BEHIN NEGAREH

Micro-CT Products:

LOTUS-NDT

LOTUS-inVivo

LOTUS Software Package


Together,
Several Steps
Forward

About us

Thanks to our ambitious goals we are the first and only manufacturer of micro-CT imaging devices in the country and the Middle East.

A micro-CT scanner is a high-tech x-ray device for non-destructive 3D high-resolution imaging of the internal structure of objects.

Considering the lack of this technology in the country and the region, and the increasing need for it in various fields of industry and research, including dentistry, botany, entomology, tissue engineering, geology, petroleum engineering, archeology and paleontology, materials sciences, civil engineering, electronics and mechanical engineering, and many other fields, we decided to design and manufacture the first type of these scanners domestically, with world-class quality. Now for the first time, the technological infrastructure of micro-CT imaging equipment in the country has been established by BN Co. Two types of scanners; LOTUS-NDT and LOTUS-inVivo, as well as LOTUS advanced software package, were designed, developed, and presented in a short period of time. By analyzing the needs of researchers, the next and improved versions of the devices were also produced, and this process of research and development continues.

Our team consists of top researchers, engineers, and technicians to provide world-class quality desktop and laboratory micro CT scanners. From hardware to software, all our experts work together, and with clients to provide the best solutions for you.

By using Lotus scanners, you become a member of our family of users and benefit from the exchange of knowledge and experiences. Welcome!

LOTUS: The most common symbol used in ancient Persepolis buildings, the ceremonial capital of the Achaemenid Empire.

LOTUS-NDT

A Versatile Industrial Micro-CT Scanner

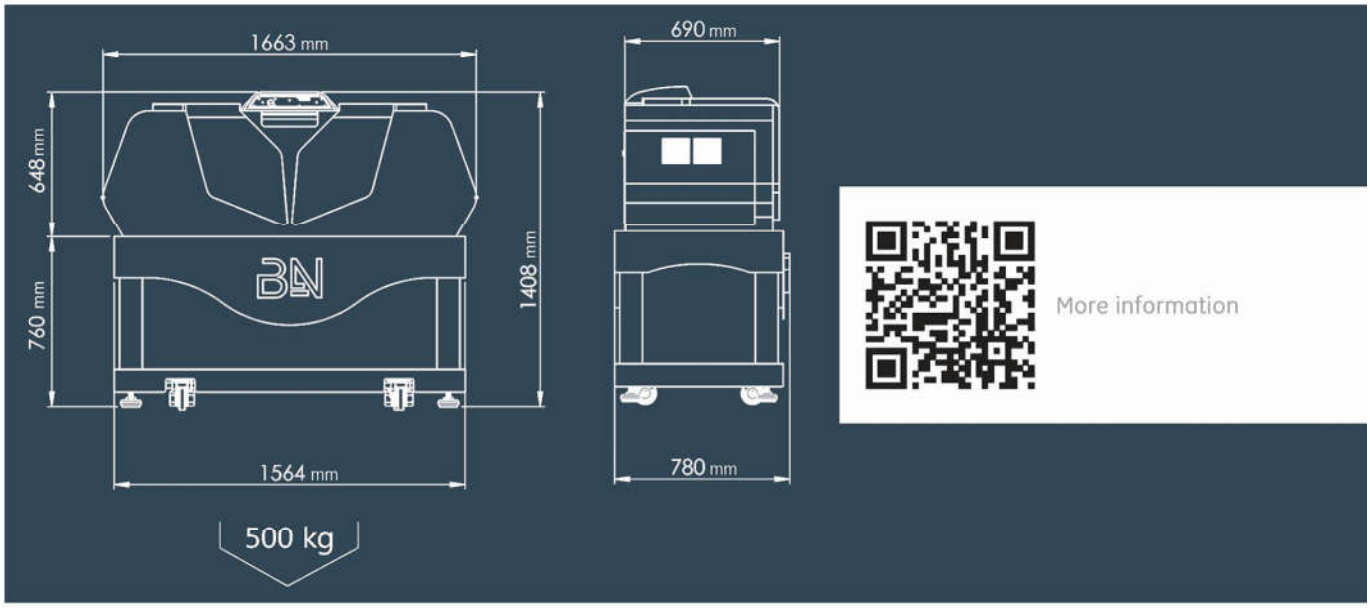
An Ultra-High-Resolution Device for Non-Destructive Testing
Rotating Object System

LOTUS-NDT is a high-performance, stand-alone, fast, desktop NDT micro-CT, providing high-quality images with a high contrast-to-noise ratio and high resolution at an optimum dose.

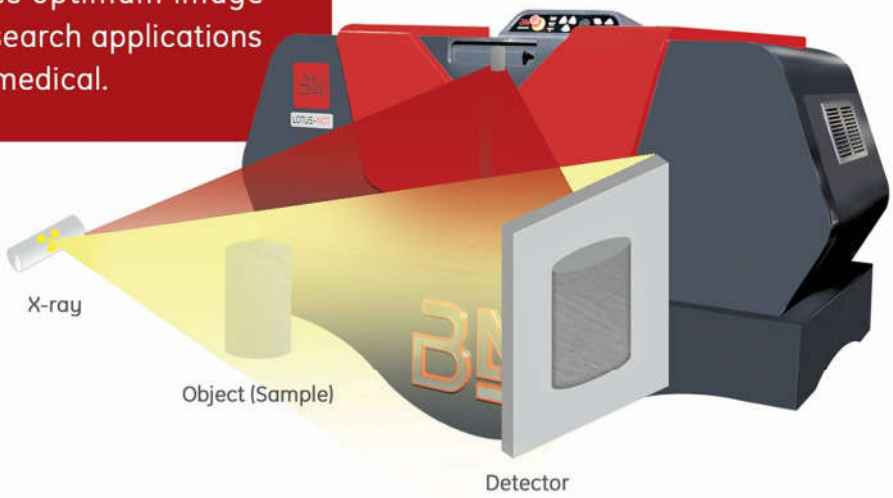
- Wide kV range
- Variable magnification (FOV)
- Continuous, and gated mode of imaging
- Self-shielded for user radiation safety
- 2D & 3D GPU-based reconstruction
- 2D & 3D surface and volume renderings with realistic visualization
- 2D/3D sub-micron measurements

LOTUS-NDT Overview of Specifications

X-ray source	45-130 kV, ~40 W	Covers a wide range of applications
Nominal resolution	< 2 µm	
X-ray detector	3 Megapixel 16-bit digital X-ray detector	High readout speed High signal-to-noise ratio
Reconstructed volume	Up to 4096*4096*1300 pixels	
Sample size	Max. height 100 mm, Max. Ø 50 mm	Allows scanning of various size samples
Radiation safety	Self Shielded, < 1 µSv/h	
Power supply	220 V-50 Hz	Standard wall socket



The variable X-ray energy combined with other options ensures optimum image quality for diverse research applications from industrial to biomedical.



