

Sole Source Procurement

A. What are the unique requirements (e.g., operating specifications; dimensions; tolerances; accuracy; purity; reliability; useful life, etc.)?

For researchers that would like to capture images of a specimen under an optical and a scanning electron microscope as it is being deformed: Force and displacements will be carefully measured on small samples to determine mechanical properties. Due to the small depth of field inherent to optical microscopes, it is very challenging to keep the sample from moving out of plane during loading. Even a few microns (millionths of a meter) out of plane motion will cause the image to go out of focus. Psylotech's load frame is the only one capable of such small out of plane motion. Moreover, it is small and lightweight and therefore compatible with the scanning electron microscopes (SEM). Additionally, the Psylotech control software source code will be available, such that it can be modified to interface with the SEM and automate test procedures.

The Psylotech frame a direct-drive servo with no gear box and low maintenance. It is capable of high rates, which is useful for effective load control and multi-rate experimental studies. High speed is also important for step-loading experiments, such as creep or stress relaxation.

B. How are these requirements critical to your needs?

We are studying mechanical properties on multiple length scales. Psylotech's load frame is uniquely suited to multiple length, force and speed scales. It is also highly modular and can readily be upgraded in the future, including nano-positioning and temperature control. We could not conduct this research without the small-scale positioning capabilities of Psylotech's load frame and without its constraint of out-of-plane motion.

C. What other suppliers were considered and why were they rejected? (Brand names and suppliers should be specified.)

Deben, Admet, Kamrath&Weiss. All have the following limitations: 1)unsophisticated motion control, 2)out of plane motion, 3)insufficient speed for effective load control, 4)no available 10nm closed loop control, 5)no available high resolution load cell and 6)no available temperature chamber. Additionally, Psylotech offers Arcan grips for possible future pure shear experiments.

D. Why is this make, model, service, or supplier the only one acceptable?

The Psylotech system has exceptional flexibility for multi-scale testing on these length scales. It has a very sophisticated motion control, with speeds up to 100mm/sec, yet capable also moving nanometers/sec. The speed is important for step-loading, key to important creep and stress relaxation tests. The available high resolution load cell offers 100x higher resolution compared to the strain gauged load cells typical to such frames. This is important, because it means a stiffer load cell for the ultra low loads we require. Most importantly, only Psylotech's universal load frames control out of plane motion, enabling in situ testing under high microscope magnification.