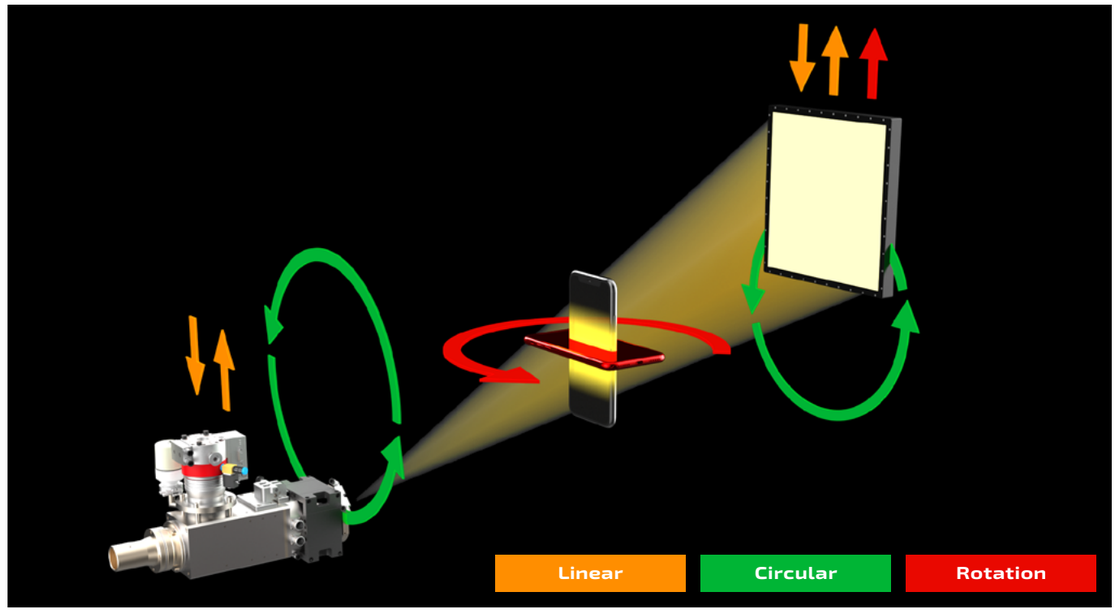
CT Imaging

+ **Multipoint Correction**
  for the reduction of ring artifacts
+ **Automatic Focus Drift Correction**
  to reduce blurring caused by the thermal expansion of the X-ray tube
+ **Multiple Rotation Modes**
  for different speed-precision trade-offs: Continuous - Stop in Motion - Stop and Go
+ **Generic or Custom Projection Filters**
  for optimizing image quality
+ **Field of View Extensions [FoV]**
+ **Limited Angle Scan**
  helps with scanning very large objects and reduces scanning duration

+ **Helix-CT**
+ **Dual-Helix-CT**
+ **diPlanar**
  for scanning high-aspect ratio samples using laminography trajectories
+ **Ultra Wide FoV Extension**
  for scanning the very widest samples
+ **Multi-Line**
  for the reduction of scatter artifacts

CT Imaging Features

Revolutionize Quality and Efficiency.



+ diPlanar

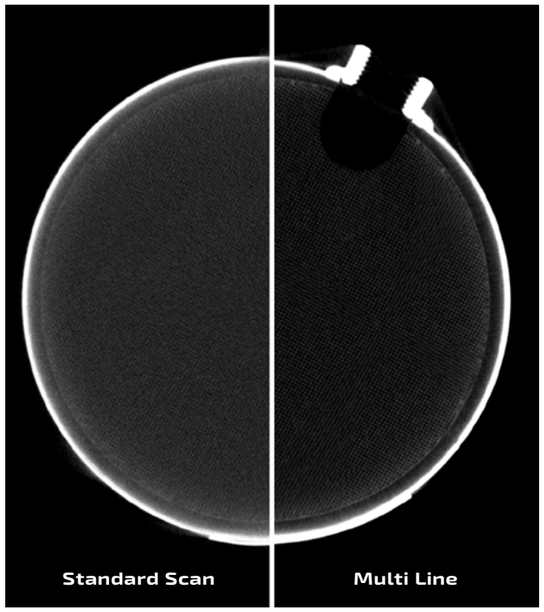
The diPlanar function, based on laminography, enables high-resolution imaging of flat objects such as printed circuit boards, microchips, and similar components. It is ideal for capturing depth information that goes beyond the limitations of 2D X-ray imaging and cannot be sufficiently resolved with full 3D CT scans.

