

About Square One

We are a multi-disciplinary engineering company that specializes in the design and development of innovative automated workcells, robots, and precision positioning devices. Nestled in Jackson Hole, Wyoming, Square One maintains state-of-the-art laboratory and manufacturing facilities staffed by engineers, physicists and skilled technicians.



Our vision is to assemble the best minds in the business in an idyllic location, equip them with the latest design tools, and then turn them loose on the most challenging automation projects. We believe our unconventional setting fosters original thinking and we know our collaborators always enjoy their visits.

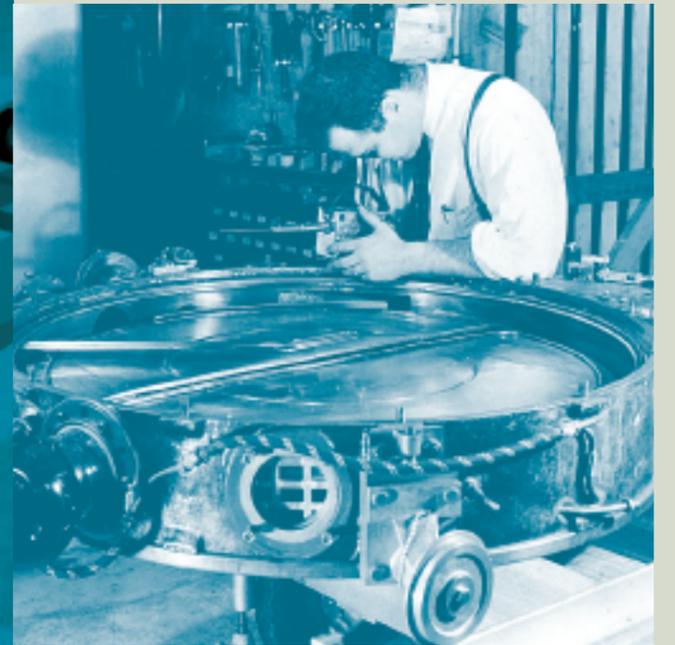
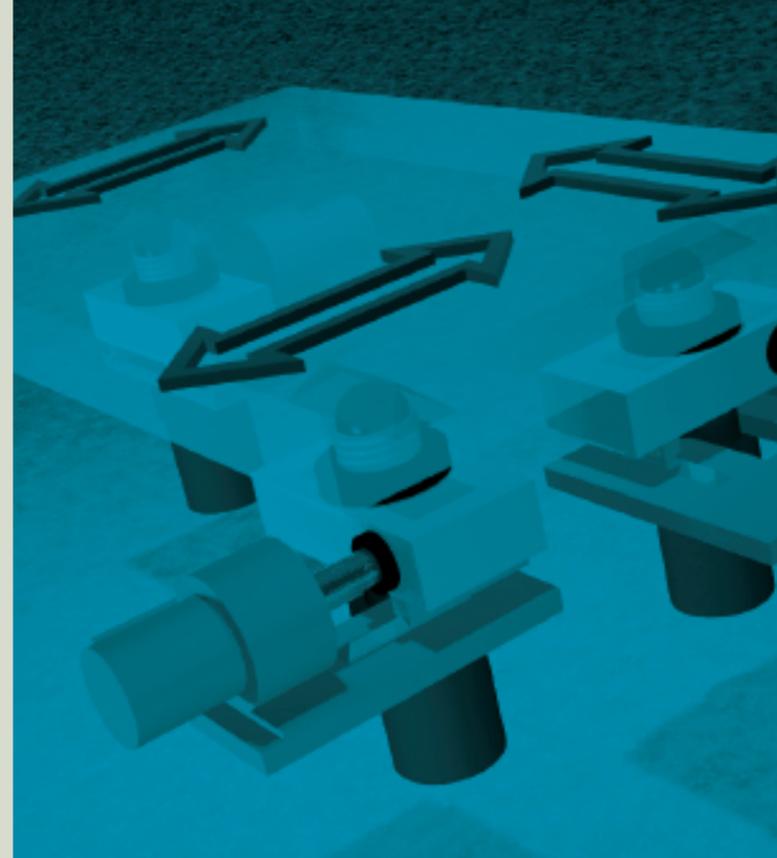
Square One received the 2006 National Tibbetts Award in recognition of the consistent excellence of our SBIR-sponsored research, the success of our commercialization efforts and the positive economic impact our company has had on our region.