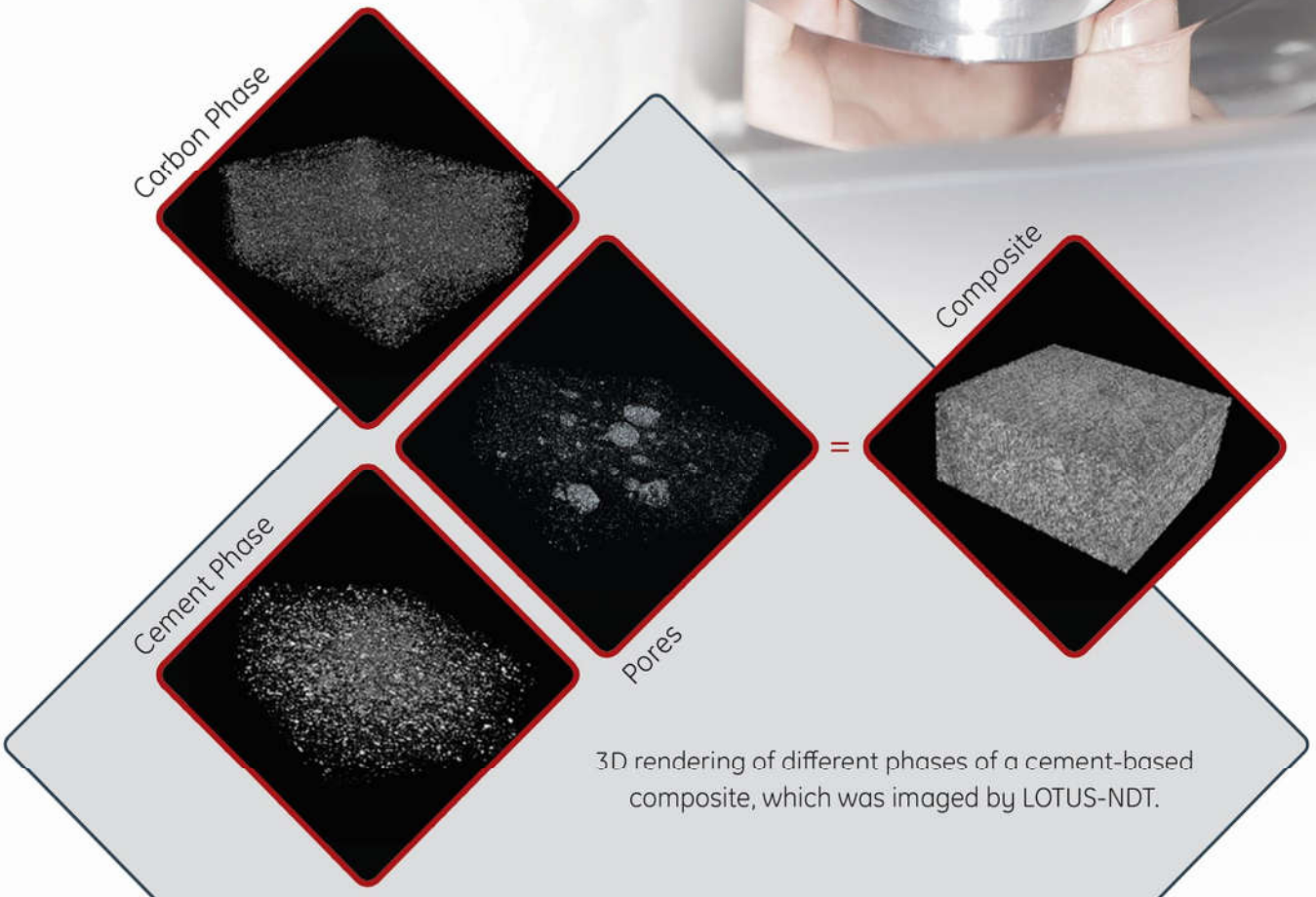
LOTUS-NDT

Applications

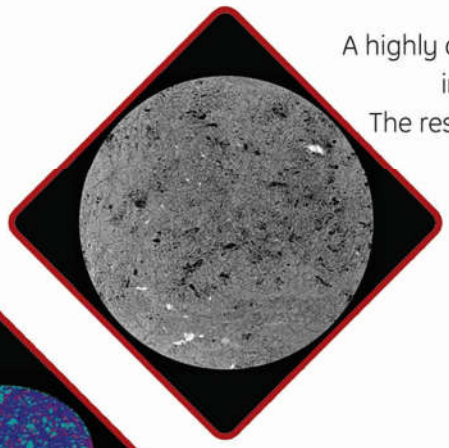
There are many applications in various fields such as:

- Petrology and geology
- Food industry and botany
- Civil engineering
- Materials science
- Dental studies
- Entomology
- Biomaterial and tissue engineering
- Pharmaceutics and pharmacology
- Paleontology and archaeology
- Other fields

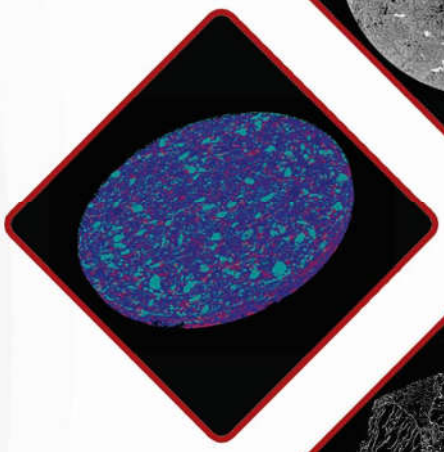
In order to study the microstructures of the objects.