Compared to standard 2D X-ray inspections, which do not provide spatial information, laminography combines the high resolution of 2D technology with depth data to precisely detect and locate defects. Even the smallest defects in complex, flat objects can be reliably detected.

Depending on the system, our diPlanar function offers up to three modes for inspecting your objects:

- Linear
- Circular
- Rotation

These modes vary in the movements of the X-ray tube and detector relative to the object, allowing for faster and more accurate imaging results based on the specific requirements.



+ Multi-Line

This scanning mode combines the benefits of conventional flat panel detectors, offering consistently high resolution both vertically and horizontally, with the advantages of line detectors, which reduce scatter radiation. This mode exploits the fully software-integrated motorized tube collimator, which minimizes scatter radiation artifacts.

With this innovative approach, not only can individual regions of interest (ROIs) be analyzed, but a fully automatic scan of the component can also be programmed in batch mode. Users benefit from the diondo-specific stitching method, which prevents typical gray value jumps between individual scanvolumes and produces a contiguous volume of outstanding quality.

CT Imaging

+ **Multipoint Correction**
for the reduction of ring artifacts

+ **Automatic Focus Drift Correction**
to reduce blurring caused by the thermal expansion of the X-ray tube

+ **Multiple Rotation Modes**
for different speed-precision trade-offs: Continuous - Stop in Motion - Stop and Go

+ **Generic or Custom Projection Filters**
for optimizing image quality

+ **Field of View Extensions [FoV]**
for seamless detection of even the largest objects

+ **Limited Angle Scan**
helps with scanning very large objects and reduces scanning duration

+ **Helix-CT**
for long objects and improved image quality

+ **Dual-Helix-CT**
combines the advantages of FoV Extension and Helix-CT

+ **diPlanar**
for scanning high-aspect ratio samples using laminography trajectories

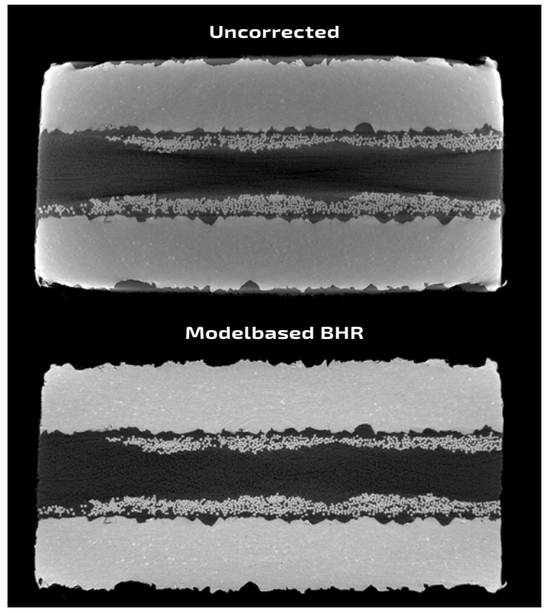
+ **Ultra Wide FoV Extension**
for scanning the very widest samples