Collaborations

Square One collaborates closely with universities, national labs, and private industry across the nation in support of our research. Current partners include:



Stanford University
National Instruments
Johns Hopkins Applied Physics Laboratory
The Scripps Research Institute
Stäubli Robotics
Oak Ridge National Laboratory
Boeing PhantomWorks
SLAC National Accelerator Laboratory
The University of Wyoming
The Lawrence Berkeley National Laboratory



TRI-SPHERE SUPPORT AND POSITIONING SYSTEM

An innovative six degree-of-freedom precision alignment system specifically tailored for synchrotron applications.

SQUARE ONE
Systems Design

P.O. Box 10520, Jackson, WY 83002
TEL 307 734-0211, EMAIL info@sqr-1.com
WEB www.sqr-1.com

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TRI-SPHERE POSITIONING SYSTEMS

The mechanisms used to support and position mirrors, monochromators, and other beam conditioning components are critical to the performance of synchrotron beamlines. However, the performance of these mechanisms is often not equal to the demands placed upon them by modern synchrotron designs. This results in temperamental beamlines that are difficult to align, susceptible to vibrational and thermal disruptions, and incapable of achieving operational goals.

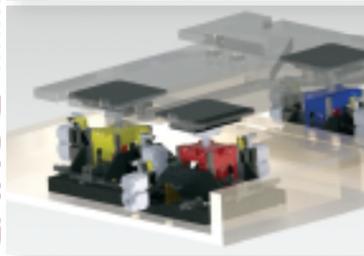
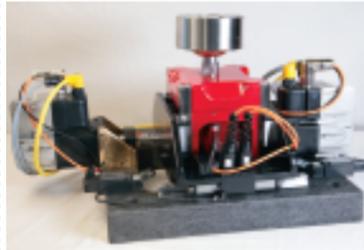
Square One's Tri-Sphere is a fundamentally new type of positioning technology specifically designed to meet the stringent requirements of 3rd and 4th generation synchrotron light sources. The Tri-Sphere delivers precision adjustment in all six degrees-of-freedom while providing rock solid stability. While derived from the same class of mechanisms as hexapods, the Tri-Sphere's innovative design allows it to transcend the limitations of conventional six-axis positioners. Comprised exclusively of prismatic actuators, the Tri-Sphere is almost infinitely scalable and can generate large, highly asymmetric work envelopes.

The basic element of a Tri-Sphere is a "jack" that is adjustable in the vertical and one lateral direction but is unconstrained in the other lateral direction. Three of these

jacks, each rotated 90° relative to its neighbor, are arranged in a triangle. The result is a kinematic adjustment system analogous to an optical gimble mount. Because of its unique passive interfaces, a Tri-Sphere can accommodate thermal expansions and contractions of the object being supported.

A complementary controls architecture harnesses the Tri-Sphere's inverse kinematic equations to translate and rotate components about any point in space with micron level resolution. An intuitive graphical user interface makes the system exceptionally easy to operate. The controls architecture also provides the sockets needed to seamlessly integrate the Tri-Sphere into EPICS or other lab-wide control networks.

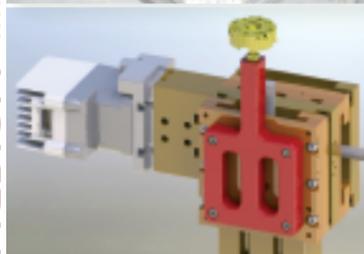
LARGE



When called upon to support very heavy objects, the Tri-Sphere's vertical actuators are created using high-precision ball screw jacks driven by DC stepper motors. By nesting these jacks within the horizontal actuators, it is possible to create very low profile systems with large work envelopes and exceptional resolutions. The inherent flexibility of the Tri-Sphere design allows systems to be cost-effectively tailored to specific applications.