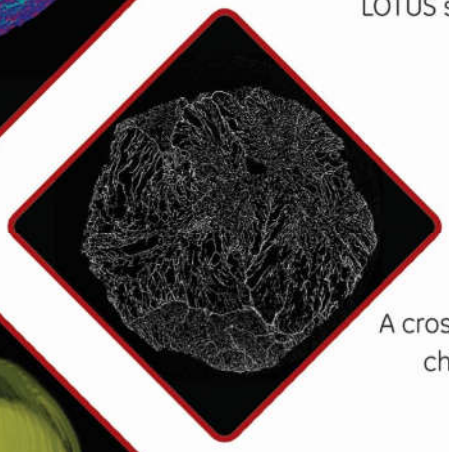
3D rendering of different phases of a cement-based composite, which was imaged by LOTUS-NDT.



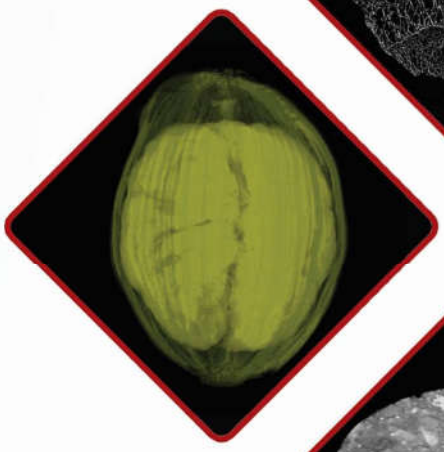
A highly dense carbonate reservoir rock imaged by LOTUS-NDT.
The resolution of this image is 5 µm.



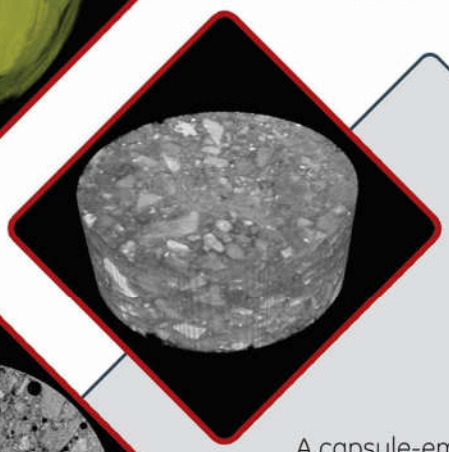
A rock composed of different materials; All different materials have been segmented using LOTUS software package.

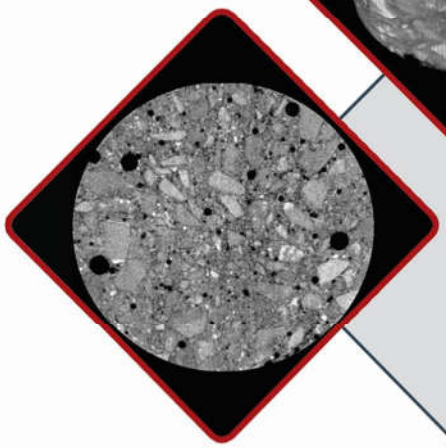


A cross-section image of dry banana chips, imaged by LOTUS-NDT.



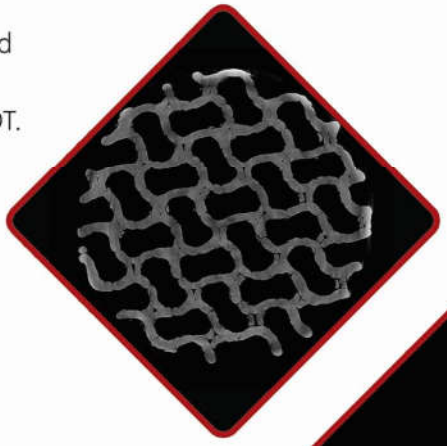
Cardamom imaged by LOTUS-NDT. 3D rendering performed by LOTUS 3D.



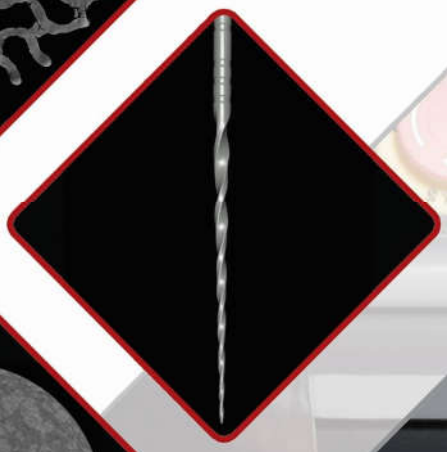


A capsule-embedded concrete sample with a diameter of 1cm, imaged by LOTUS-NDT micro-CT scanner (3D surface rendering and a cross-section of the sample are shown).

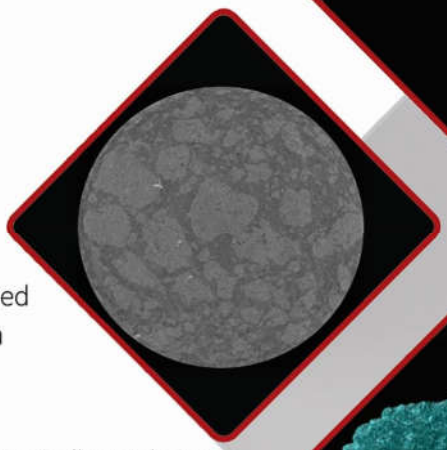
A cross-section of a 3D-printed polymer with about 2 cm diameter, imaged by LOTUS-NDT.