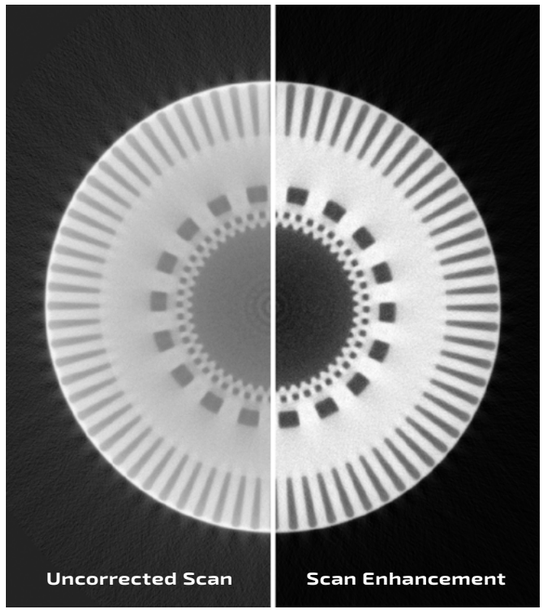
+ **Multi-Line**

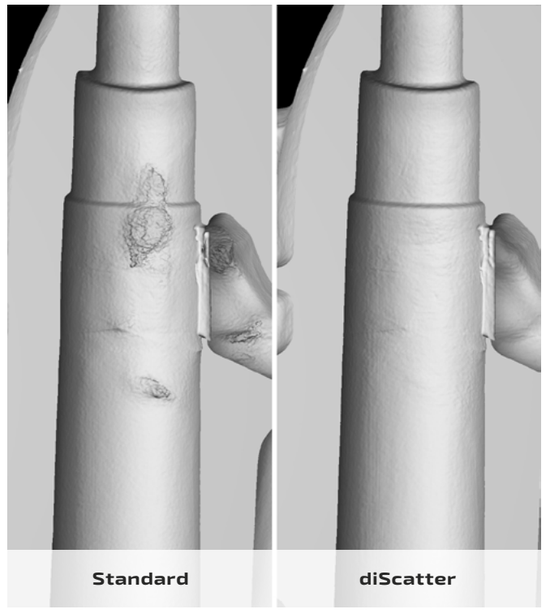
Reconstruction Features

Focus on what matters.

Reduce Scan Time, Image Artefacts, and Data Size.







+ Preview

Optimize your workflow with our tomogram preview function, significantly speeding up the adjustment of your reconstruction parameters.

In perfect synergy with the multi-recon function, our tool allows you to automatically reconstruct 3D volumes with different parameters right after scanning – efficiently, without generating unnecessary data volumes and without wasting valuable time. You can effortlessly choose the optimal set of parameters for reconstruction, generating the ultimate volume in top-notch quality.

+ Scan Enhancement

This powerful feature utilizes advanced filtering techniques to refine your scan results, delivering unmatched clarity. By effectively reducing beamhardening and scatter effects, this algorithm elevates your scans to the top of CT imaging quality.

+ diScatter

Our advanced diScatter module is specifically designed to effectively reduce image artifacts caused by scattered radiation both internally in the detector and from the test object. With just one short additional calibration measurement, our system enables precise correction that significantly enhances the clarity and accuracy of your scans. The model can then also be readily reused for similar test components and scan configurations.
When combined with the use of the 4-field collimator, our software offers a fully automatic process that facilitates optimal positioning of the collimator for calibration measurements. Furthermore, the module is also compatible with micro focus tubes in conjunction with the micro focus collimator, to achieve optimal results and maximize image quality even at the highest resolutions.

Reconstruction

+ **Preview**
+ **Generic or Custom Tomogram Filters**
  for optimizing image quality
+ **Data Reduction**
  skipping projections, reducing resolution and background segmentation
+ **Multi-Recon**
  for direct comparison of different reconstruction parameters
+ **Inline Reconstruction**
  enables reconstruction to start during data acquisition, so reconstructed volume is ready moments after the scan completion
+ **Artifact Reduction**
  + Ring artifacts
  + Image noise
  + Truncation artifacts
  + Metal artifacts
  + Beam hardening [BHR]
+ **ROI Recon**
  for data volume and reconstruction time savings data
+ **Automatic Creation of VGL Files**
  for easy import of reconstructed data

+ **Scan Enhancement**
+ **diScatter**
+ **Creation of VG-Recon-File**
  for use in alternative, offline reconstruction

Digital Radiography Features

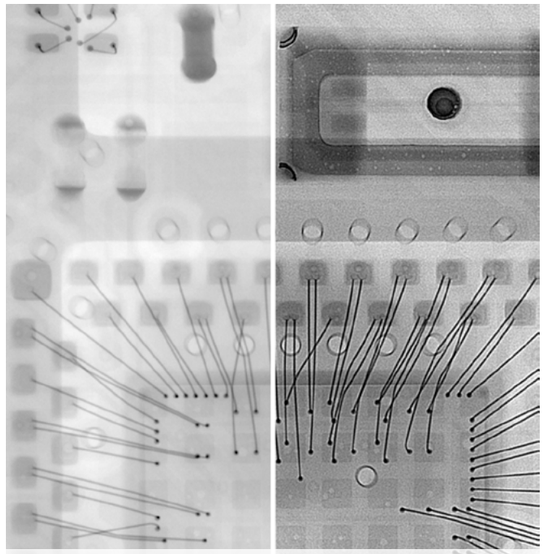
Digital Radiography – Fast, Efficient, Digital.

While CT scans are recognized as the gold standard in X-ray imaging, digital radiography (DR) maintains one crucial advantage: its speed. Our software, equipped with numerous features specifically developed for 2D imaging, allows these images to be viewed and analyzed in real-time and in true-to-detail 1:1 format.

Unlock the full potential of our systems with precise measuring tools that enable you to directly determine distances and angles within your images. Draw line profiles through your X-ray images or through 2D cross-sectional views of reconstructed volumes to uncover details in the grayscale distributions.

Enhance the visibility of irregularities and defects in your components with our collection of generic or custom image filters.

