

Dimensional X-Ray CT System

XDimensus 300



A "New Dimension" in Measurement

The XDimensus 300 is a dimensional X-ray CT system capable of measuring the 3D internal and external geometry of sample interiors.

It features a large-scale, high-resolution flat panel detector, which provides a wide field of view at excellent resolution, Shimadzu's proprietary new X-ray generator, with approximately three times the X-ray generating efficiency of our previous models, and new software, which provides excellent operability. It also features an air conditioning unit to maintain a consistent temperature inside the instrument, a frame that provides high geometric stability, and an ultra-high-accuracy sample positioning stage. As a result, it provides a level of dimensional measurement accuracy impossible with conventional observation X-ray CT systems.

Shimadzu is offering this new, unprecedented system for dimensional measurements, including the interior and exterior of industrial goods such as plastic molded parts and aluminum die cast parts.

Dimensional X-Ray CT System

XDimensus 300

High Accuracy

It achieves accurate measurements, with a sphere distance error of $(3.8 + L/50) \mu\text{m}$. It provides the world's highest level of accuracy assurance.



Large Measurement Volume in Compact Cabinet

It provides measurements of samples 300 mm in diameter, within a compact 2.2 m wide and 1.5 m deep housing. This means that it is not necessary to be as selective about the installation site.

Quick and Easy Operation

No calibration process is necessary before scanning. Scans can be started immediately after sample placement.

High Accuracy

The XDimensus 300 provides the highest level of sphere distance accuracy, with a measurement error of $(3.8 + L/50)^*$ μm .

In addition to Shimadzu's proprietary microfocus X-ray generator and a detector with high resolution and a wide field of view, it is equipped with an air conditioning unit to maintain a constant temperature inside the instrument, a granite frame that provides high geometric stability, and an ultra-high-accuracy sample positioning stage, thereby achieving highly accurate measurements.

* Example: A 5.8 μm error for $L = 100 \text{ mm}$

Proprietary Microfocus 225 kV Generator

The system is equipped with a high output microfocus X-ray generator, which generates 225 kV. X-ray focal point drift caused by heat is corrected in real time.

Self-Diagnostic Function

The system is equipped with a self-diagnostic function to monitor the system status. The operator is notified of the system status in real time.

Shield Box Internal Temperature Control Device

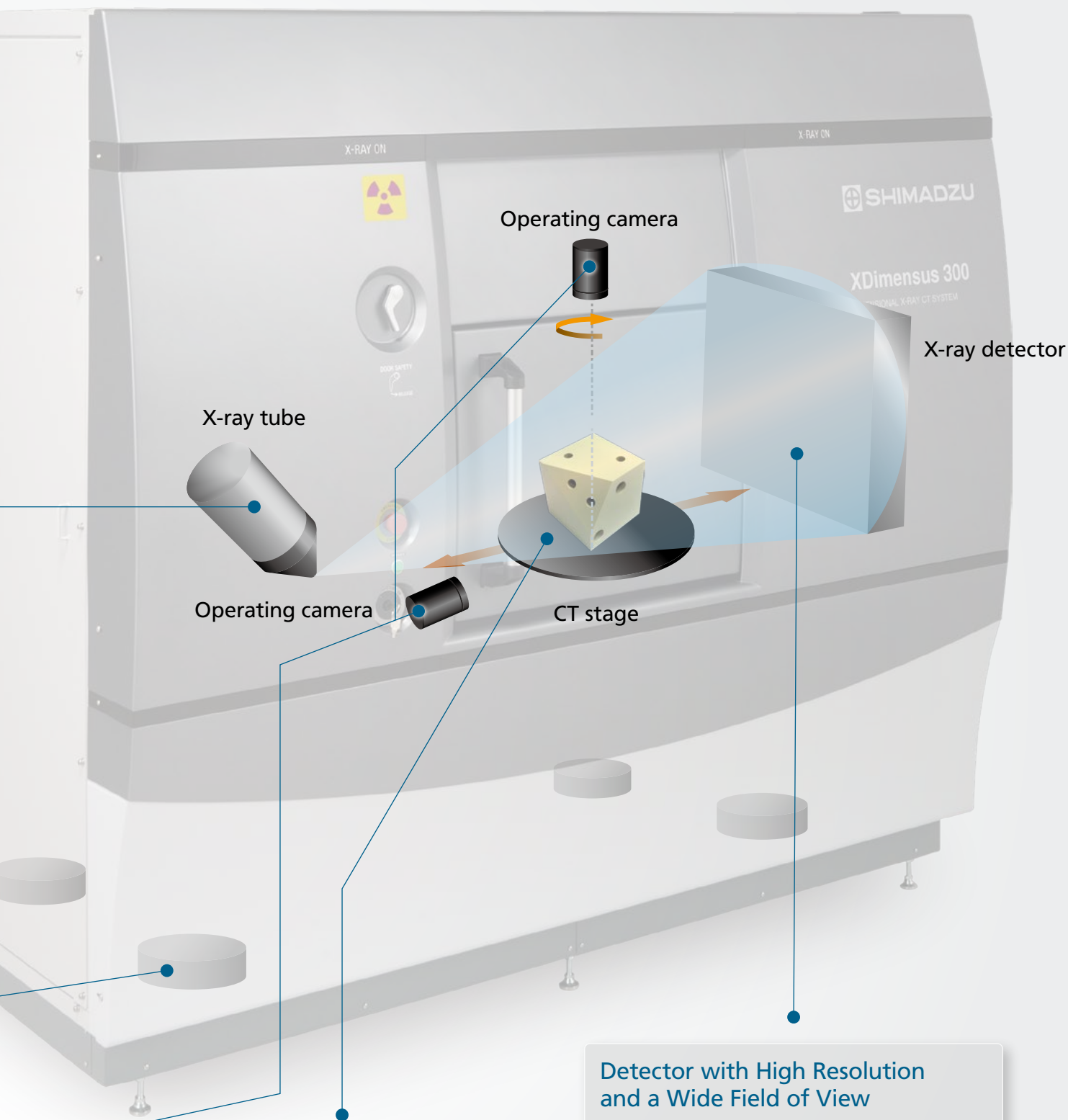
The system is equipped with a temperature control system, which controls the temperature inside the shield box. A thermostatic room is not required, so it is not necessary to be as selective about the installation site.

