Cone Beam CT Image Quality Testing
锥束 CT 图像质量测试

Corgi® Phantoms

featuring

Corgi CBCT
Corgi Dental CT
Smári Analysis

With the automated Smári analysis, Corgi provides an efficient method to measure image quality and dose in cone beam CT systems. Corgi Dental CT configuration is also available.

借助自动化的 Smári 分析功能，Corgi 为锥束 CT 系统中的图像质量和剂量测量提供了一种高效方法。此外，Corgi 还提供牙科 CT 配置版本

The Corgi Phantom, with the automated Smári analysis, provides an efficient method to measure image quality and dose in cone beam CT systems.
Corgi 体模搭配自动化的 Smári 分析功能，为锥束 CT 系统中的图像质量和剂量测量提供了一种高效方法。

Corgi® Phantom Design

John Boone, Ph.D. and Jeffrey Siewerdsen, Ph.D. developed the original Corgi phantom design. They have collaborated with The Phantom Laboratory to develop production models of the Corgi phantom and the automated analysis.
约翰·布恩博士（John Boone, Ph.D.）与杰弗里·西沃德森博士（Jeffrey Siewerdsen, Ph.D.）设计了初代 Corgi 体模。他们与美国模体实验室（The Phantom Laboratory）合作，开发了 Corgi 体模的量产型号以及相关的自动化分析系统。

Corgi® Configurations

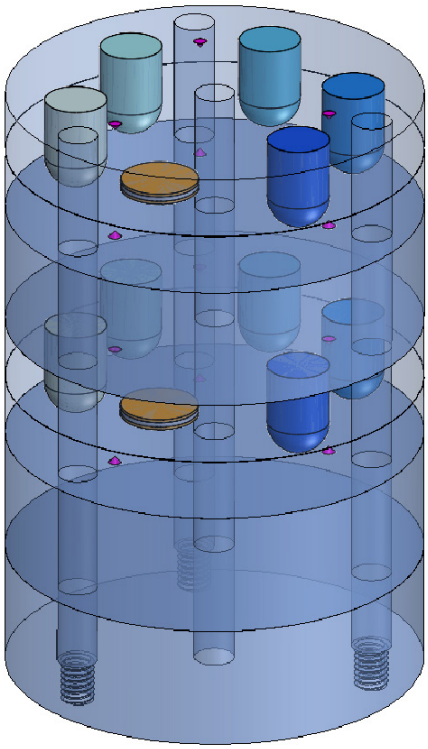
Corgi's modular design allows configurations for many Cone Beam CT applications. The phantoms are configured from 4 cm long, 13.5 cm diameter sections. These sections are secured together with retaining rods. Rod sets for Corgi phantoms up to 13 sections (52 cm long) are available for special applications.

Corgi 体模的模块化设计使其可配置用于多种锥束 CT 应用场景。该体模由长 4 厘米、直径 13.5 厘米的单元段组装而成，这些单元段通过固定杆连接固定。针对特殊应用需求，还提供了可用于组装多达 13 个单元段（总长 52 厘米）的 Corgi 体模固定杆套件。

标准的 CGI014 配置通过两个 CGI006 图像质量单元段，可同时评估两个成像平面的图像质量。将单元段分别置于锥束的中心和边缘位置，能够获取扫描区域内整体性能的相关信息。CGI014 可配置为五单元段或三单元段的组合形式。

Five Section Corgi (CGI014)

The standard CGI014 configuration enables simultaneous evaluation of image quality in two imaging planes with two CGI006 image quality sections. Positioning the sections in the center and near the edge of the cone beam provides information on performance across the scan area. The CGI014 can be configured in five or three-section units.



CGI014

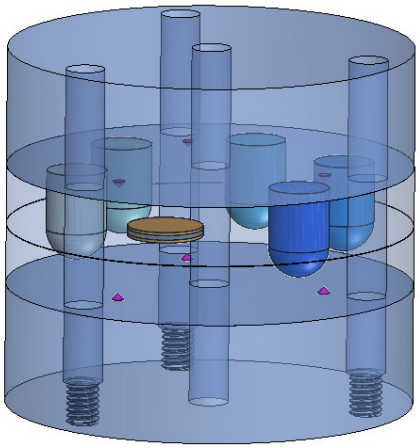
Corgi Dental Phantom (CGI025)

The CGI025 Corgi Dental can be configured in three or two-section units with one CGI006 image quality section.

