

BeamWorks Client-Server Software

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

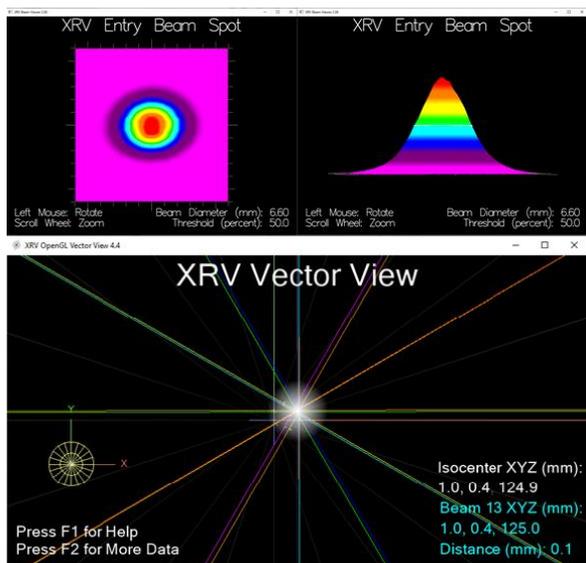
Client-Server Feature set:

- Remotely operate any Logos Systems 2D or 3D camera phantom over a network connection
- Facilitates automated QA and commissioning operations
- Acquire measurements from the phantom and deliver them to the treatment system
- Enables automatic beam capture and system parameter modification
- XML-RPC protocol supports quick integration with system software developed in Python, C#, VB, C++, Java, JavaScript and many other languages
- Example Client source code and Visual Studio development environment provided



XRV-124 positioned for closed loop QA with Client-Server

The BeamWorks Client-Server software package is a remote operation tool for Logos Systems camera phantoms such as the XRV-124. The Client-Server package enables users to integrate Logos Systems hardware into their routine QA or commissioning process in order to reduce QA or commissioning time and manpower. Using Client-Server, a network-connected computer can control beam acquisition and measurement programmatically. Beam measurements are exported in real-time to the treatment system's Beam Position Control software to detect and correct for position and parameter errors automatically. The toolkit includes executables, source code, Visual Studio development environment, and documentation for the BeamWorks Client-Server.