Anti-Vibration Stands

The manipulator is installed on an anti-vibration stand. This suppresses vibrations from outside the system, reducing the impact on measurement accuracy.

Operating Cameras

Two operating cameras monitor the inside on a real-time basis. Operators can control the system interactively via a computer screen.



Ultra-High-Accuracy Rotating Stage

Air bearings have been adopted for the rotating stage. A loading sample size of 300 mm in diameter and 300 mm in height has been achieved while minimizing problems with shaft eccentricity.

Detector with High Resolution and a Wide Field of View

A 16-inch high-resolution flat panel detector has been adopted. It achieves both high resolution and a wide field of view.

Large Measurement Volume in Compact Cabinet

Measurement Volume

ø300 mm × H 210 mm

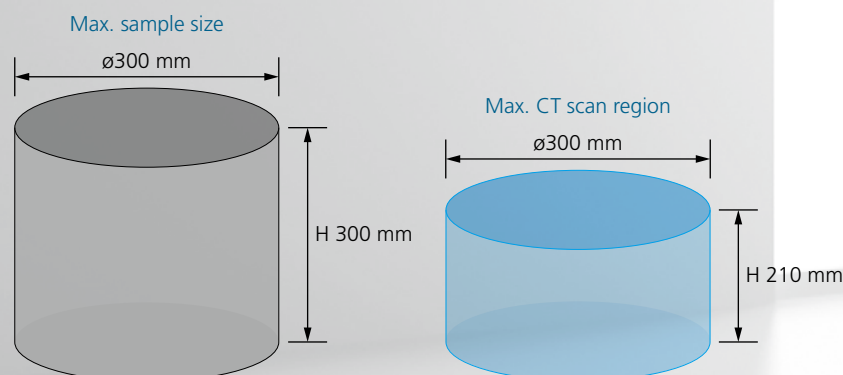
Cabinet size

W: 2,195 mm × D: 1,561 mm × H: 1,971 mm

With its compact housing, 2.2 m wide and 1.5 m deep, it can be installed in an area a mere 3.5 m long and 4 m wide.

Although the housing is small, it provides measurements of samples 300 mm in diameter.