Optional annuli enable the Corgi to be expanded to 16 cm or 20 cm diameters. The 20 cm annulus can be used with the oval and circular Catphan® body annuli.

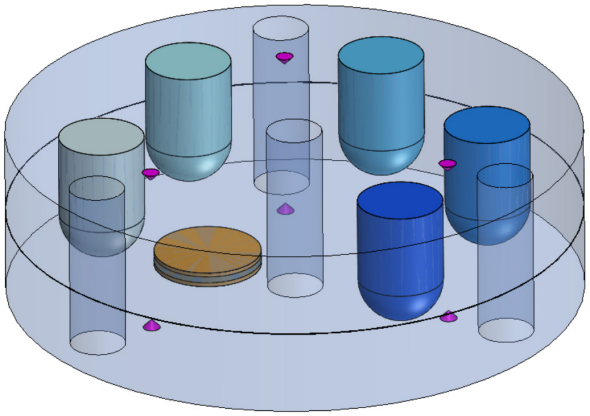
CGI025 Corgi 牙科体模可配置为三单元段或两单元段的组合形式，且包含一个 CGI006 图像质量单元段。

可选配的环形套件可将 Corgi 体模的直径扩展至 16 厘米或 20 厘米。其中 20 厘米的环形套件可与椭圆形及圆形的 Catphan® 体部环形套件配合使用。



CGI025

CGI006 Image Analysis Section



CGI006

图像质量

图像质量单元段用于评估以下内容:

- 感光测定
- 高分辨率
  - 轴位平面
  - 体素分辨率
- 锥束伪影
- 畸变
  - 轴位平面
  - Z轴方向

Image Quality

The image quality section is used to evaluate:

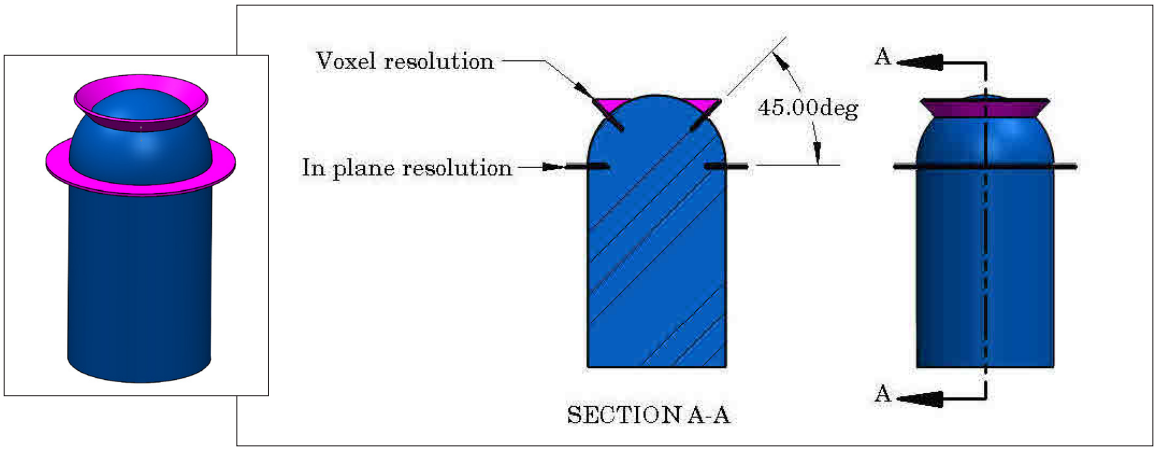
- Sensitometry
- High Resolution
  - Axial plane
  - Voxel resolution
- Cone beam artifact
- Distortion
  - Axial plane
  - Z direction

Sensitometry

The Corgi phantom contains five sensitometry inserts. The insert rods are 20 mm in diameter with one semi-spherical end. The inserts are made from Polystyrene, Nylon, Polycarbonate, POM Copolymer, and PVC.

感光测定

Corgi 体模包含五个感光测定插件。插件杆直径为 20 毫米，一端为半球形。插件由聚苯乙烯、尼龙、聚碳酸酯、聚甲醛共聚物和聚氯乙烯制成。



高分辨率

高分辨率测量值是通过边缘扩展函数（edge spread function）由感光测定杆计算得出的。通过在 x-y 平面内设置边缘，或将边缘旋转 45° 以获得 x-y-z 体素分辨率，即可对平面内分辨率和体素分辨率进行评估。

High Resolution

High resolution measurements are calculated from the sensitometry rods using an edge spread function. Both in-plane and voxel resolution can be evaluated by running edges in the x-y plane or rotating the edge 45° to get x-y-z voxel resolution.