Our integrated histogram facilitates grayscale scaling, while the use of HDR filters or false colors can be crucial in highlighting critical details in your images. Save your results in widely used and accessible formats such as TIFF, Raw, and DICONDE, ensuring smooth further processing and analysis of your valuable data.



+ High Dynamic Range [HDR]

You can count on our HDR filter to tease out every detail. With this advanced feature, you preserve important details in both the darkest and brightest areas of your DR images.

This is particularly beneficial for effectively highlighting defects in difficult-to-penetrate assemblies with components of varying absorption. Our HDR filter is your key to more precise inspections and improved defect detection.

+ Image Sequence Capturing

This software feature is designed for capturing DR image sequences. It offers the opportunity to gain detailed insights into complex processes and structures by capturing a series of high-resolution DR images in quick succession.

Digital Radiography

+ **1:1 mode**
  avoid missing defects due to reduced resolution
+ **Crosshair**
  for better orientation and easy positioning of the object in the center
+ **Live Image Filtering**
  to see the improved result immediately
+ **Generic or Custom Filters**
  to individually optimize the image quality
+ **High Dynamic Range [HDR]**
+ **Image Sequence Capturing**
+ **Pseudo Colors**
  false-color representation to recognize every detail
+ **Grayscale Histogram Display**
  overview of the grayscale distribution to optimize scan parameters
+ **DR Toolbox Measurement**
  + Line profile
  + Angle measurement tool

+ **CNC Measurement**
  high-precision measurement
+ **DR Stitching**
  for high-resolution DR images of large objects
+ **Statistics Box**
  for evaluating the grayscale values within defined ROIs
+ **DR Analysis Tool**
  for tile-by-tile OK / Not OK classification of a sample

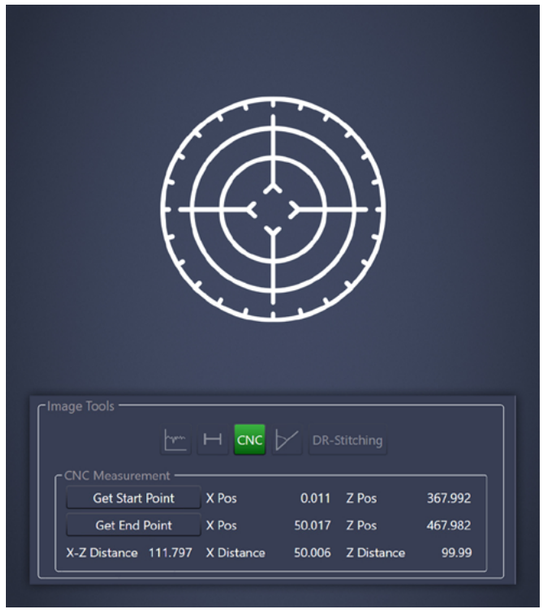
Digital Radiography Features

Digital Radiography – Fast, Efficient, Digital.

+ Pseudo Colors

Transform grayscale images into false-color representations, making details visible that were previously hidden. This innovative technique readily highlights the smallest differences and defects.

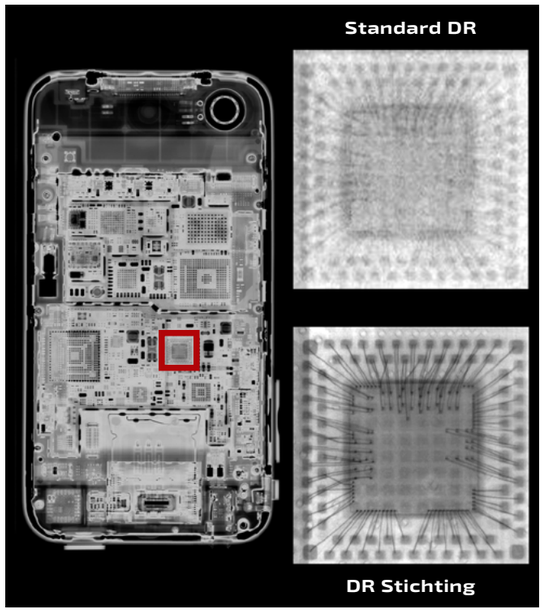
Additionally, this tool is ideal for identifying areas with high absorption or separating the grayscale values of individual components and materials in the tomogram. It is possible to choose from a range of color spectra or even add a custom one.



+ CNC Measurement

This software function enables high-precision measurement of distances without the distortion caused by the conical X-ray beam or magnification uncertainty.

High-accuracy measurements can be performed within a plane parallel to the detector, using the manipulator precision.



