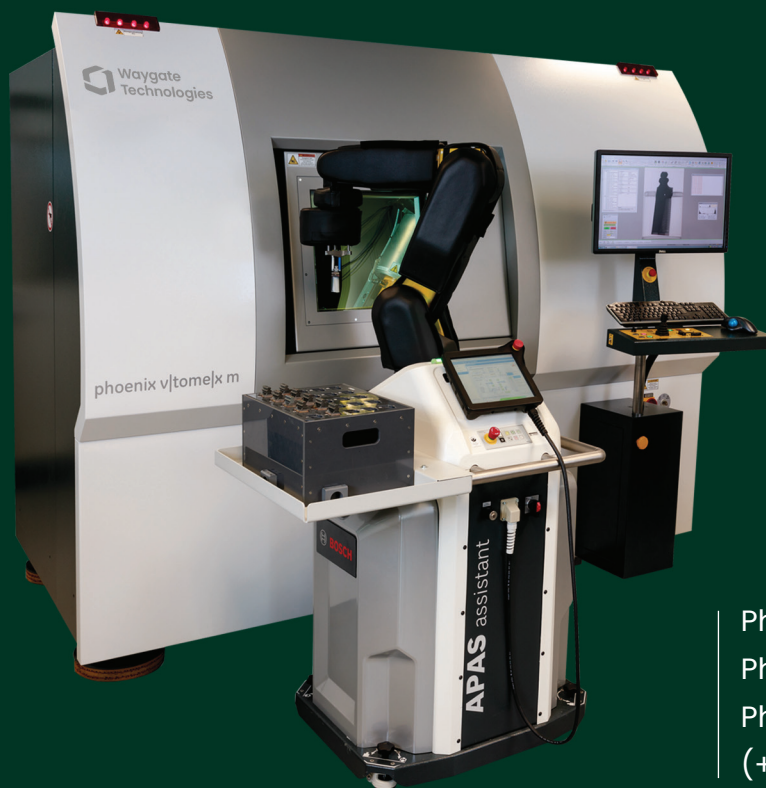


# Phoenix V|tome|x M microfocus CT

Uniting premium 3D metrology  
and inspection with quality and speed.



Phoenix V|tome|x M240  
Phoenix V|tome|x M300  
Phoenix V|tome|x M Dual|tube  
(+180 kV nanoCT®)

# Inspect with precision, power, and productivity.

As manufacturing becomes more complex and automation becomes the norm, it's more important than ever to inspect with both precision and efficiency. Waygate Technologies is revolutionizing 3D inspection for non-destructive testing (NDT) and dimensional control to make these goals a reality.

By adapting CT technology for industrial needs and combining it with powerful X-ray technology, robotic manipulators, automated software, and proprietary CT technologies, we have created a family of high-precision CT products that reduce overall inspection times from hours to just minutes, at an extremely high quality level.

The new Phoenix V|tome|x M pushes this innovation one step further to give you the most versatile and precise X-ray microfocus CT system for NDT and 3D metrology and analysis. This highly productive scanner delivers improved accuracy at unprecedented speeds—helping you dramatically optimize your lab processes to meet today's increasing demands.

## The Phoenix V|tome|x M system covers a wide range of application capabilities:



Internal defect analysis



3D quantitative porosity analysis



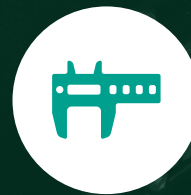
Assembly control



Materials structure analysis for small high-absorbing castings



Precision 3D metrology



CAD Data nom/act comparison

# Reduce scanning time without compromising quality.

The Phoenix V|tome|x M is the first microCT system to harness the breakthrough Scatter|correct technology, Dynamic 41 digital detector, and High-flux|target—enabling high image quality as it scans much faster, or with improved accuracy, and truly revolutionizing inspection.

We offer several configurations and optional tools to help you achieve your production throughput goals with extreme accuracy. With new additions like the Ruby|plate and True|position for improved measurement, workflows, and precision, as well as Helix|CT and multi beam hardening correction for improved image quality, you can increase probability of detection (POD) with efficiency and ease.



- **Scatter|correct technology**

Get unprecedented low artifact precision up to 100 times faster than with a comparable quality fan beam CT.

Drops scan time from 60 minutes to just 6.