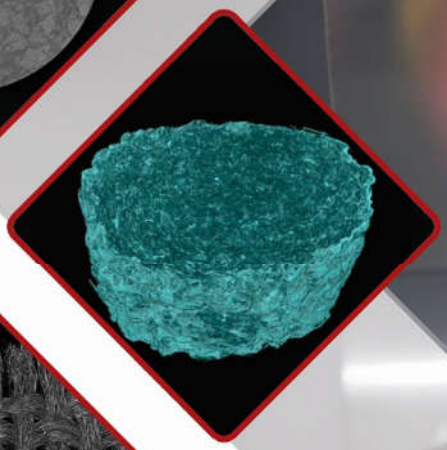
A gold rotary dental file with a minimum diameter of 40 microns, imaged by LOTUS-NDT.



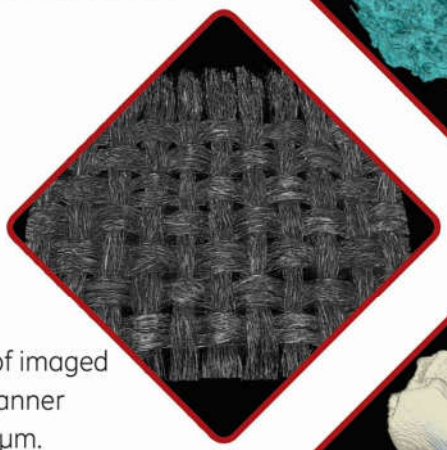
An antidepressant tablet scanned by LOTUS-NDT in a resolution of about 10µm.



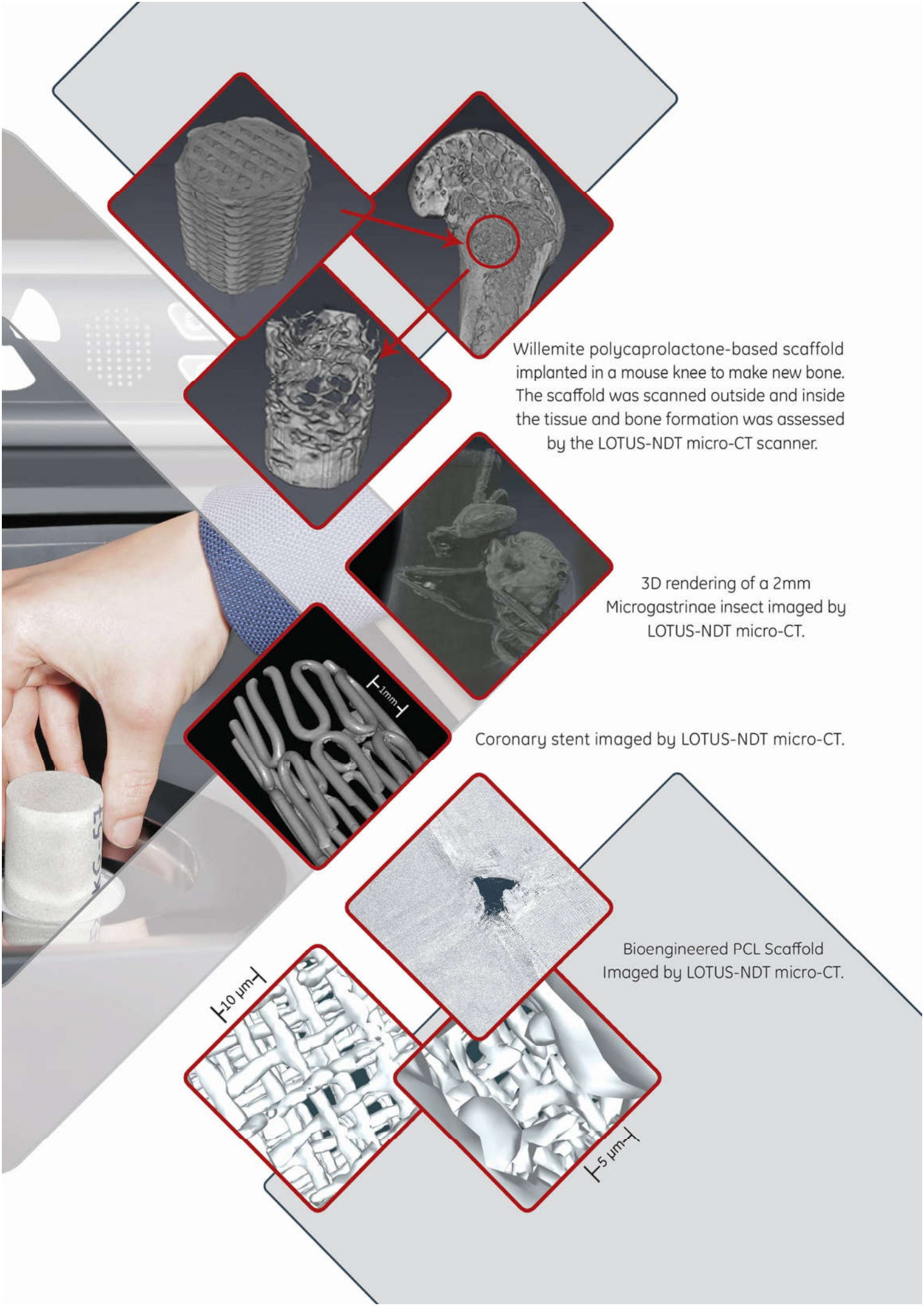
An Alginate-nano Hydroxyapatite-Collagen bone scaffold with a diameter of 1cm
3D images provided by LOTUS-NDT scanner.



A 5*5 mm textile warp and woof imaged by LOTUS-NDT micro-CT scanner in a resolution less than 4µm.



Micro-CT image of rat tooth, imaged by LOTUS-NDT for Bone Mineral Density (BMD) and BV/TV analyses.



Willemite polycaprolactone-based scaffold implanted in a mouse knee to make new bone. The scaffold was scanned outside and inside the tissue and bone formation was assessed by the LOTUS-NDT micro-CT scanner.

3D rendering of a 2mm Microgastrinae insect imaged by LOTUS-NDT micro-CT.