- ✓ Undulators
- ✓ Monochromators
- ✓ Superconducting Cavities
- ✓ Diffractometers

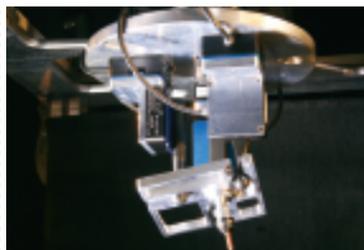
MEDIUM



Tri-Spheres sized to support medium loads can be readily configured for a wide range of applications. Components can be supported from below or can be suspended from above thus providing maximum operational flexibility. Vacuum compatible systems can be built without compromising the Tri-Sphere's performance.

- ✓ Mirrors
- ✓ Beam Position Monitors
- ✓ Sample Environments
- ✓ Detectors

SMALL

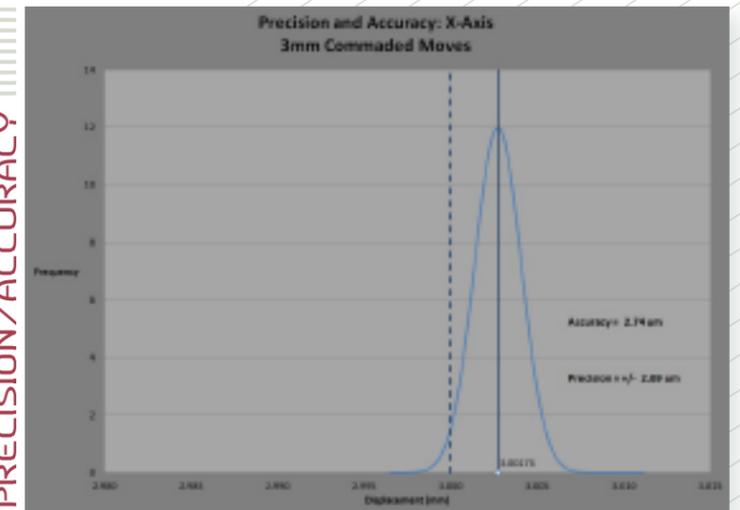


By creating the Tri-Sphere's prismatic joints from miniature piezo-electric actuators, we produce extremely compact six-axis positioners having nanometer-level resolution. These incarnations are ideal for aligning small samples relative to an X-ray beam and for rotating the samples while gathering data.

- ✓ Single Crystals and Other Solid Samples
- ✓ Small Sample Chambers
- ✓ In-Hutch KB Mirrors

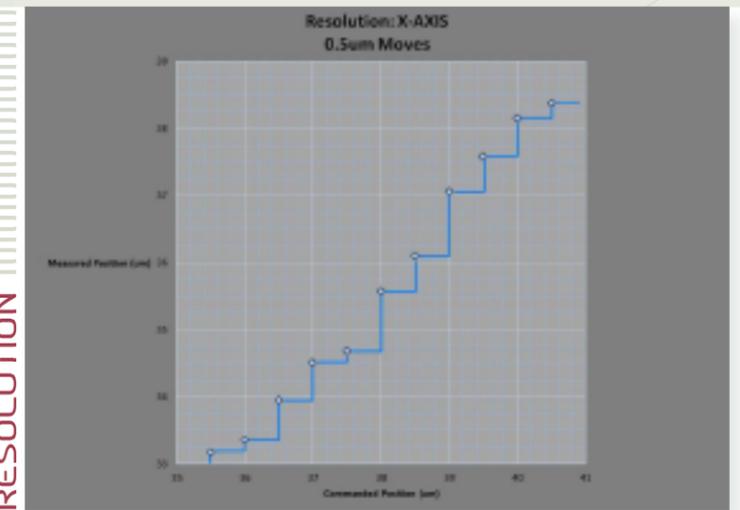
Unique automated process tools that address the needs of the scientific community and high-tech industry.

PRECISION/ACCURACY



Like its payload capacity and work envelope, the accuracy, precision and resolution of a Tri-Sphere system can be tailored to match an application's requirements. Performance of a heavy-duty jack at Lawrence Berkeley National Laboratory.

RESOLUTION



Designs are characterized by innovation and daring, coupled with a ruthless devotion to functionality.

