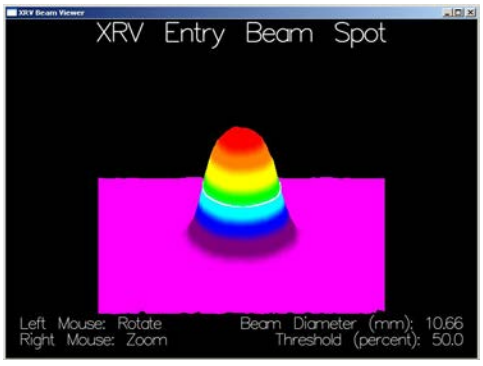
IBAC Radiosurgery Quality Assurance

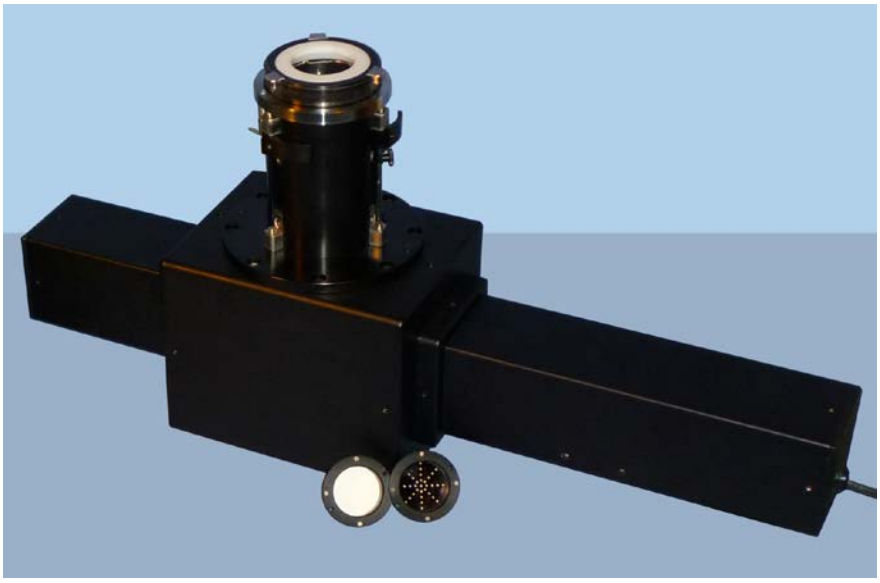
CyberKnife IRIS® Aperture and Beam Metrology - Logos Systems Int'l

IBAC System Features:

- CyberKnife IRIS aperture and X-ray beam width metrology
- Real-time beam profile capture
- Beam diameter accuracy to .05 mm
- Dose duration accuracy to 50 ms
- 3D beam profile viewing and measurements
- Direct inspection of the IRIS
- Aperture width accuracy to .05 mm
- BeamWorks point-and-click or automated measurements
- Quick data export to spreadsheets and graphing software for trend analysis
- Archives all data for later review
- Flexible detached Iris operation for 80 cm SAD measurements
- Setup and Training included



3D Beam Profile Viewing



IBAC Camera Module with Scintillator Disks

The IRIS Beam Aperture Caliper (IBAC) combines precision metrology with high-energy radiation detection to provide a completely electronic alternative to film-based measurement.

The IBAC mounts directly to the CyberKnife robot and performs a variety of quality assurance measurements at the exit point of the X-ray beam from the IRIS collimator. Beam profiles and aperture widths can be obtained with a single mouse click, and automation scripts can be used to record changes in the beam shape and intensity over time. Beam and aperture images are archived for later review and measurements are directly transferred into spreadsheet programs for further analysis and report generation.

IRIS aperture and beam measurements are accurate to .05 mm and repeatability is typically .02 mm. The camera module comes with a 3 to 30 meter (100 feet maximum) USB cable system so the operator can be located safely away from the treatment room.