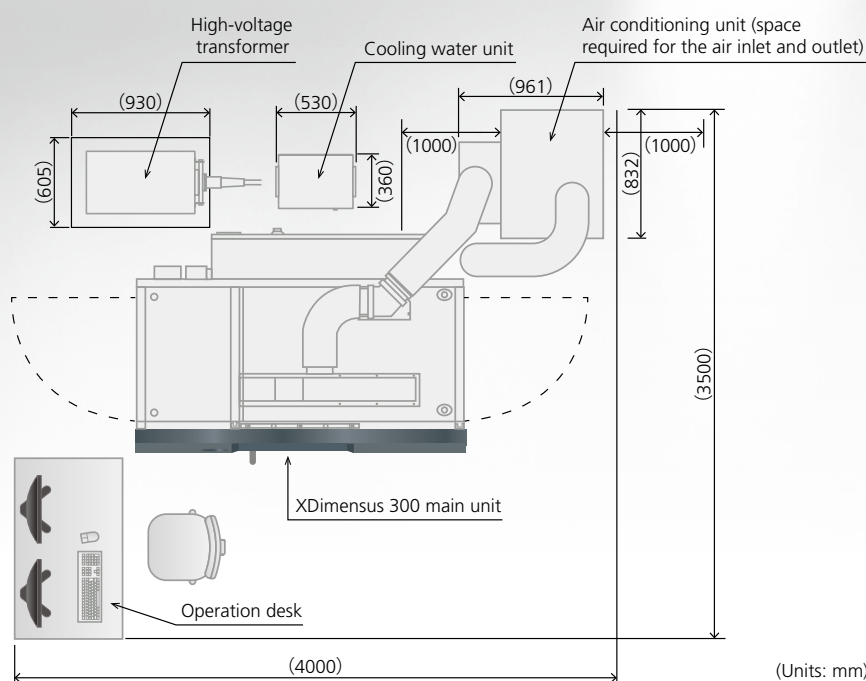
Measurable sample size and maximum measurement area



Layout

Recommended Installation Area:

W 4000 mm × D 3500 mm



1,561 mm



XDimensus 300
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Quick and Easy Operation

No calibration process is necessary before scanning. Corrections are performed in real time during data collection, so scanning can start immediately after sample placement.

With its new user interface, the operator can start scanning without complicated parameter settings.

1

Sample Placement

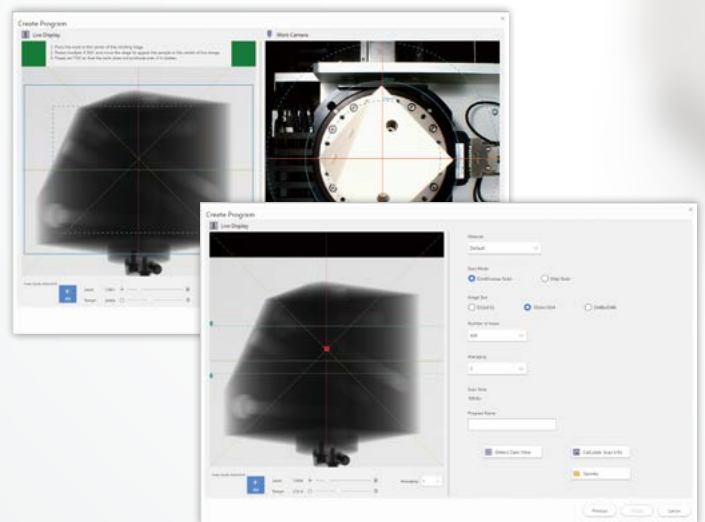
Load the sample of interest onto the stage. Samples up to 300 mm in diameter can be loaded and observed.



2

Set the Scan Field of View and Parameters

Determine the positioning and field of view using a software wizard.



3

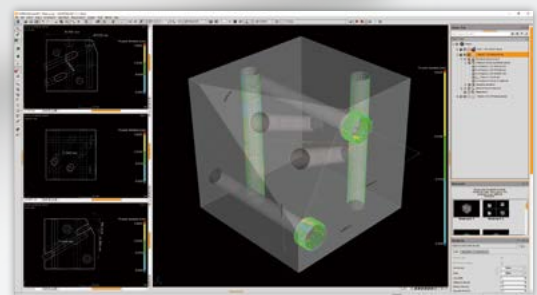
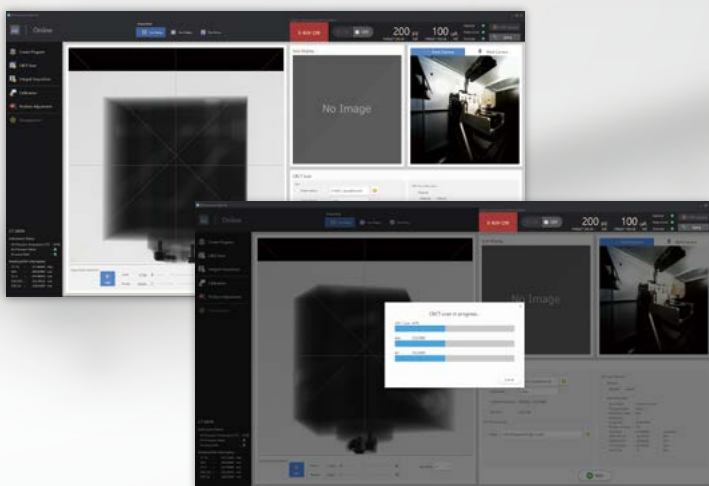
CT Scan and Reconstruction

