

# PI Wins Substantial Hexapod Contract for ALMA Millimeter Radio Telescope



## General Dynamics subsidiary Vertex Antennentechnik has ordered 25 high-precision micropositioners for large array radio telescope

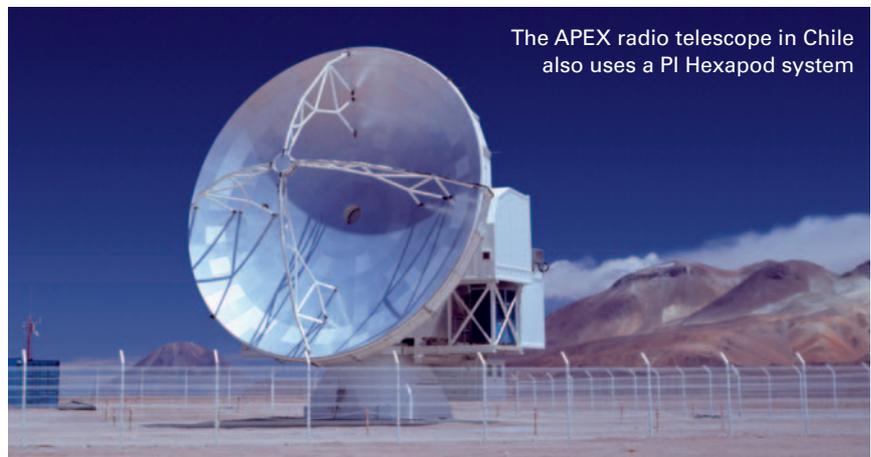
The ALMA (Atacama Large Millimeter Array) international partnership is constructing and will operate a radio telescope comprising an array of up to 64 antennas. The partnership is made up of North America (USA and Canada), Europe and Japan, in cooperation with Chile. PI will deliver a total of 25 Hexapod systems for the extremely precise alignment of the telescope's secondary reflectors to Vertex Antennentechnik in Duisburg, Germany by 2011. Hexapods are the first choice of positioning system for astronomical multi-axis alignment tasks. They can provide very high stiffness, a very large aperture, and are devoid of cable management issues.

The PI Hexapod combines a load capacity of 200 kg with sub-micron linear resolution and microrad-level angular resolution. A highly sophisticated digital controller provides advanced features such as a user-programmable virtual pivot point,

extremely important in complex alignment applications. Target positions in 6-space are entered in user-friendly coordinates and reached by smooth vectorized motion which saves valuable programming time when integrating the system. Similar six-axis micropositioning systems from PI have already proven reliable in operation at the ALMA VertexRSI test antenna and the Atacama Pathfinder Experiment (APEX) radio telescopes. Millimeter and sub-millimeter astronomy investigates the universe in the spectral range which traditionally stretches from radio waves to the infrared.

ALMA will be used in this spectral range to investigate the structure of the early universe as well as galaxies, stars and planets in their formative stages. ALMA is being built in the Chilean Atacama desert at an altitude of over 5000 m, one of the driest places on earth. These are favorable conditions for the best possible observations, since millimeter radiation is absorbed by water vapor in the atmosphere.

Each individual ALMA antenna has a primary reflector 12 m in diameter, higher than a four-story house. The mobile antennas will be used together in various arrangements as a single



The ALMA VertexRSI test antenna  
with PI Hexapod system



telescope. The spread of the antenna array will be between 150 m and a maximum of 12 km. On completion in 2011, ALMA will be the largest and most powerful radio telescope in the world, with a resolution ten times better than that of the Hubble space telescope.

In supplying the six-axis Hexapods and their high-performance controllers, Physik Instrumente is contributing its many years of experience in extremely high-precision positioning to the ALMA project. PI was able to demonstrate the reliability and accuracy of its systems in the ALMA VertexRSI test antenna in New Mexico, USA. ALMA's technological forerunner project, the APEX radio telescope in Chile, is already successfully using the same PI micropositioning system.

PI has been supplying hexapods, micropositioning actuators and active optics for astronomical telescopes, including several infrared telescopes on Mauna Kea in Hawaii as well as telescopes in Chile, South Africa and the Canary Islands, for over 15 years.

<http://www.alma.nrao.edu>

<http://www.eso.org/projects/alma>

<http://www.apex-telescope.org>

<http://pi.ws>