Logos Systems

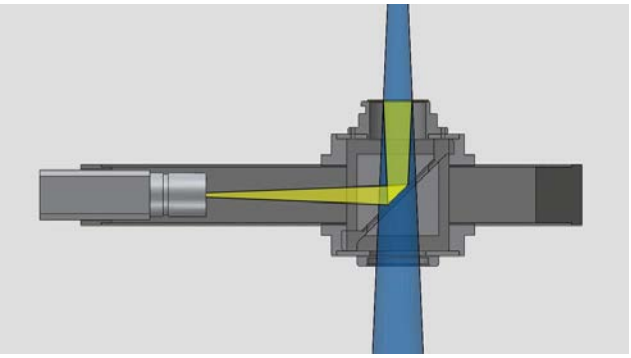
Logos Systems Int'l – 175 El Pueblo Road - Scotts Valley, CA 95066
Phone: 831-600-6101 Fax: 831-439-9440
Email: sales@logosvisionsystem.com www.logosvisionsystem.com

IBAC Operation

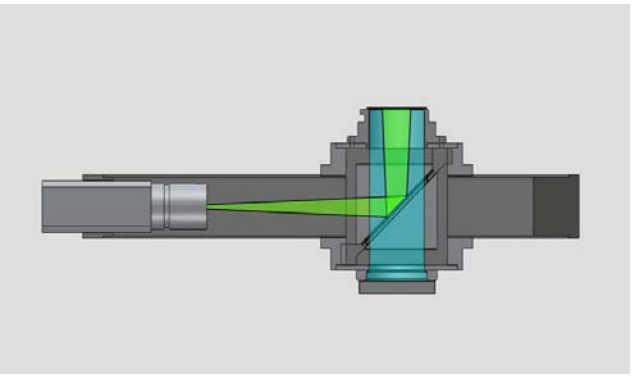
The XRV IBAC system uses a plug-in scintillator to turn invisible X-ray beam fluence into visible light that can be measured with the highly sensitive CCD camera and sophisticated metrology software. An access panel in the mounting column allows the scintillator module to be removed for direct viewing of the IRIS aperture. In this mode, the aperture is illuminated by LEDs located in the column.

The IBAC BeamWorks software is used to acquire, analyze, and archive beam images. Precision metrology routines measure the beam spot and aperture widths multiple times to verify accuracy. Beam profiles are displayed in 3D with real-time zoom and view angle selection. Beam diameters can be measured at any vertical slice of the beam for easy penumbra calculations. Spreadsheet macros are provided for extended statistical analysis of the captured data. Measurements can be made from the GUI or customized with a powerful scripting environment.

Shown below is the beam caliper mode of the IBAC. X-ray fluence (blue) illuminates the scintillator and the visible representation of the beam (yellow) proceeds to the camera for measurement.



The aperture gauge mode of the IBAC illuminates the lower collimator of the IRIS with LED light (blue) and measures the aperture with .05 mm resolution.



IBAC Specifications:

Accuracy: [1]

Beam Width:	+-.05 mm
Repeatability:	+-.02 mm (typical)
Aperture Width:	+-.05 mm
Repeatability:	+-.02 mm (typical)

Optical System: [1]

Resolution:	1280 x 960 pixels binned to 640 x 480 pixels
Capture Rate:	20 frames/sec (typical)
Lens MTF:	Megapixel resolution
Camera Interface:	USB

Optional Camera Shielding: [2]

Camera Top:	12.7 mm lead alloy
Camera Sides:	12.7 mm lead alloy
CCD Lifetime:	~ 1,500 beam hours

Camera Module Physical:

H x W x D:	31.75 x 15.25 x 64.75 cm
Weight:	6.4 or 9.1 kg (14/20 lbs)
Enclosure Material:	Aluminum and stainless steel

Interface:

Capture Trigger:	GUI, Script, I/O, or Network watch-file

Computer Components:

Computer:	HP laptop or selectable desktop options
Misc:	USB to Cat-5 extension cables, Windows 7, USB dongle license, Pelican case

General:

Electrical Power:	110 - 220V, 2 or 4A 9V battery
Environment:	5 to 30 degrees C; 90% humidity, no condensation; minimal vibration

NOTES:

1. Contact us for higher camera resolutions.
2. Contact us for custom shielding requirements. The camera may be replaced for a service fee when the number of weak pixels begins to impact measurement accuracy. This time duration varies on use but is estimated to be approximately 3 years.

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