Coronary stent imaged by LOTUS-NDT micro-CT.

Bioengineered PCL Scaffold Imaged by LOTUS-NDT micro-CT.

LOTUS-inVivo

Pre-clinical Micro-CT Scanner

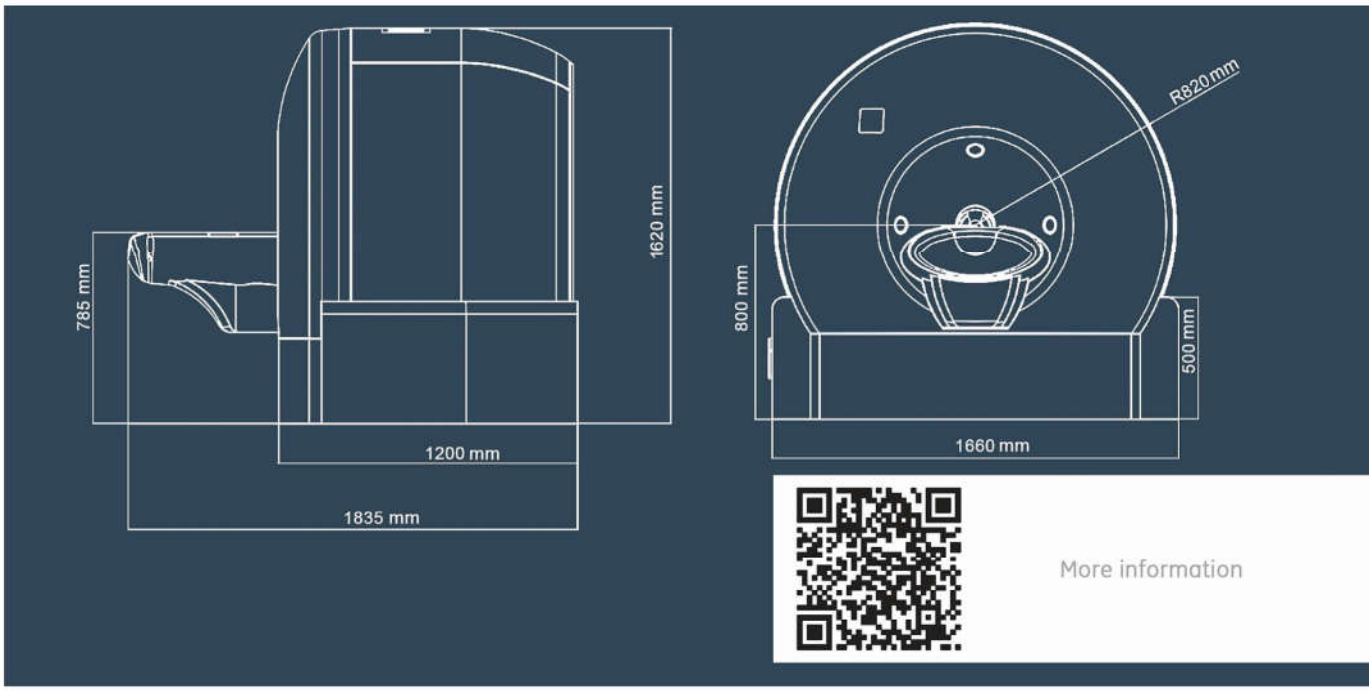
A User-friendly Device for Qualitative and Quantitative Preclinical Studies
Rotating Gantry System

LOTUS-inVivo provides extremely high-quality images with contrast-to-noise, resolution and dose performance optimized for pre-clinical imaging. It also is a high-performance, stand-alone, fast in-vivo and ex-vivo micro-CT. Its large image field of view allows full object scanning.

- Wide kV range
- Variable magnification (FOV)
- Continuous rotating gantry with the shortest scanning cycle of about 1 minute
- 2D & 3D GPU-based reconstruction
- 2D & 3D surface and volume renderings with realistic visualization
- 2D/3D sub-micron measurements
- GLP (Good Laboratory Practice) software package

LOTUS-inVivo Overview of Specifications

X-ray source	30-90 kV, ~8 W	Covers a wide range of preclinical applications
Nominal resolution	< 10 µm	
X-ray detector	16-bit flat pannel detector	High readout speed High signal-to-noise ratio
Reconstructed volume	Up to 4096*4096*1300 pixels	
Sample size	Max. height 120 mm, Max. Ø 80 mm	Allows scanning of various size samples
Radiation safety	Shielded room is required	
Power supply	220 V-50 Hz	Standard wall socket