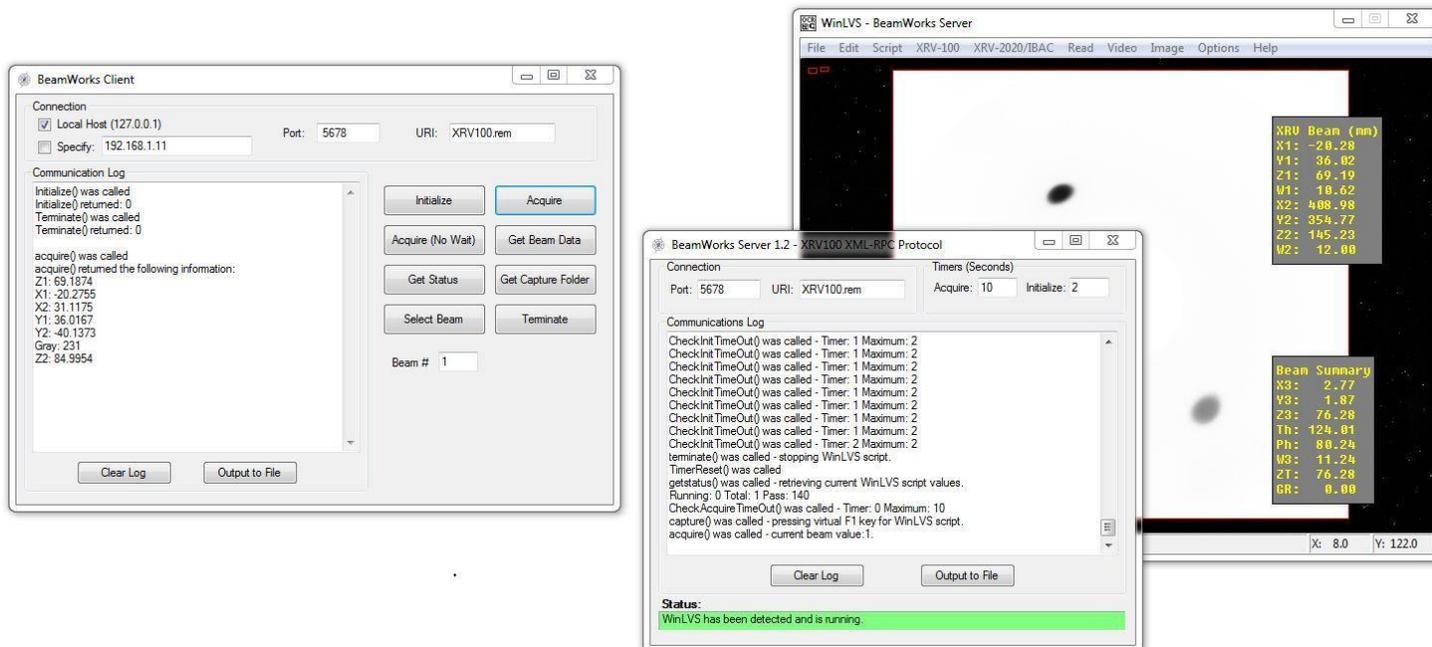


Beam position error mapping is necessary to correct for deviations from ideal gantry motion. As positioning errors are both gantry angle and energy dependent, it is important to characterize the accuracy for every combination of gantry angle and beam energy, and use software to compensate for errors.

Beam shapes can also deviate from a nominal gaussian profile for different combinations of gantry angle and energy due to beam-line bending deformations.

Using an XRV-124 with BeamWorks Client-Server, the user can determine beam shape, diameter, and 3D position all at once. Those parameters are fed into the customer's beam tuning algorithms to automatically correct for beam distortion at various gantry angles for every energy.

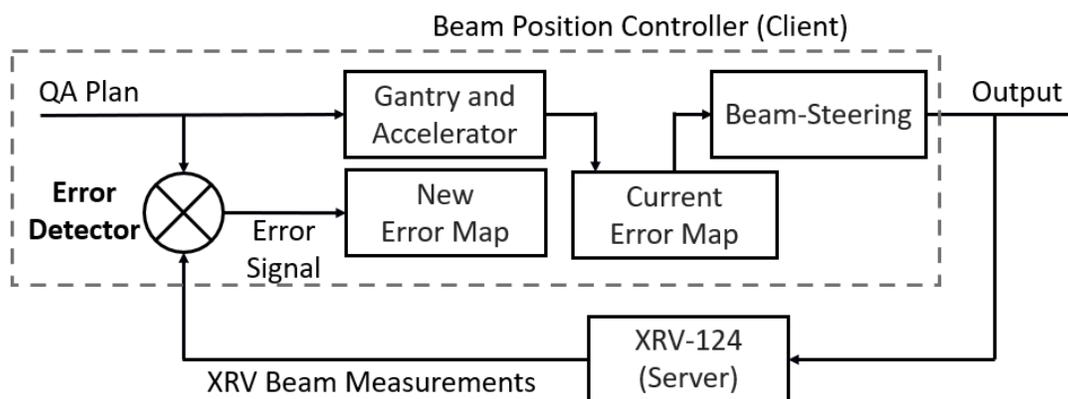
Automation of these processes is possible with BeamWorks Client-Server which reduces the time necessary to commission a treatment system while optimizing delivery accuracy.



Example of running BeamWorks Client-Server with an XRV-124 or XRV-100

Since the BeamWorks Client-Server software needs to be integrated with the treatment system, Logos Systems will work with vendors or proton facilities to ensure proper translation of the Client application example source code as well as correct XML-RPC communication over the network with the server. Typically, commands are sent from the Client to the Server and beam data is returned from Server back to the Client.

The BeamWorks Client-Server software package is not limited to use during commissioning, but can also be used to automate regular QA and to make fine adjustments in the treatment system parameters, making sure the system is optimized for peak productivity and accuracy.



Control diagram integrating the XRV-124 with a Proton Treatment System

As the gantry rotates, the center spot position requires characterization and tuning. In addition, the entire treatment field is affected by the changing gantry angle. Using 2D Logos camera phantoms (such as the XRV-4000 Hawk) with the Client-Server, entire treatment fields can be measured automatically with bending magnet adjustments made on a per-spot, per-energy, and per gantry angle basis. Any Logos 2D phantom can be mounted on a motorized rotating mechanism for unattended mapping at various gantry angles. Combining the capabilities of the 2D grid test error map and the 3D phantom's isocenter error map enables automatic systematic offsets to be applied to the grid testing results, reducing setup time, and yielding error maps for correcting the beam position at every XY location and gantry orientation.