Just select the scan parameters, and click [Start] to start the CT scan. Calibration is not required.

4

3D Measurement

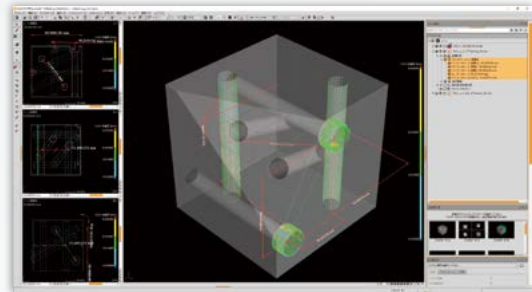
Various measurements are performed with 3D data obtained using the 3D image processing software.



Optional Software

VGMetrology

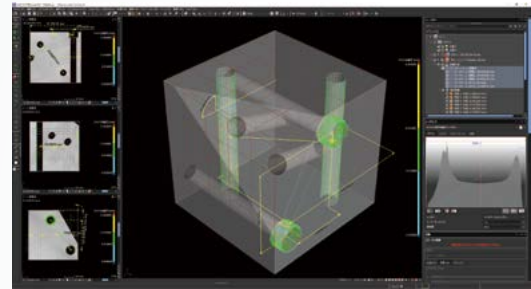
This 3D image processing software performs coordinate measurements using voxel data obtained with CT scans. The package is specially designed for use of the coordinate measurement function, and can perform measurements not only with voxel data, but with collections of points, meshes, and CAD data. Being specially designed for coordinate measurements, it is easier to use than general-purpose 3D image processing software.



(Volume Graphics GmbH)

VGStudioMAX + Coordinate Measurement Module

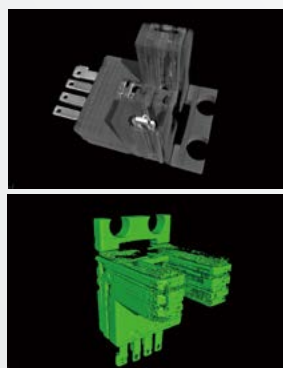
This software uses volume rendering to display 3D images from voxel data obtained using CT imaging. Adding the coordinate measurement module enables coordinate measurements in the same way as with VGMetrology. In addition to coordinate measurements, there are functions for a variety of analyses (including length).



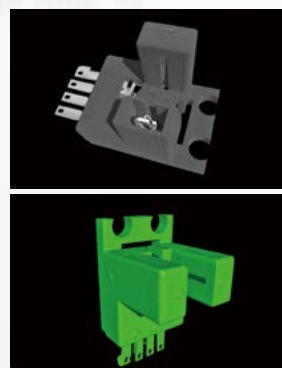
(Volume Graphics GmbH)

Metal Artifact Reduction Software

The Metal Artifact Reduction Software is a reconstruction software program used to reduce metal artifacts in the cross-sectional images acquired using Shimadzu's dimensional X-ray CT system, XDimensus 300. This software allows for easier and more accurate analyses in cross-sectional images.



Photosensor before processing
(Top: VR image, bottom: STL)



Photosensor after processing
(Top: VR image, bottom: STL)