More information

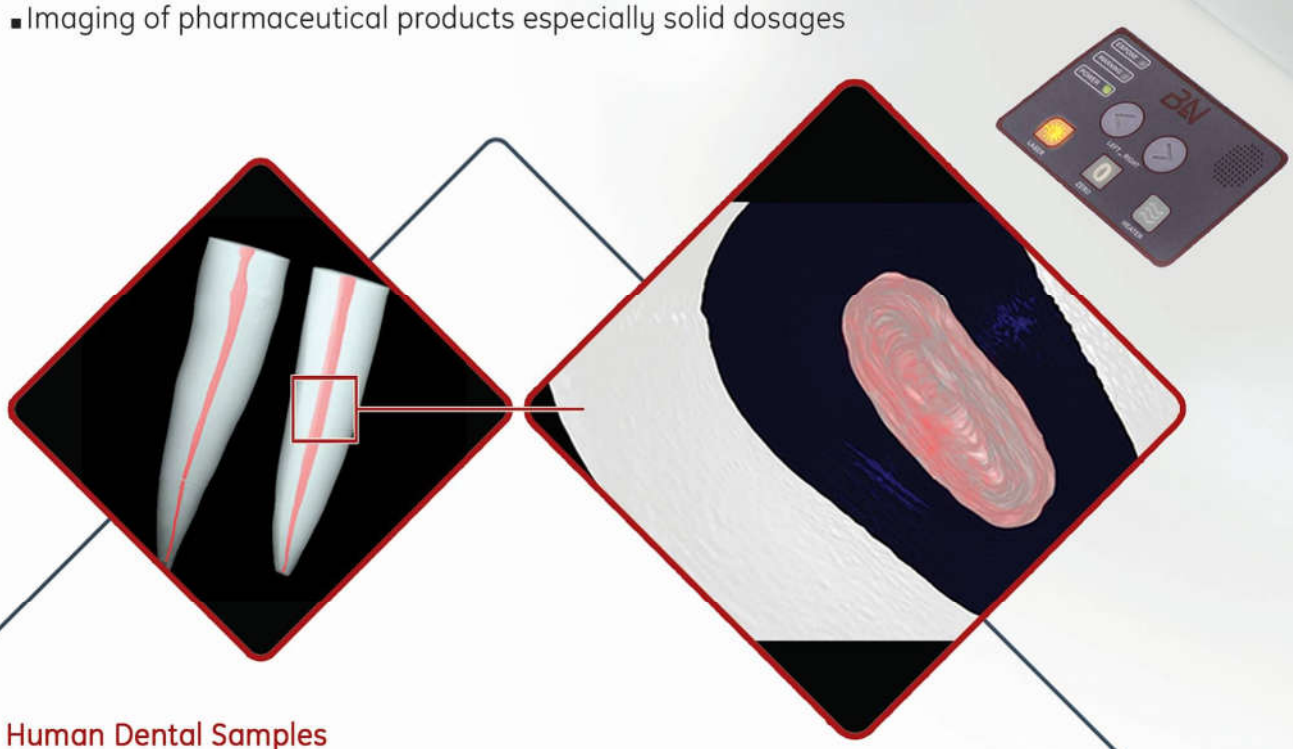
Variable X-Ray energy combined with other options ensures optimum image quality for diverse research applications from soft tissue imaging to bone and teeth studies.

LOTUS-inVivo

Applications

Applications of LOTUS-inVivo Micro-CT are in various fields including, but not restricted to, below areas:

- In-vivo imaging of small animals
- Bone analysis
- Tumor detection and quantification
- Vascular imaging
- Imaging of tooth and jaw bone in mice
- Imaging of human teeth samples
- Imaging of biological implants
- Imaging of biological scaffolds and their effects
- Imaging of pharmaceutical products especially solid dosages