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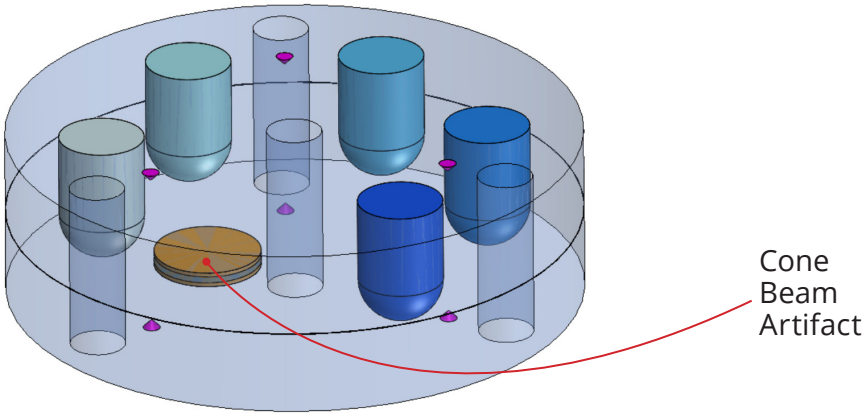
CGI006 Image Analysis Section

continued

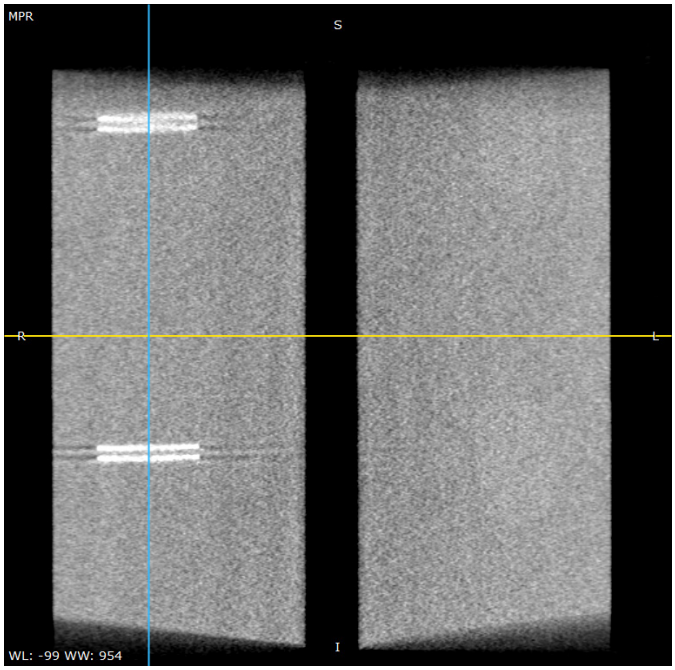


锥束伪影

锥束伪影测试由两个聚四氟乙烯（Teflon）圆盘构成，每个圆盘直径 25 毫米、厚度 1 毫米，两圆盘间距 1.5 毫米。当体模从锥束中心位置移动至边缘位置时，射线束的发散会导致这些圆盘在 Z 轴方向出现模糊。这种干扰会在 Sm á ri 分析中通过数学方法进行评估。

Cone Beam Artifacts

The cone beam artifact test is constructed from two Teflon disks, 25 mm in diameter and 1 mm thick. The disks are separated by 1.5 mm. As the phantom is moved from a central to beam edge position, the beam divergence creates a z-axis blurring of these objects. This disturbance is mathematically evaluated in the Smári analysis.



