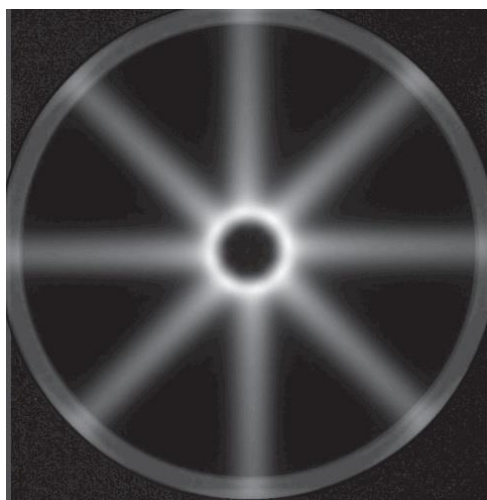


# ARC-200 2D/3D Phantom

Proton and X-Ray Beam Metrology — Logos Systems Int'l

## ARC-200 Features and Benefits:

- Real-time Proton and X-ray beam profile and position capture
- 190 mm diameter x 55 mm deep cylindrical detector with near water equivalence
- 360-degree Gantry Rotation capable, no repositioning
- Effective Resolution 0.2 mm at 8 or 12-bits per pixel
- FLASH-ready 400 fps captures
- Flexible fiducial and build-up options
- BeamWorks Strata software includes GUI or script operation
- Individual or integrated frame capture modes
- Advanced Bragg peak viewing and measurement



**Bragg Peak Star-Shot Delivery Integration**



## **ARC-200 Phantom**

The ARC-200 Beam Viewer combines high-energy radiation detection with precision two-dimensional metrology to form a completely electronic alternative to film-based measurements. The ARC-200 captures and measures the beam profile and integrated dose depth of radiation beams with unmatched speed and accuracy.

Single beams and single axis proton spot scans may be directed at the scintillator block from any gantry orientation for capture and measurement. Automation scripts can be used to capture changes in the beam shape, intensity, location, and penetration depth at camera speeds up to 400 frames per second.

Logos Systems Camera Phantoms calibrate proton and radiosurgery systems or industrial radiation sources that must deliver precise amounts of radiation to targeted regions in 3D space. The correct operation of pencil beam scanning or high-density collimators used in these systems can be quickly verified.

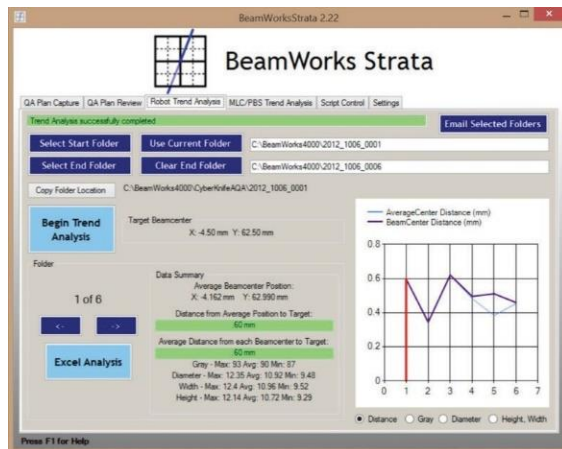
Beam position and width measurements are accurate to 0.2 mm and beam dose depth measurements can be accurate up to 0.5 mm. Captured images can be exported to ImageJ or other image analysis software.

All operations are controlled by a laptop or desktop PC supplied with the camera phantom. The ARC-200 comes with a 30-meter (100 feet) USB3 power-over-fiber extender cable so that the system PC and operator can be located safely away from the radiation source. The digital camera phantom weighs approximately 7.0 kilograms (15.5 pounds) and is stored in the Pelican case provided with the system.