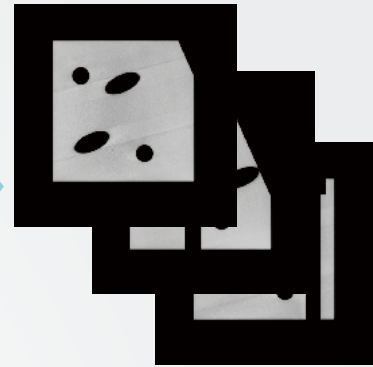
Applications



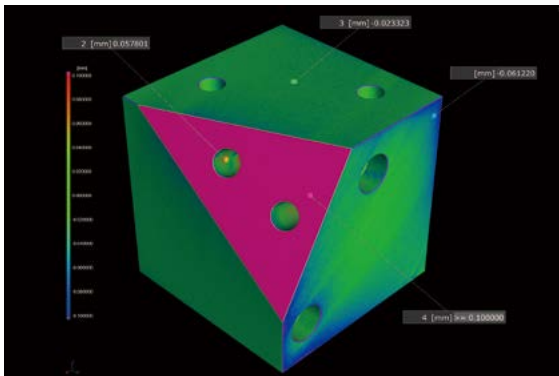
Observation sample



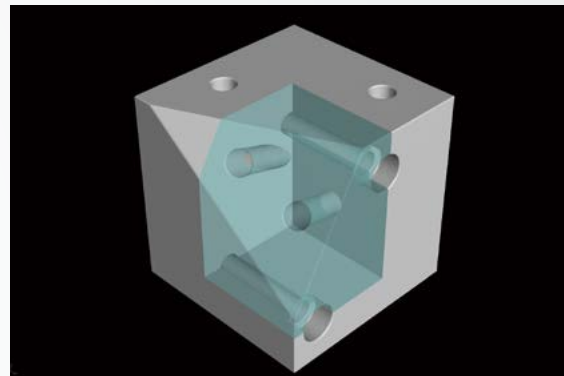
Fluoroscopic image



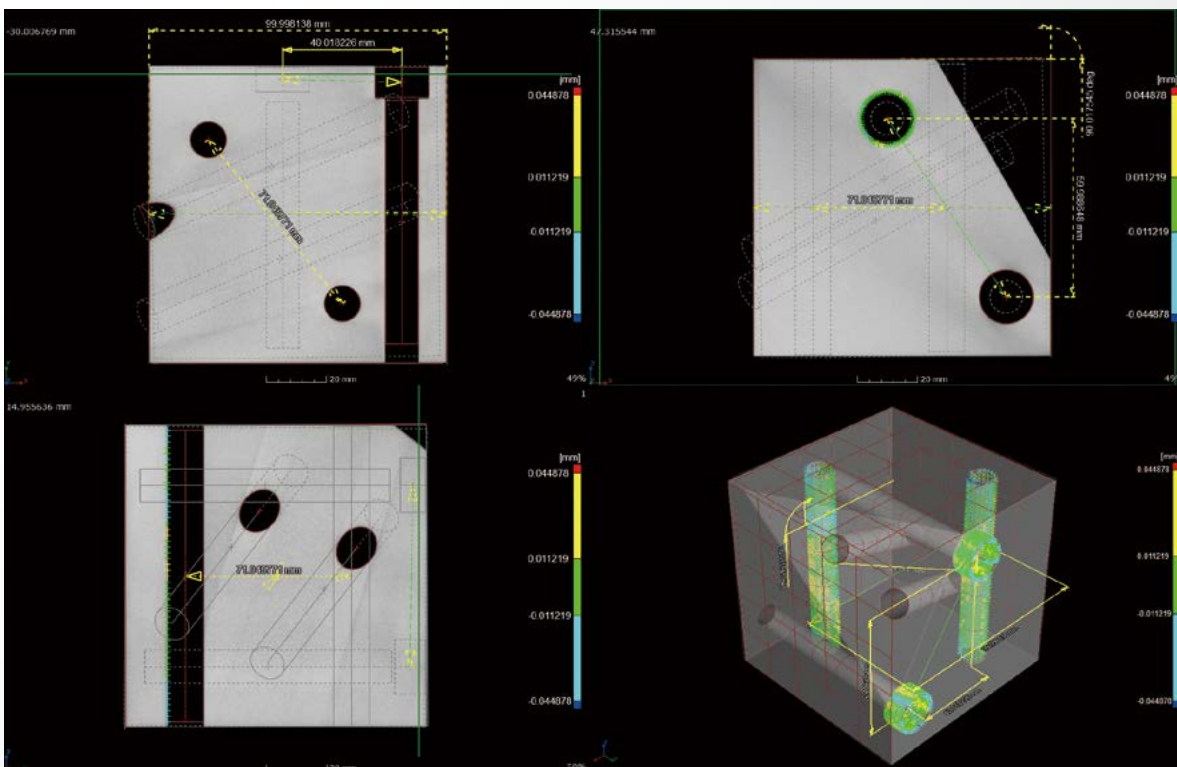
Cross-section images



Comparing to CAD data



VR data



Specifications

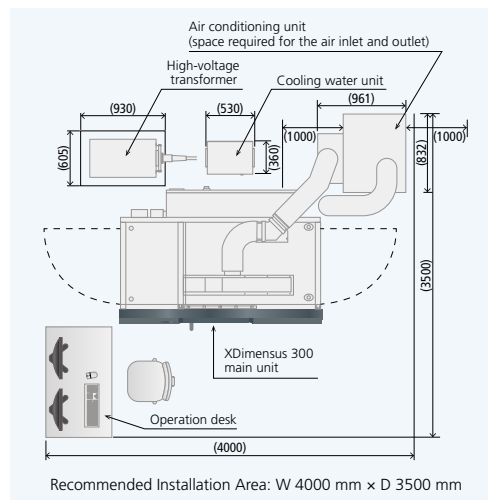
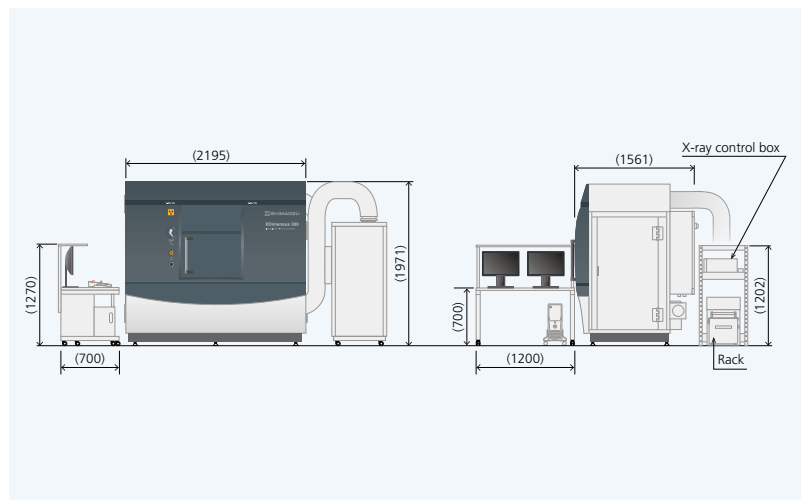
Model: XDimensus 300		
X-Ray Generator	Rated Power	135 W
	Max. Tube Voltage	225 kV
	Max. Tube Current	1000 μ A
X-Ray Detector		Flat panel detector
X-Ray Detector Size		16 inch
X-Ray Detector Shades of Gray		16 bit, 65536 shades of gray
Max. Sample Size and Weight		\varnothing 300 mm \times H 300 mm, 10 kg max.
Max. CT Scan Region		\varnothing 300 mm \times H 210 mm
Measurement Accuracy*1	Probing Error	$ PS + PF = 5.0 \mu\text{m}^2$
	Sphere Distance Error	$\pm (3.8 + L/50) \mu\text{m}$
CT Stage Max. Stroke	SRD Axis*3	730 mm
	CT-Z Axis	300 mm
CT Data Acquisition Time		20 min to 60 min
Max. CT Image Size		2048 \times 2048
High-Performance Computing System		Yes