+ DR Stitching

Discover our pioneering tool, specifically designed to provide you with seamless and super-high-resolution overview DR-Images of your large-scale objects.

This advanced software combines exceptional image quality with easy and intuitive operation to guarantee a seamless user experience.

Digital Radiography

+ **1:1 mode**
  avoid missing defects due to reduced resolution
+ **Crosshair**
  for better orientation and easy positioning of the object in the center
+ **Live Image Filtering**
  to see the improved result immediately
+ **Generic or Custom Filters**
  to individually optimize the image quality
+ **High Dynamic Range [HDR]**
  enables the display of a wider range of brightness and contrasts to make defects more visible
+ **Image Sequence Capturing**
  to record dynamic processes
+ **Pseudo Colors**
+ **Grayscale Histogram Display**
  overview of the grayscale distribution to optimize scan parameters
+ **DR Toolbox Measurement**
  + Line profile
  + Angle measurement tool

+ **CNC Measurement**
+ **DR Stitching**
+ **Statistics Box**
  for evaluating the grayscale values within defined ROIs
+ **DR Analysis Tool**
  for tile-by-tile OK / Not OK classification of a sample

Quality Control Features

Precision at Every Step: Monitor, Calibrate, Assure Quality.

+ Health Monitor

This innovative feature acts as a constant guardian of your system, providing real-time feedback from every system component, interface, and ongoing scanning process.
Enjoy the peace of mind that in the event of a malfunction, you will be immediately informed with a clear, understandable text message, knowing the cause and then being able to rectify the error.

Every status report and interaction is meticulously documented in log files, thus creating a comprehensive performance profile of your system. This valuable record is not only a tool for operators but also enables diondo's expert service technicians to conduct in-depth analyses to ensure the long-term reliability and efficiency of your system.

+ Scan Report

Discover the efficiency and transparency of our software with the automatically generated scan report that provides a complete documentation of each CT scan or DR image. This comprehensive report includes not only all imaging and reconstruction parameters but also additional webcam images of the object within the CT system, as well as X-ray images and cross-sectional views from the reconstructed interior of the component.

Each automatically generated report ensures the traceability of each examination and is a valuable resource for maintaining your databases. Ideal for quality control, research, or archiving of scan data, our PDF report delivers all the necessary information in a clear and easily accessible format.

+ Daily Check

Safeguard quality assurance through the innovative Daily-Check. An effortless and precise verification of the geometry and image quality of the CT system is enabled by starting the automated process after positioning the provided diondo test cylinder on the turntable.
The scans and their evaluations are carried out fully automatically. Upon completion, the results are color-marked with respect to predefined tolerances, enabling immediate recognition of the need for recalibration.

For seamless documentation and easy traceability, all Daily Checks are visualized in a clearly structured report. This report automatically updates after each measurement, providing an ongoing overview of the condition and precision of the CT system.

Quality Control

+ **Health Monitor**
+ **Scan Report**
+ **Measurement History**
  for automatic documentation of all scan reports
+ **Daily Check**

+ **Metrology Mode**
  for highest precision measurements
+ **Temperature Monitor**
  with additional documentation as PDF
+ **Environment Monitor**
  monitoring temperature and humidity with additional documentation as PDF
+ **ASTM & SMPTE Tools**
  integrated and fully automated implementations of ASTM 2597 + AITM6-7007, ASTM 2737 guidelines

Quality Control Features

Precision at Every Step: Monitor, Calibrate, Assure Quality.

+ Metrology Mode

Experience unmatched precision using diondo's metrology mode, compliant with VDI/VDE 2630 guidelines.

Our calibration routine ensures top accuracy as per VDI/VDE 2630 1.3, valid until any mechanical modifications. The metrology kit features the diondo ruby ball calibration artifact, with two CFRP ball plates in a protective Plexiglas housing, each with 15 durable ruby balls.

Calibration of the ball plates is performed by DAkkS or otherwise certified lab for factory calibrations, with a provided test certificate.

+ Environment Monitor

Our software ensures complete traceability of the testing environment through detailed logging of temperature and humidity, which are fully integrated into the software interface and also listed in the PDF report of each measurement to provide you with a comprehensive overview of the testing conditions.

For high-precision measurements or temperature- and humidity-sensitive objects, where environmental conditions can significantly impact the quality of the results, it is possible to configure the scanner to only start data acquisition when the required conditions have been reached.

+ ASTM & SMPTE Tools

Enhance the precision and reliability of your CT scans in the aerospace sector with diControl's advanced image analysis tool, specifically designed to meet the strict standards of ASTM 2597 + AITM6-7007, ASTM 2737.
This feature evaluates and logs key parameters such as "spatial resolution" and "contrast resolution". Moreover, it includes a comprehensive "Bad Pixel" analysis, ensuring that your image quality meets the highest standards.

