

# **XRV-100 Metrology System**

3D X-ray Beam Inspection - Logos Systems Int'l

## **XRV System Features:**

- 3D Beam Vector Measurements
- 3D X-ray Dosimetry
- 2D Beam Profile and Divergence Measurements
- Point and Click or Automated Measurements
- Spherical and XYZ Coordinates
- Quick Data Export to Spreadsheets and Graphing Software
- Flexible Script Driven Environment
- Secondary X-ray Noise Suppression
- Network and Discrete Input/Output Interfaces
- Rugged Industrial Camera Housing with 13.5 meter cable
- Easy to Maintain Windows PC
- Integration Services and Training

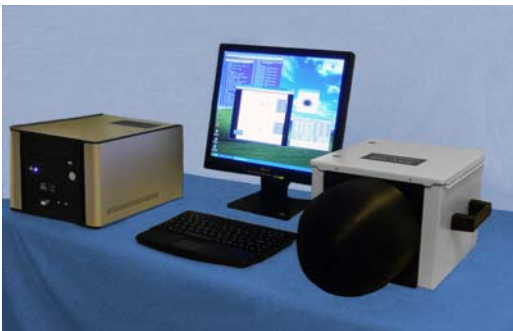


## **XRV-100 Camera Module**

The XRV family of 3D X-ray beam inspection systems combines precision metrology with high-energy radiation detection to form a completely electronic alternative to film-based measurement. The XYZ location and vector of pencil-thin beams of radiation can now be measured with unmatched speed and accuracy. Beam profiles and divergence can be obtained with a single click of the mouse. Automation scripts can be used to record changes in the beam shape, intensity, location, and direction over time for use in 3D dosimetry analysis.

XRV systems can be used to calibrate stereotactic radiosurgery systems that must deliver precisely dosed amounts of radiation to irregularly shaped volumes. The correct operation of mechanical leaf collimators used in these systems can also be quickly verified before or during treatment. Beam measurements are accurate to .2 mm and measurement repeatability is typically .02 mm.

Image processing software algorithms enhance measurement accuracy by reducing the effect secondary X-rays have on bitmaps produced by the 1.3 megapixel CCD sensor. The camera module comes standard with a 13.5 meter cable so that the system PC and operator can be located safely away from any hazardous radiation.



## **XRV-100 System Components**

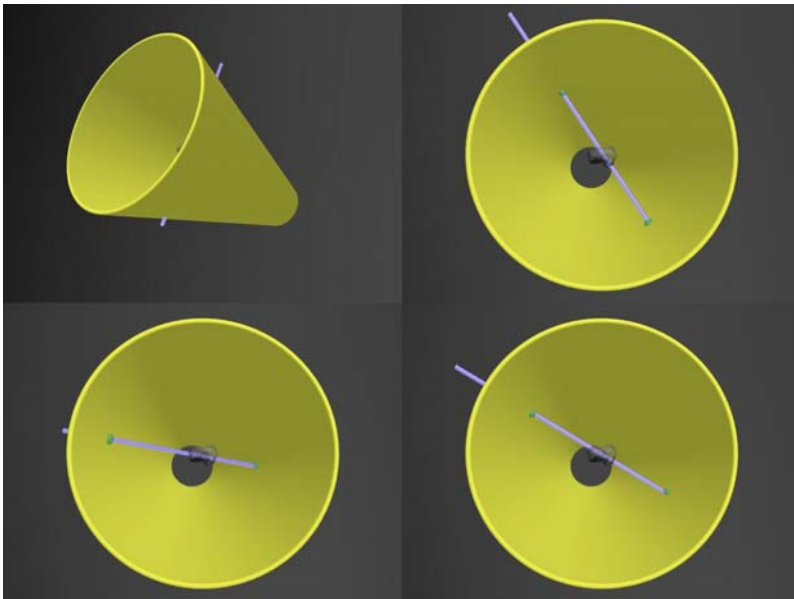
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## XRV Operation

XRV systems work on the principle of the hodoscope: once two locations are known for a given X-ray beam, a comprehensive mathematical model of the beam can be calculated. In the case of the XRV, entry and exit beam spots are created on the surface of a conical scintillator located within the dome-shaped light shroud attached to the steel camera enclosure. Within the darkened enclosure a sensitive CCD camera digitizes the beam spots and transfers the bitmap to the XRV computer for analysis. The camera is protected from secondary radiation with a lead-lined steel enclosure and leaded glass.

The WinLVS software application is used to acquire, analyze, and archive XRV images. Image processing and pattern recognition algorithms separate the beam spots from the secondary radiation noise on the images. Precision metrology routines measure the XY beam spot locations on each image and combined with the internal geometric model of the scintillator, reconstruct the 3D locations of the beam spots on the cone along with the beam path vector.

Beam data is displayed on the captured image as well as sent to disk in a Comma Separated Variable format compatible with spreadsheet applications. Beam measurements can be automated with an easy-to-use scripting environment.



**Shown above is a representation of X-ray beams striking the XRV-100 scintillator cone from various angles. Once the entrance and exit spots for each beam are measured, the 3D path can be precisely calculated. Dose information can be determined using the length of time a set of spots are in a single position.**

## XRV-100 Specifications:

### Accuracy: <sup>1</sup>

XYZ Beam Center:	+-.2 mm
Repeatability:	+-.02 mm (typical)
Vector Theta/Phi:	+-.2 degree
Repeatability:	+-.05 degree (typical)

### Optical System:<sup>1</sup>

Resolution:	1280 x 960 pixels binned To 640x480 pixels
Capture Rate:	8 frames/sec (typical)
Lens MTF:	Megapixel resolution
Cone Angle:	60 degrees
Usable Cone Area:	60-120 mm from apex
Camera Interface:	Firewire

### Camera Shielding:<sup>2</sup>

CCD and Lens:	3.2 mm lead equiv. at 150 KVP
Front:	9.5 mm
Back and Top:	6.4 mm
Sides:	3.2 mm

### Camera Module Physical:

H x W x D:	21.6 x 33.0 x 50.8 cm
Weight:	13.2 kg (29 lbs)
Mounting holes:	See Hoffman A12108
Enclosure Material:	Steel and ABS Plastic
Shroud Thickness:	1.8 to 2.5 mm

### Interface:

Trigger:	Parallel port I/O Network watch-file
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### Computer Components:

Computer:	Core 2 Duo E8400, MicroATX case, 1 GB RAM, DVD-RW+/-, 500 GB HD, Ethernet, Firewire PCI interface
Misc:	Three 4.5 meter Firewire Cables with 2 repeaters, LCD, Keyboard with touchpad, XP Pro SP2, USB Dongle License

### General:

Electrical Power Computer:	110V, 4A
Environment:	5 to 30 deg C; 90% humid no condense Minimal vibration

**NOTES:** 1. For beam sizes 3 – 8 mm in diameter passing within 10mm of cone axis. Contact us for larger beam sizes, custom cone shapes and higher camera resolutions.  
2. Contact us for custom shielding requirements.