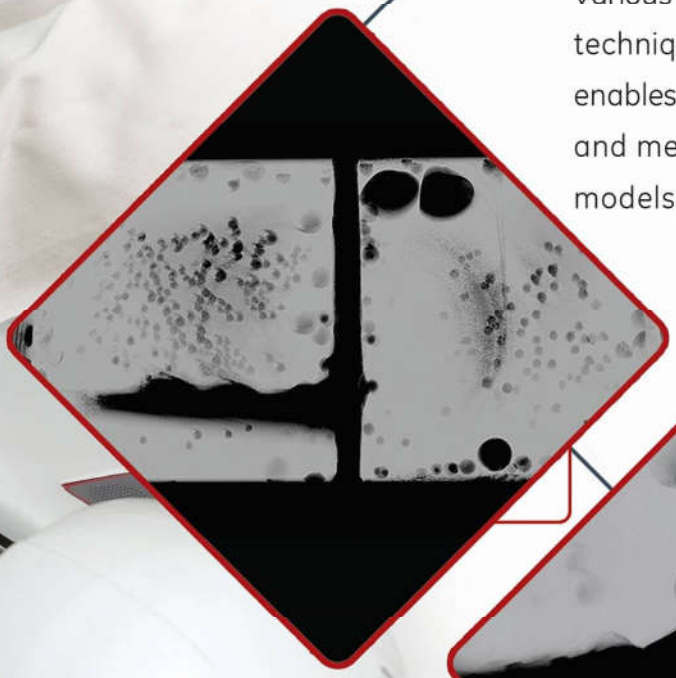


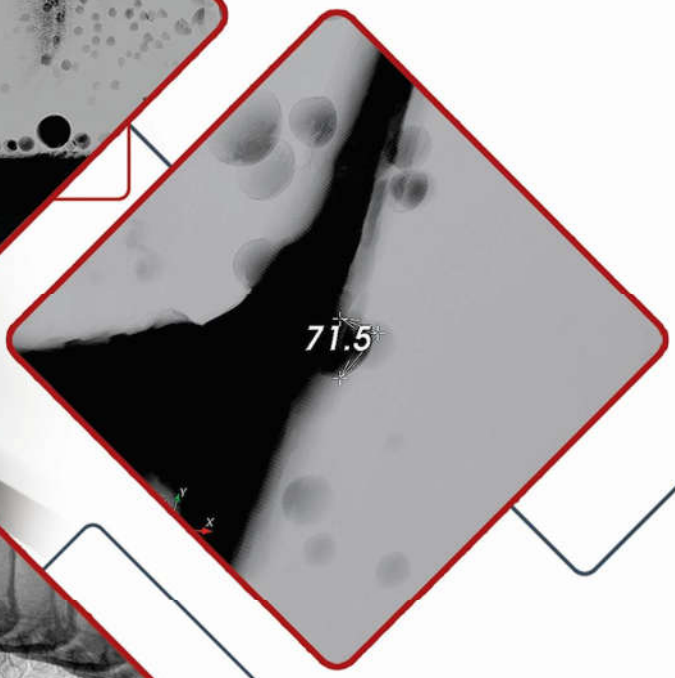
Human Dental Samples

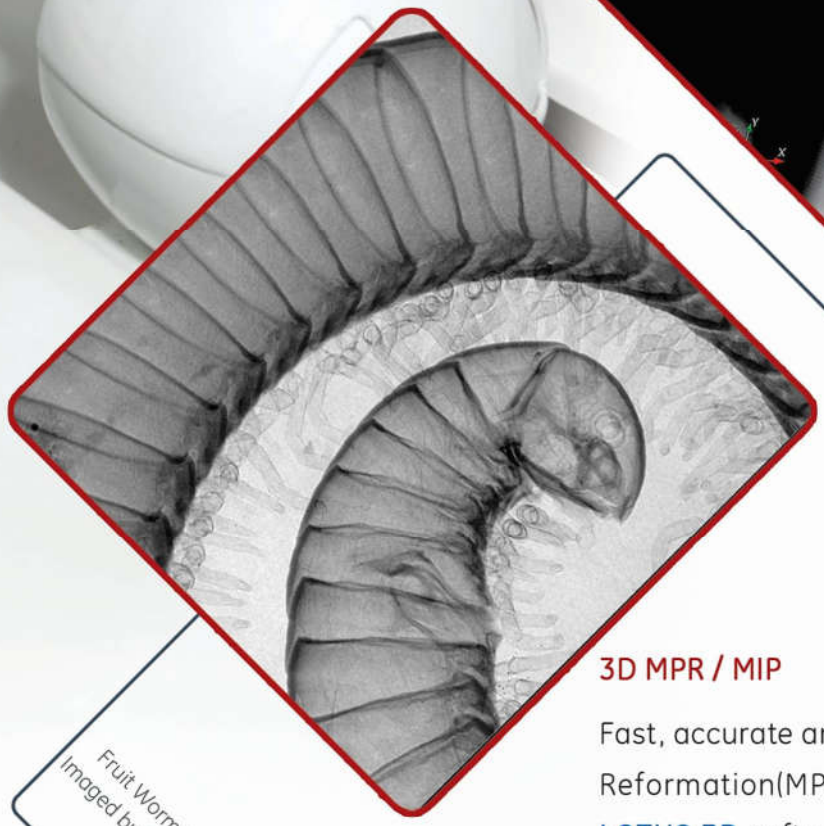
LOTUS 3D software provides optimized Surface Rendering (SR), and Volume Rendering (VR) techniques for 3D visualization of teeth samples. Flying through root canal and 3D measurements and analysis are available: comparative analysis of existing approaches in endodontic treatment, and enhancement of dental education in preclinical stages.

3D VR of Biocompatible Composite

Various optimized Volume Rendering (VR) techniques used in LOTUS 3D software enables users to do multiple interactions and measurements with 3D visualized models.







3D MPR / MIP

Fast, accurate and precise Multi-Planar Reformation(MPR) techniques used in LOTUS 3D software can show coronal, sagittal, axial and oblique planes in a view with 3D Volume Rendering (VR).

Fruit Worm Anatomy
Imaged by LOTUS-inVivo

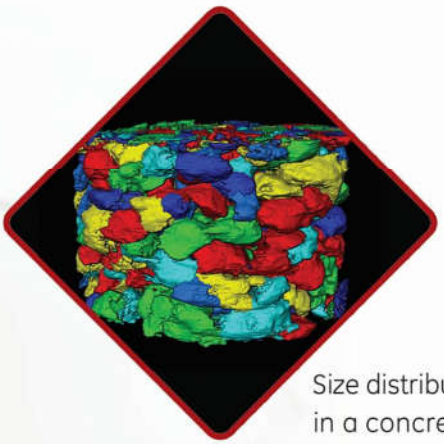
A binarized cross-section of a cow's tibia with a diameter of 2cm, imaged by LOTUS-inVivo micro-CT scanner.

Human tooth imaged by LOTUS-inVivo micro-CT scanner. Scan, reconstruction and 3D rendering processes have been done by LOTUS software package.

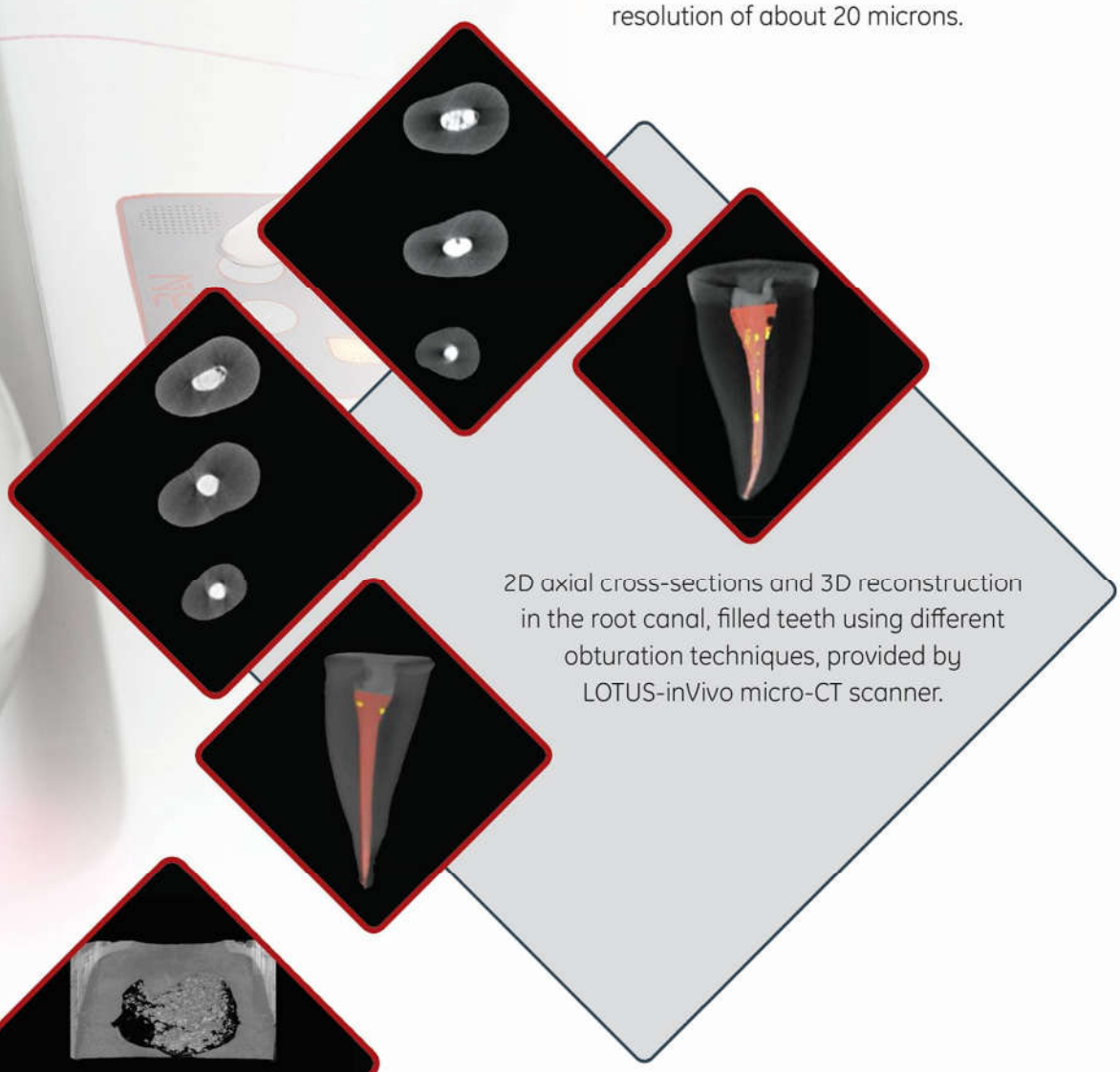
Bone regeneration assessment in a knee of a mouse imaged and visualized by LOTUS-inVivo micro-CT scanner.