Ensure that the devices you use comply with the specifications and requirements for consistent quality control in terms of image format and color space with the help of this SMPTE tool.

Quality Control

+ **Health Monitor**
for monitoring all system components

+ **Scan Report**
for automatic documentation of all measurements

+ **Measurement History**
for automatic documentation of all scan reports

+ **Daily Check**
for automatic checking of image quality and measurement capability

+ **Metrology Mode**

+ **Temperature Monitor**
with additional documentation as PDF

+ **Environment Monitor**

+ **ASTM & SMPTE Tools**

Automation Features

Increasing Efficiency, Preventing User Errors.

+ CT Batch Processing

The diondo batch mode enables various DR images or entire CT scans to be performed. Completely different X-ray settings can be specified for the scans, especially when diondo's motorized filter changer is in use.

Using multi-storey sample holders, a large number of potentially different samples can be continuously (e.g. overnight) scanned without operator intervention.

+ Time-Controlled Warm-Up

Innovative function to shorten the warm-up time and increase productivity: The operator can, for example, set up the warm-up process of the X-ray source for Monday morning on Friday afternoon and thus increase the availability of the entire system by avoiding waiting times.

+ Smart Collimator Control

Automatic collimation for multiline-CT revolutionizes imaging by automatically cropping the beam's cone in relation to the detector distance. This feature, based on our 4-field motorized collimator with synchronously movable tungsten sheets, enhances image quality significantly in both DR and CT modes.

It seamlessly works with dual detector setups, requires no manual collimator adjustments for LDA scans, and includes a prefiltration fixture.

Automation

+ **CT Batch Processing**
+ **Detector Correction**
  automatic execution of detector corrections for each measurement
+ **Projection Selection**
  automatic selection of the number of projections
+ **Tube Power Selection**
  automatic selection for maximum resolution and minimum time

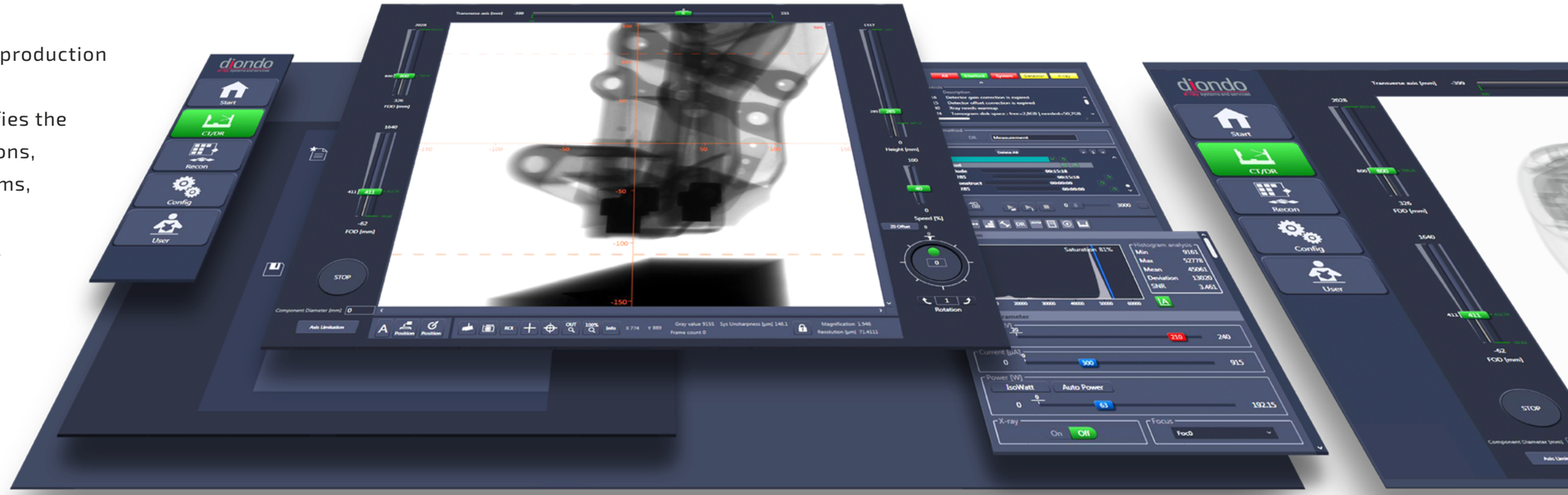
+ **Macro Execution**
  automatic execution of a VG macro immediately after reconstruction or at a later time
+ **Time-Controlled Warm-Up**
+ **Smart Collimator Control**

User Aids

Simplify Your Life with Smart Solutions.