- **Dynamic 41 digital detector**

Double CT resolution at the same speed, or double throughput at the same quality level as 200  $\mu\text{m}$  pitch DXR detectors.

Drops 6 minute scan time down to 3.

- **High-flux|target**

Improve efficiency with faster microCT scans or doubled resolution with higher power on a smaller focal spot.

Cuts the 3 minutes down to 1.5.

- **Sample|changer**

This easily removable holder allows automatic change of different samples.

- **Filter|changer**

In combination with the Sample|changer, the optional Filter|changer allows to perform batch CT scans.

- **Helix|CT**

Scan with improved image quality to increase probability of detection (POD) with efficiency and ease.

- **Offset|CT**

Scan even larger parts with up to 100% larger scanning volume.

- **Multi|bhc**

The Multi|bhc tool corrects streaking artifacts which typically occur as multiple dark streaking bands positioned between dense areas in multi-material samples.

- **Fully automated robot**

Maximize speed, accuracy, and reduce operational costs.

- **phoenix Datas|x CT software**

Fully automate your data acquisition, volume processing, and evaluation with ease.

\*typical small high density object



# Meet your specific microCT needs.

Whether you need to increase speed, detection detail, or do both, the Phoenix V|tome|x M can be formatted for any 3D industrial or scientific microCT task. The first CT system worldwide, this versatile high-resolution scanner works with a variety of optional features like Scatter|correct to meet your high-quality inspection needs with up to two times faster inspections or scanning volume with up to 300kV/500W—all to help you make the most out of your inspections.

## Industrial 3D NDT

Beyond high-resolution 3D analysis in R&D and failure analysis labs, this machine allows 3D production control with a powerful 300 kV tube and high dynamic detector technology for fast CT acquisition, fast and precise volume reconstruction, and a fully automated robot option. And with the offset|CT, you can scan even larger parts with up to 100% larger scanning volume.

- Internal defect analysis / 3D quantitative porosity analysis
- Assembly control
- Materials structure analysis

## Research & Development innovation

With its high-resolution 180 kV nanoCT® option, the Phoenix V|tome|x M opens a non-destructive third dimension for research & development down to the submicron scale—with no required preparation, slicing, coating or vacuum treatment.





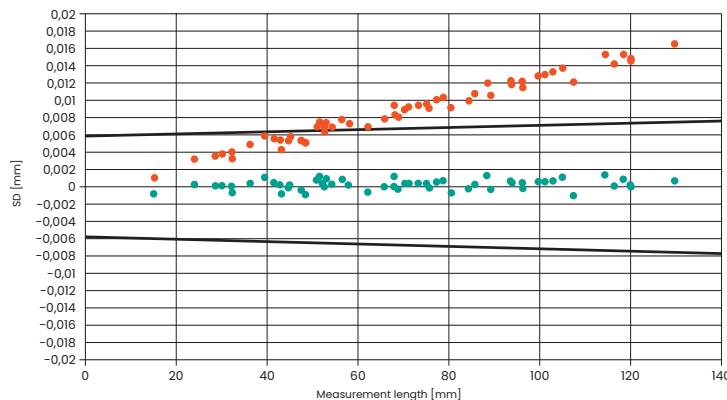
# Metrology 2.0

## Reproducible precision 3D metrology with CT

3D CT offers big advantages over conventional tactile or optical coordinate measuring machines (CMM) – especially if there are complex parts with hidden or difficult surfaces. New True|position and Ruby|plate technologies bring metrology workflows and precision to a new performance level. These allow improved VDI 2630 conform accuracy specification and three times faster performance verification of multiple positions. This is possible due to fully automated workflows, new Ruby|plate calibration phantom (patent pending), and compensation of thermal drift effects by using temperature sensors.