An ancient Parthian-Sasanian clay figurine imaged by LOTUS-inVivo micro-CT scanner and rendered three-dimensionally by LOTUS 3D software.

A whole body micro-CT image of a mouse, provided by LOTUS-inVivo scanner.



Size distribution visualization of the grains in a concrete sample which was imaged by LOTUS-inVivo micro-CT scanner with a resolution of about 20 microns.



2D axial cross-sections and 3D reconstruction in the root canal, filled teeth using different obturation techniques, provided by LOTUS-inVivo micro-CT scanner.

Bone HA-based scaffolds implanted in a rat calvaria, imaged by LOTUS-inVivo micro-CT scanner. The LOTUS software package has performed 3D rendering.

LOTUS Software Package

LOTUS NDT-ACQ Software

LOTUS inVivo-ACQ Software

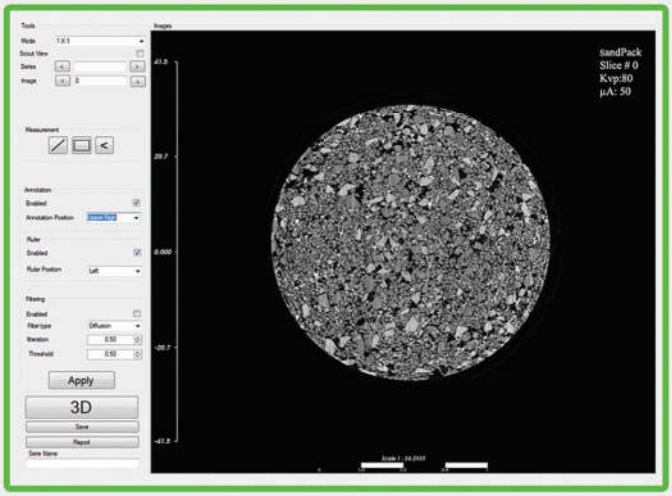
- The ability to full hardware and software control of the device
- The ability to choose different imaging protocols according to the type of sample
- Able to automatically save the data in the form of a project to use in reconstruction software
- Able to display the estimated time, based on the selected protocol, before the start of imaging
- Preview to determine the exact location of the sample for imaging
- Able to save two-dimensional images from different angles

LOTUS NDT-REC Software

LOTUS inVivo-REC Software

- The ability to choose the output three-dimensional matrix size
- The ability to save images in mat, raw, tiff, and DICOM formats
- The ability to choose reconstruction kernels from available kernels
- The ability to choose interpolation types from available methods
- The ability to choose the type of output data in LAC (1/mm) or CT# (HU).
- The ability to simultaneously add different reconstructions from a project to the queue
- Able to estimate reconstruction time based on the average time of reconstruction loops
- The ability to select DFOV and view the scout from different angles
- Able to display reconstructed slices in 1*1, 2*2 and 4*4 grids

Highly flexible reconstruction controls using LOTUS REC



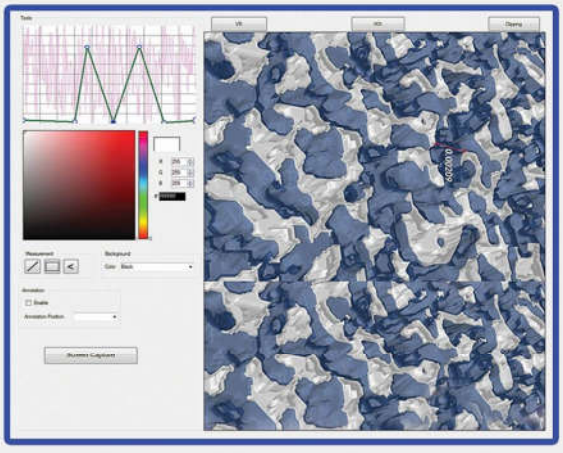
LOTUS Software Package

LOTUS 3D
Software

LOTUS 3D

- Surface Rendering (SR) capability by determining the iso-value and setting color and light features including ambient, diffuse, specular, and specular power
- Volume Rendering (VR) capability by setting the opacity and intensity values along with the interactive mode of selecting the Volume-Of-Interest (VOI) and changing the display screens as clipping
- The ability to display intensity projection from 3D data as MAX (MIP) and MIN (mIP) with the ability to select the range of slices to display
- The ability to display Multi-Planar Reformation (MPR) in axial, coronal, Sagittal and oblique planes interactively
- The ability to add annotation, ruler, and scale to the sides of the image
- The ability to measure dimensions in 3D displays in two linear and bi-dimensional modes interactively
- The ability to measure angles in interactive 3D displays
- The ability to record videos of interactions between the display and the user in the display methods of the software

2D/3D visualization and measurements with volume & surface renderings using LOTUS 3D



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