Developed to meet the requirements of modern production environments, our software offers a simple and intuitive user interface that significantly simplifies the scanning process. Through innovative automations, comprehensive support, and precise alert systems, our software efficiently guides the operator to achieve optimal scanning results - with minimal effort.

Our software aims to eliminate potential sources of error, extend the lifetime of your valuable machine components, and ensure consistently high image quality. With this solution by your side, you not only save valuable time but also costs.



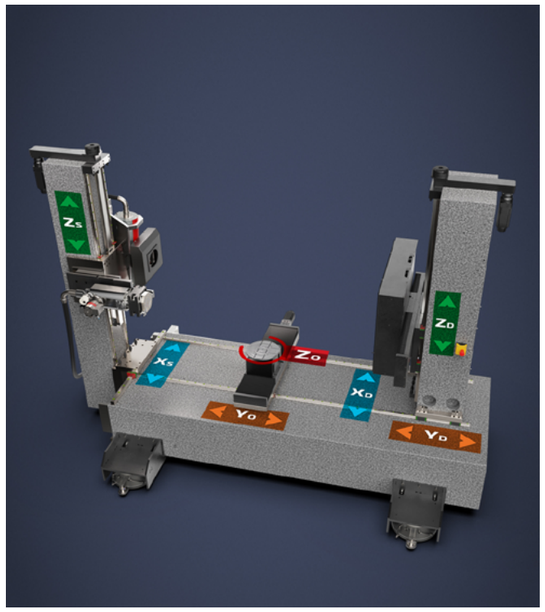
+ **Multilingual User Interface**
  instantly switchable with 9 languages
+ **Integrated Webcam**
  up to 4 integrated cameras within the radiation protection enclosure
+ **Digital Machine Logbook**
  digital recording of machine events and user-supplied information
+ **User Levels**
  allows management of user permissions
+ **Scan Reports**
  automatically generated as XML and PDF with all relevant scan parameters

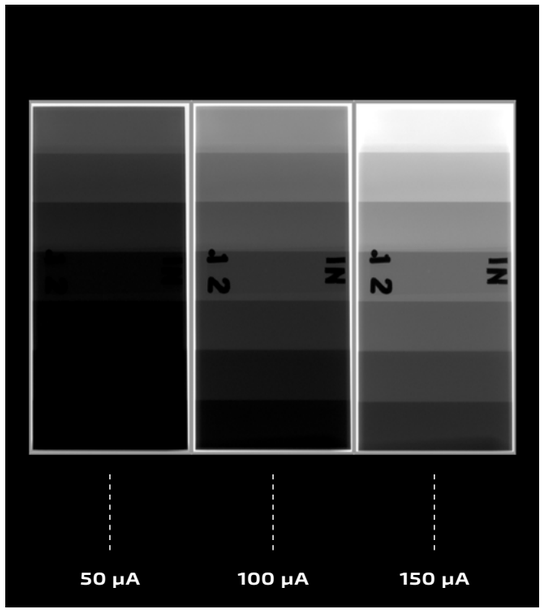
User Aids

+ **Target Rotation**
  automatic reminder to rotate the target to avoid target burn-in
+ **Pre-Filter Traceability**
  Pre-Filter is logged, and if a filter-changer is fitted, automatically selected
+ **Beam Centering**
  automatic centering of the tube and filament adjust for long durability and best image quality
+ **Histogram Display**
  Color warnings regarding the saturation of the detector to avoid damage
+ **Tutorial Button**
  comprehensive and easy-to-understand assistance with just one click
+ **Pause Measurement**
  enables access to the radiation protection enclosure at any time during a scan - which can be seamlessly continued.

Special Features

Control Your Experience –
Personalized, Independent, Tailored to Your Needs.





+ External Triggering

Maximize the synchronisation and efficiency of your system components with our ground-breaking external trigger feature.
This innovative solution enables precise communication and timing control of various components or processes by using external signals for triggering.

Ideal for imaging complex processes where timing and coordination are crucial, our external trigger offers reliable and seamless integration.

+ User-Defined Trajectories

With the ability to configure arbitrary sequences of projections – varying in source, detector, and manipulator settings – our software offers unprecedented adaptability, easily managed through user-created XML files. Our diControl software continues to ensure the highest safety by enforcing axis limits and other safety features, allowing you to experiment with confidence.

