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Hexapod Precision Positioning Systems provide Motion in 6 Degrees of Freedom by [Piezo](#)

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Hexapod positioning systems (Stewart- Gough platforms) for precision micro-positioning applications became first commercially available in the 1990. Today's electromechanical and piezoelectric hexapods are now mainstream and provide many advantages over to serial kinematics electromechanical and hydraulic parallel positioning positioning systems.

Hexapod positioners are used as surgical robots and for single mode fiber alignment applications. They are key components for all modern astronomical telescopes.

A hexapod, is mostly designed as a six-legged parallel mechanism structure with 6 actuators between two platforms. The precision actuators move in parallel (parallel kinematics). Computer controlled motion of all actuators enables motion in any degree of freedom (3 linear directions – x, y, z (lateral, longitudinal and vertical), and the three rotation directions (pitch, roll and yaw).

There are fixed strut length and variable strut length hexapod designs available.

Fixed-strut-length designs can use 6 linear motors to move the basis of each joint up and down, or move in plane.

Benefits of Hexapods vs Stacked Traditional Precision Positioners

Parallel-kinematic mechanism (PKM) motion control systems have a number of advantages over standard serial kinematic (stacked) positioning systems.

Higher Stiffness

In a hexapod, all actuators act directly on the same moving platform, with the same dynamic characteristics for the six axes. Because each actuator basically only has one degree of freedom, (unlike a serial stack of stages, where imperfections bearings in each axis contribute to crosstalk and runout), accumulation of off-axis errors is much less of a concern for hexapod designs. Due to the high stiffness flexing and bending errors are not an issue.

Faster

Because of the lower moving mass positioning can be performed with faster settling times than with conventional, stacked stage systems.

No Moving Cables

In such systems, runout, guiding errors, and the friction and inertia of moving cables all accumulate to limit accuracy and repeatability – problems which do not affect parallel kinematic systems like the Hexapod.

Fixed Virtual Pivot Point

For optics and other alignment tasks, it is important to be able to define a fixed pivot point. The more sophisticated Hexapod vector controller allows choosing any point in space as the pivot point for the rotation axes by software command. The pivot point remains fixed relative to the platform.

No Cumulative Errors – In serial stacked precision positioning systems, the bottom stage supports its own moving platform plus all stages above it and wobble and guiding errors of each axis accumulate. With a hexapod all actuators work parallel and their bearings are constricted to one degree of freedom.

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[Piezo](#) - About Author:

Technology has always fascinated the technician inside me. And writing about the latest in technologies and mechanisms in usage has been my forte over the last few years. Follow my write ups to know about the latest in technologies and mechanisms this season for one. This fall a [Hexapod](#), Precision Positioning system, a [peizo mechanism](#), piezo actuators, nanopositioning systems, linear slide, linear actuators are very much in demand among the technical and mechanical industries across the world. Keep yourself updated on these products exclusively from USA.

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