- Nominal-actual CAD comparison
- Dimensional measurements / wall thickness analysis
- Reverse engineering / tool compensation
- $(3.8 + L/100 \text{ mm}) \mu\text{m}$  referring to VDI 2630 guideline
- $(5.5 + L/100 \text{ mm}) \mu\text{m}$  at any other z and y position between both VDI 2630 positions
- $(3.8 + L/100 \text{ mm}) \mu\text{m}$  at any position after applying the easy|calib tool

Improved measurement accuracy with True|position



## Improve measurement methodology and accuracy.

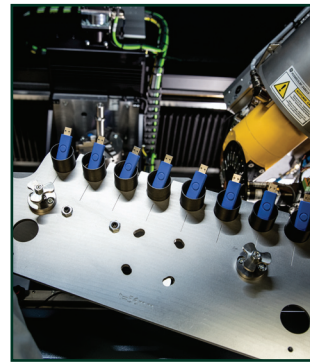
Our True|position technology expands the measurement positions with specified accuracy to all positions which can be verified with Ruby|plate which allows a faster setup of CT scans with the extremely high measurement accuracy  $(3.8 + L/100 \text{ mm}) \mu\text{m}$  referring to both VDI 2630 guideline and  $(5.5 + L/50 \text{ mm}) \mu\text{m}$  for all other positions.

# Automate your entire CT process chain.

From loading, to scanning, to analysis, your entire inspection and measurement process can now be automated to increase efficiency and reproducibility.



Fully automated robot loading



24/7 operation with integrated sample and filter changer

## The Production|edition

With the optional Production|edition configuration, you can fully automate your inspection. With a collaborative robot for automated sample loading, one operator can run several systems at once with less training. So you can quadruple operator productivity and save operational costs with high reproducibility, long-term stability, and high inspection throughput.

## Fully automated CT

Our CT Datos|x automation software and its Speed|ADR algorithms implemented in VGInline for makes metrology and failure analysis faster and easier than ever before. It allows you to fully automate data acquisition, volume processing, and evaluations like inspection reports, as well as to complete reproducible high-precision 3D metrology and failure analysis tasks with minimal operator training.

# Improve reliability with real results

We are always working to provide smarter inspections with the peace of mind of knowing you'll meet high accuracy and security standards. All main hardware and system software components are made with proprietary technology—combining durable hardware with high-quality results.

The Phoenix V|tomelx M is designed for reproducibility with a temperature-stabilized X-ray tube and digital detector array and cabinet, as well as security with data integrity and long-term DICOM data management.