Shield Box Size and Mass		W 2,195 mm \times D 1,561 mm \times H 1,971 mm, approx. 4,000 kg
Air Conditioning Unit Size and Mass		W 832 mm \times D 961 mm \times H 1,529 mm, approx. 200 kg
Specialized Desk Size and Mass		W 1,200 mm \times D 700 mm \times H 1,270 mm, approx. 50 kg
Power Requirements	Main Unit	Single-phase, AC 200 V \pm 10%, 50/60 Hz, 4 kVA
	Air Conditioning Unit	Three-phase, AC 200 V \pm 10%, 50/60 Hz, 2.6 kVA
	Control Computer	Single-phase, AC 100 V \pm 10%, 50/60 Hz, 1.5 kVA
	Ground	Type-D ground (100 ohm max. ground resistance)
Air Source		0.6 MPa to 1 MPa, 60 SLPM min.
External Leakage Dose		1 μ Sv/h max.

*1 Measurement Accuracy Conformity to the VDE/VDI 2630 Part 1.3 standard

*2 Probing Error SRD = 200 mm, in the center of the fluoroscopic image

*3 SRD Axis The source-to-rotation center distance (SRD) is the distance from the X-ray source to the rotation center of the sample.

Layout and Dimensional Drawings (Units: mm)



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