## ARC-200 Operation

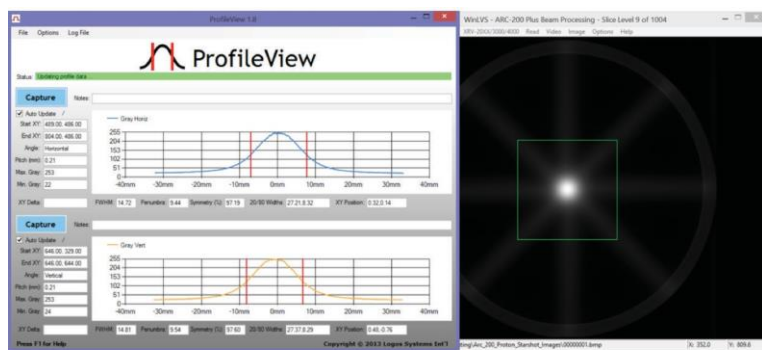
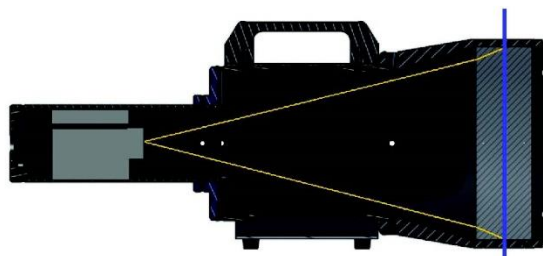
The ARC-200 phantom may first be imaged with a CT scanner so that the fiducials can be used as a target for the treatment volume. Every beam of the test QA plan can then be measured for delivery accuracy. The ARC technology uses a scintillator to turn the invisible X-rays or protons into a path of visible light that accurately represents the location and profile of the beam. A sensitive USB3 camera then digitizes the beam spot and transfers the bitmap to the ARC computer for analysis and storage.

The BeamWorks Strata software is used to acquire and analyze ARC images. Beam data is displayed in 3D allowing real-time zoom and viewing angle selection. Beam height, width, penumbra and symmetry measurements are available from any angle of gantry rotation. Spreadsheet macros are provided for extended statistical analysis of the captured data. Automated measurements can be made from the graphical user interface (GUI) or customized with an easy-to-use scripting environment.

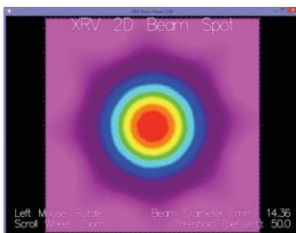


BeamWorks Strata Target Trend Analysis

The 55 x 190 mm plastic disk scintillator turns the X-ray or proton beam (blue) into a visible light (yellow) that is captured by the camera and processed in the ARC-200 software.



Fast isocenter and beam diameter measurements



## ARC-200 Specifications:

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

XY Beam Center:	0.2 mm
Repeatability:	±0.04 mm (typical)
Beam Diameter:	0.2 mm
Repeatability:	±0.04 mm (typical)
Proton Range:	0.5 mm
Repeatability:	±0.2 mm (typical)

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

Resolution:	1280 x 960 pixels with 8 and 12-bits per pixel 2 x 2 binning optional
Capture Rate:	0.1- 400 frames/sec
Scintillator Size:	55 x 190 mm dia.
Lens MTF:	Megapixel resolution
Camera Interface:	USB 3.0

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

Camera top and sides:	12.7 mm thick bismuth and polymer composite
CCD Lifetime:	~1,500 X-ray beam hours

### Camera Module Physical:

H x W x D:	24 x 22 x 45 cm
Weight:	7.0 kg (15.5 lbs)
Enclosure Material:	Aluminum and Plastic

### Interface:

Capture Trigger:	Auto, GUI, Script, or Network watch-file
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### Computer Components:

Configurable to customer requirements

### General:

Electrical Power:	110V, 2 or 4A
Environment:	10 to 30 degrees C; 90% humidity, no condensation; minimal vibration

### NOTES:

- Contact us for higher camera resolutions or larger scintillators.
- Contact us for custom shielding requirements. The camera may be replaced for a service fee after approximately 3 years as necessary.
- Contact us for treatment couch mounting solutions.