The generated projections and associated metadata are stored in open, non-proprietary formats – including TIFF or RAW for image projections – and are immediately available for you to integrate your own reconstruction pipelines as needed. Embrace the freedom to customize your scans exactly to your preferences and unlock the full potential of your hardware.

+ Batch Parameter Studies

Our batch configurator for parameter studies opens up new possibilities for your measurement processes. This powerful tool allows for the addition of multiple measurements in a sequence, with specific parameters such as voltage, current, or integration time being changed step by step.

Ideal for comprehensive parameter studies, the Batch Configurator offers an efficient and time-saving solution to effortlessly set up the configurations for your measurements.

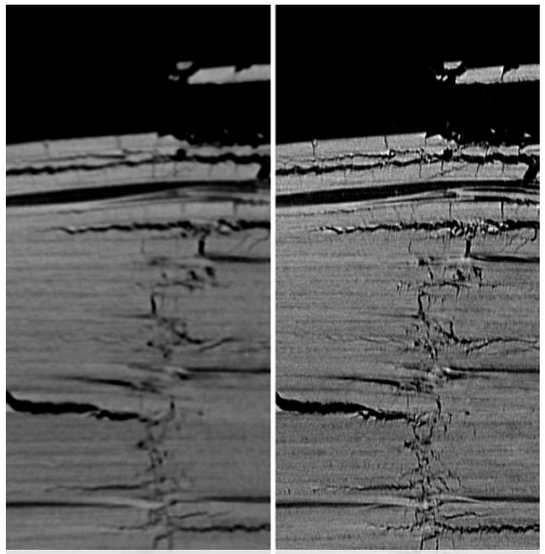
Special Tools

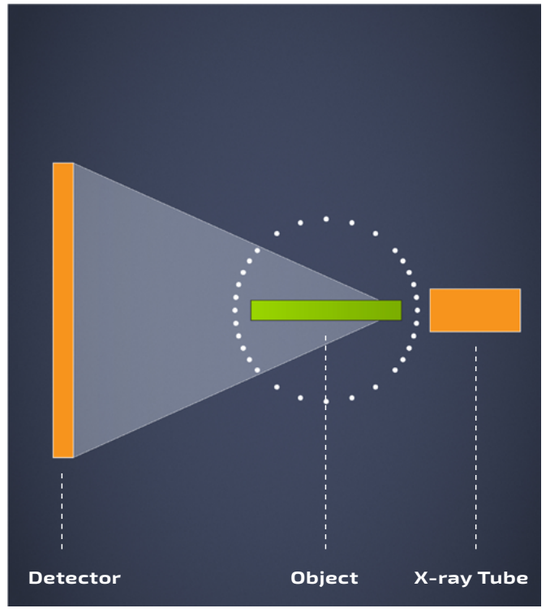
+ **External Trigger**
+ **User-Defined Trajectories**
+ **Batch Parameter Studies**
+ **di4D**
  for flexible reconstruction of different points in time of a process
+ **diZoom**
  for high-resolution scans of flat objects
+ **diAspect**
  Variable Projection-Density

Special Features

Control Your Experience –

Personalized, Independent, Tailored to Your Needs.





+ di4D

Specially designed for capturing images of processes and time sequences, our innovative function revolutionises the quality of your results. With an advanced acquisition technique that collects a large number of projections over several rotations of the turntable, our software sets new standards in terms of flexibility.

Unlike conventional scan modes, our solution allows the subsequent reconstruction of volume data for virtually every moment of the examined process and enables you to optimise the temporal resolution and image quality trade-off.

+ diZoom

This module enables a significantly higher resolution of test objects that would collide with the X-ray source in conventional CT trajectories.

Depending on the component geometry, the user can specify different magnifications segment by segment. The result is a significantly improved resolution and sharper images.

+ diAspect

With diAspect, scanning results can be optimized through simple and application-oriented focusing of the projection density to where it matters most – for superior image quality or reduced scanning time through intelligent distribution of the projections. Combined with our innovative diZoom function, an even better resolution and consequently sharper image quality can be achieved.

Special Tools

+ **External Trigger**
  for communication and timing triggering of different components or processes
+ **User-Defined Trajectories**
  for specific requirements, such as locally optimized image quality or reduced radiation exposure
+ **Batch Parameter Studies**
  for measurement studies with CT parameter variation
+ **di4D**
+ **diZoom**
+ **diAspect**

diControl

intelligent x-ray software solutions

Have a Special Feature Request?

Contact us now to share your requirements and learn how our CT software can be customized for you.

diondo

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