# General specifications

| Phoenix V tome x M   |   |
|--|---|
| <b>X-ray tube type</b>   | Open directional high-power microfocuss X-ray tube, closed cooling water circuit.<br>Optional additional (open) transmission high-power nanofocuss X-ray tube   |
| <b>Max. voltage / power</b>  | 300 kV / 500 W. Alternatively available with 240 kV / 320 W microfocuss X-ray tube<br><br>Dual tube option for nanoCT: additional 180 kV / 15 W high-power nanofocuss tube with Diamond window, precision rotation unit with air bearings, easy tube exchange just by a push of a button  |
| <b>Geometrical magnification (3D)</b>  | 1.3x to 100x; up to 200x with nanofocuss tube   |
| <b>Detail detectability</b>  | Down to < 1 μm (microfocuss tube); optional down to 0.2 μm (nanofocuss tube)  |
| <b>Min. voxel size</b>   | Down to 2 μm (microfocuss), opt. 1 μm with 4 1 100<br><br>Optional down to < 0.5 μm (nanofocuss + dyn. 4 1 100)   |
| <b>Measurement accuracy</b>  | (3.8+L/100 mm) μm referring to VDI 2630-1.3 guideline *   |
| <b>Detector type (all according US ASTM E2597 standard)</b>                          | Temperature stabilized Dynamic 4 1 200 large area detector with superior image and result quality, 410 x 410 mm (16" x 16"), 200 μm pixel size, 2036 x 2036 pixels (4 MP), extremely high dynamic range > 10000:1<br><br>Optional Dynamic 4 1 100 detector 410 x 410 mm (16" x 16"), 100 μm pixel size, 4048 x 4048 pixels (16 MP) for doubled CT resolution          |
| <b>Manipulation</b>  | Granite based precision 4-axes manipulator  |
| <b>Focus-detector-distance</b>   | 800 mm  |
| <b>Max. sample diameter x height</b>   | 360 mm x 600 mm; up to 500 x 600 mm with limited travel range, max. 3D scan size up to 420 mm Ø x 400 mm  |
| <b>Max. sample weight</b>  | 50 kg (110 lbs.), high accuracy CT up to ~20 kg (44 lbs.)   |
| <b>Max. focus object distance</b>  | 600 mm (microfocuss tube)   |
| <b>System dimensions W x H x D</b>   | 2,620 mm x 2,060 mm x 1,570 mm (103" x 81" x 62"); D 2,980 mm (117.3") with user panel and generators   |
| <b>System weight</b>   | Appr. 7,960 kg / 17,550 lbs. (without ext. components)  |
| <b>Temperature stabilization</b>   | Active X-ray tube cooling   temperature controlled cabinet   temperature stabilized detector  |
| <b>Optional patented Scatter correct hard-/software bundle (also upgrade option)</b> | CT quality like 2D fan beam CT with minimized scatter radiation artifacts.<br>Max. scan diameter: 260 mm, geom. magnification 1,51x - 100x  |
| <b>Optional High-flux target</b>   | 2 times faster CT scans or doubled resolution; X-ray inspection power up to 100 W   |
| <b>Opt. 2D inspection bundle</b>   | Tilt and rotation axes for tilted 2D inspection of samples up to 10 kg (22 lbs.),<br>2D inspection software with Flash Filters™   |
| <b>Opt. Metrology edition** (also upgrade option)</b>                                | phoenix Datos x CT software package "metrology"<br><br>The patented Ruby plate allows for 3x faster, automated verification of the specified measurement accuracy referring to VDI 2630-1.3 guideline* probed with Ruby plate phantom, which has a longest measurement length of 130 mm. This allows for a faster setup of CT scans with higher measurement accuracy. |
| <b>Opt. Helix CT &amp; Offset CT</b>   | Advanced scanning trajectories for improved scanning volume and data quality:<br>Helix CT for long part scans with less artifacts and better quality,<br>Offset CT to scan bigger parts or same size with higher resolution   |
| <b>Opt. Click&amp;measure CT</b>   | included  |
| <b>Opt. Production edition</b>   | Fully automated with collaborative robot on request   |
| <b>Software</b>  | Phoenix Datos x 3D computed tomography acquisition and reconstruction software.<br>Different 3D evaluation software packages for 3D metrology, failure or structure analysis on request   |
| <b>Radiation protection</b>  | Radiation safety cabinet for full protective installation without type approval according to German StrSchG/StrSchV. It complies with French NFC 74 100 and the US Performance Standard 21 CFR Subchapter J. For operation, other official licenses may be necessary.   |

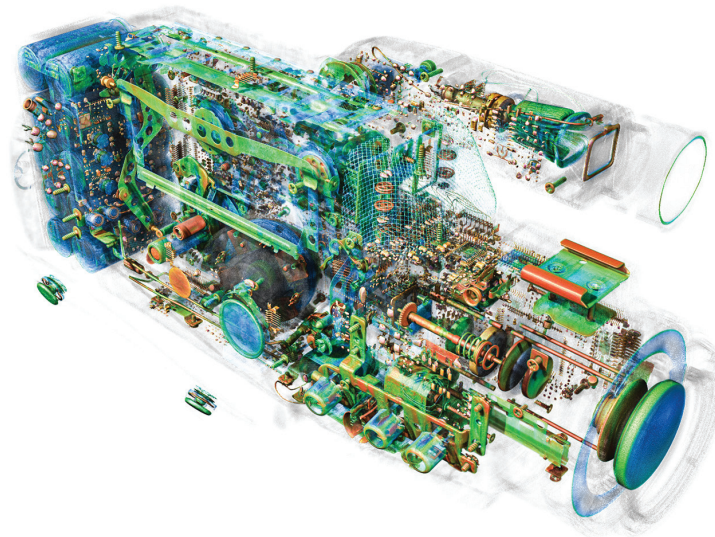
\* Measured as deviation of sphere distance in tomographic static mode SD(TS) with True|position and Ruby|plate, method details referring to VDI 2630-1.3 guideline on request, valid only for Phoenix V|tome|x M Metrology|edition

\*\* with advanced artifact reduction algorithms like advanced Scatter|correct filters and automated beam hardening correction for multi-material samples.



# A partnership for improved performance.

The premium CT performance of the Phoenix V|tome|x M is just one example of how Waygate Technologies is revolutionizing CT inspection to make manufacturing processes more efficient. With our entire precision CT line, a variety of optional innovations, and expert service, we are committed to enhancing precision, automation, and productivity for your operations through our global service network.



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