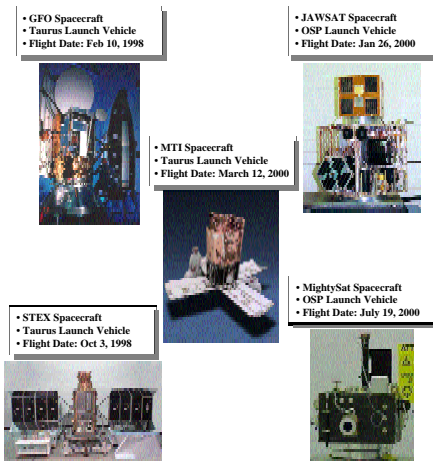


## SoftRide Success!

Launch vehicles have historically provided a very rough ride to spacecraft during launch. CSA Engineering has pioneered the design, development, fabrication, and flight of whole-spacecraft vibration isolation systems. These "SoftRide" systems are inserted between the launch vehicle and the spacecraft and serve to attenuate structure-borne launch loads imparted to the spacecraft. The figure below shows several flight programs for the SoftRide systems. CSA is currently developing or has developed SoftRide Systems for other launch vehicles, including large, liquid-fueled vehicles.



*SoftRide Technology has won wide acceptance among the launch community and is currently being developed by CSA Engineering for broader applications.*

The SoftRide systems for the Taurus and Minotaur are light-weight, between one and four inches tall (depending on the launch vehicle), and integrated directly into the existing flight hardware.

The figure below shows actual flight data of accelerations below and above the isolation system. This figure shows the great benefit that the SoftRide system can provide spacecraft during launch. The SoftRide system also virtually eliminates all high frequency structural-borne vibration and shock loads on the satellite.

See "SoftRide Success" on back page

## CSA Expands New Mexico Office



CSA is pleased to announce the recent expansion of our Albuquerque, New Mexico office. We're not exactly new to town. With this step we build on a strong ten-year track record of on-site engineering and test support for the Air Force and other customers in New Mexico. In the last year, to better serve our local and regional government and commercial customers, we have grown the staff to four full-time engineers with a combined experience base of over 50 years.

Our engineers in Albuquerque have the same capabilities CSA's customers expect in vibration control, dynamic testing, control algorithm and system design, and innovative device development. The

most recent addition is Dr. Keith Denoyer, formerly a Technical Adviser in the AFRL Space Vehicles Directorate. Keith adds a variety of skills in smart structures, control systems, and other areas, with a particular strength in space systems. We're excited to have Keith as the point person for our increasing activities in Albuquerque.

The new CSA facility is located less than one mile from the airport at 2021 Girard SE, Suite 112, Albuquerque, NM 87106. For more information on CSA in Albuquerque, contact Keith at (505) 765-5860, or visit [www.csaengineering.com/ofcloc/albuquerque.shtml](http://www.csaengineering.com/ofcloc/albuquerque.shtml).

### Featured Product:

## PH-1 Hexapod

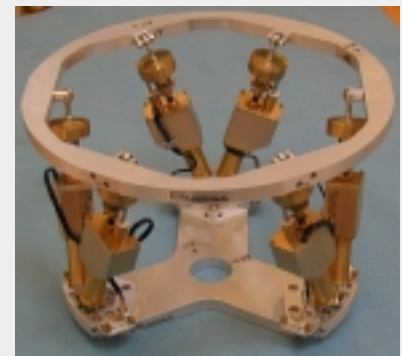
The PH-1 system (short for Type 1 Point and Hold Hexapod) is a highly capable multi-degree of freedom actuation system that can deliver significant range of motion to attached payloads in all 6 degrees of freedom. Once the payload, such as a secondary mirror, is oriented, the system can be powered off for a true zero-power hold capability.

#### Key features include:

- Zero-power hold capability
- Large range of motion and high resolution (see table)
- Vacuum compatibility
- Light weight (2.2 kg)
- Compact (200mm tall, 205/280mm inner/outer diameter)
- Stiff (first lateral mode > 70 Hz)
- Payload capability up to 10 kg.

The hexapod and amplifier can be purchased separately or together with an automated control system for true standalone operational capability.

Individual actuators and amplifiers are also available for single degree of freedom applications. Customization is easily accommodated. §



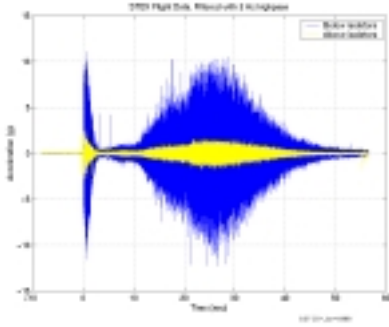
*CSA's latest MDOF Pointing and Positioning System, the vacuum compatible PH-1 hexapod*

Mode	Stroke	Resolution	Speed
Piston	±6.25mm	2.0 μm	1mm/min
Shear	± 19mm	2.0 μm	
Tip/Tilt	±2.4 deg	0.1 μrad	1mrad/min
Twist	±9 deg	0.1 μrad	

For more information on this and other pointing and positioning systems, please contact [eric.flint@csaengineering.com](mailto:eric.flint@csaengineering.com)

Continued "SoftRide Success"

The SoftRide system has reduced some critical dynamic loads to as little as 20% of their original magnitude. §



For more information on SoftRide systems, please contact [paul.wilke@csaengineering.com](mailto:paul.wilke@csaengineering.com)

# Did You Know?

CSA designs and builds *magnetic* and *electromagnetic devices* for a variety of customers and applications. Using sophisticated analysis software, CSA develops concepts for devices including actuators and dampers. With an established supplier chain, and in-house capabilities including coil winding, we are capable of prototyping and small quantity manufacturing. All developments emphasize mass, volume and power efficiency to meet customer needs. From voice coil actuators to eddy current dampers to magnetorheological

devices, CSA provides the engineering expertise to produce high-performing electromagnetic components that enable vibration and motion control. §



## We would like to hear from you!

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## Join the CSA Team!

We are always interested in outstanding people experienced in the following areas:

- Structural dynamics and vibration control
- Acoustics and noise control
- Electronic and software control of electromechanical systems
- Dynamic testing
- Smart materials, devices and structures
- DSP and embedded control
- Finite element modeling

Visit [www.csaengineering.com](http://www.csaengineering.com) for specific job openings.  
Send resumes to [info@csaengineering.com](mailto:info@csaengineering.com).

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