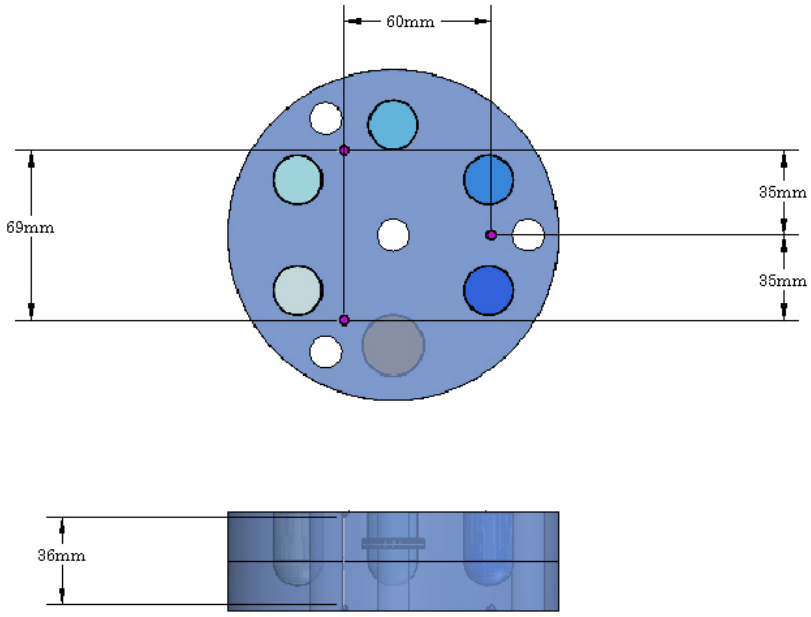
畸变

为测量 x、y、z 三个方向的畸变，在图像质量模块的顶部和底部精确加工了六个锥形空洞。

Distortion

To measure x, y, and z distortion, six cone-shaped voids are precisely machined on the top and bottom of the image quality module.

CGI009 and CGI010 Uniformity Sections



均匀性与噪声

均匀性单元段用于测量图像的均匀性和噪声。CGI010 同时还可作为 Corgi 体模的基础单元段，其上设有用于安装连接 rod 的螺纹孔。

Uniformity and Noise

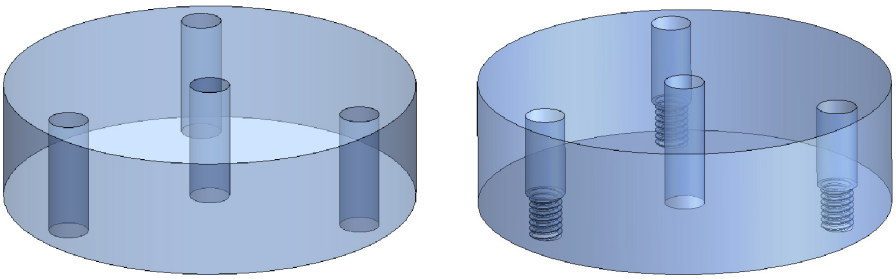
The Uniformity Sections are used to measure image uniformity and noise. CGI010 also functions as the Corgi's base section and has threaded holes for the assembly rods.

剂量

CGI009 单元段上的中心孔及三个外围孔可容纳 CTDI 电离室。连接 rod 可轻松拆卸，以便在不同位置进行外围剂量测量。

Dose

The central hole and three peripheral holes on the CGI009 sections will accept a CTDI chamber. Connecting rods are easily removed to enable peripheral dose measurements in various locations.



CGI009　　CGI010

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这些算法支持与临床相关的协议。自动化上传流程无需人工选择切片或识别感兴趣区域，可实现频繁的数据采集。数值和图形报告输出可进行显示和定制，以满足地方、国家及国际的监管要求。Smári 会保存测量数据，用于趋势分析、设备与协议对比以及历史记录留存。

Smári

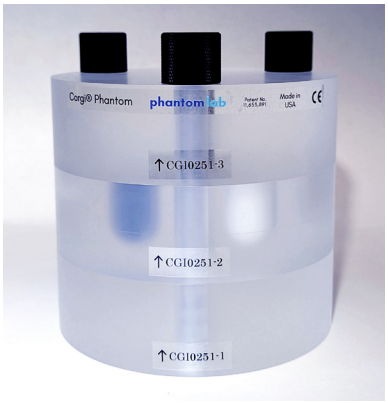
完全自动化

我们的 Sm á ri 分析平台从体模图像分析中剔除了主观的人工观察因素，使物理学家能够利用客观数据评估系统性能并制定临床成像协议流程。

Complete Automation

Our Smári analysis platform removes the subjective human observer component from phantom image analysis, allowing the physicist to evaluate system performance and develop clinical imaging protocol procedures with objective data.

The algorithms support clinically relevant protocols. The automated upload process, which does not require manual slice selection or identification of regions of interest, allows for frequent data collection. Numerical and graphical report output can be displayed and customized to meet local, national, and international regulatory requirements. Smári maintains measurements for trend analysis, machine and protocol comparisons, and historical records.



图中为 Corgi® 体模的五单元段、三单元段及两单元段堆叠形式

Corgi carrying case

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