

Temperature Testing

Psylotech offers a variety of *in situ* temperature solutions that are compatible with our load frames, including:

- a -100 to 300°C convective chamber
- 800 & 1600°C furnaces
- >2000°C prototype laser heating

Closed loop temperature control is integrated into Psylotech's motion control software, Psylotest.

Convective Environmental Chamber

The chamber to the right is compatible with 10mm working distance microscope objectives. Forced convection eliminates light refraction, enabling small-scale digital image correlation.

Additive manufactured stainless steel ducting diffuses the air entering the heater into a parallel flow within the chamber. Suction at the chamber's outlet is sufficient to hold temperature, even without front and back covers.

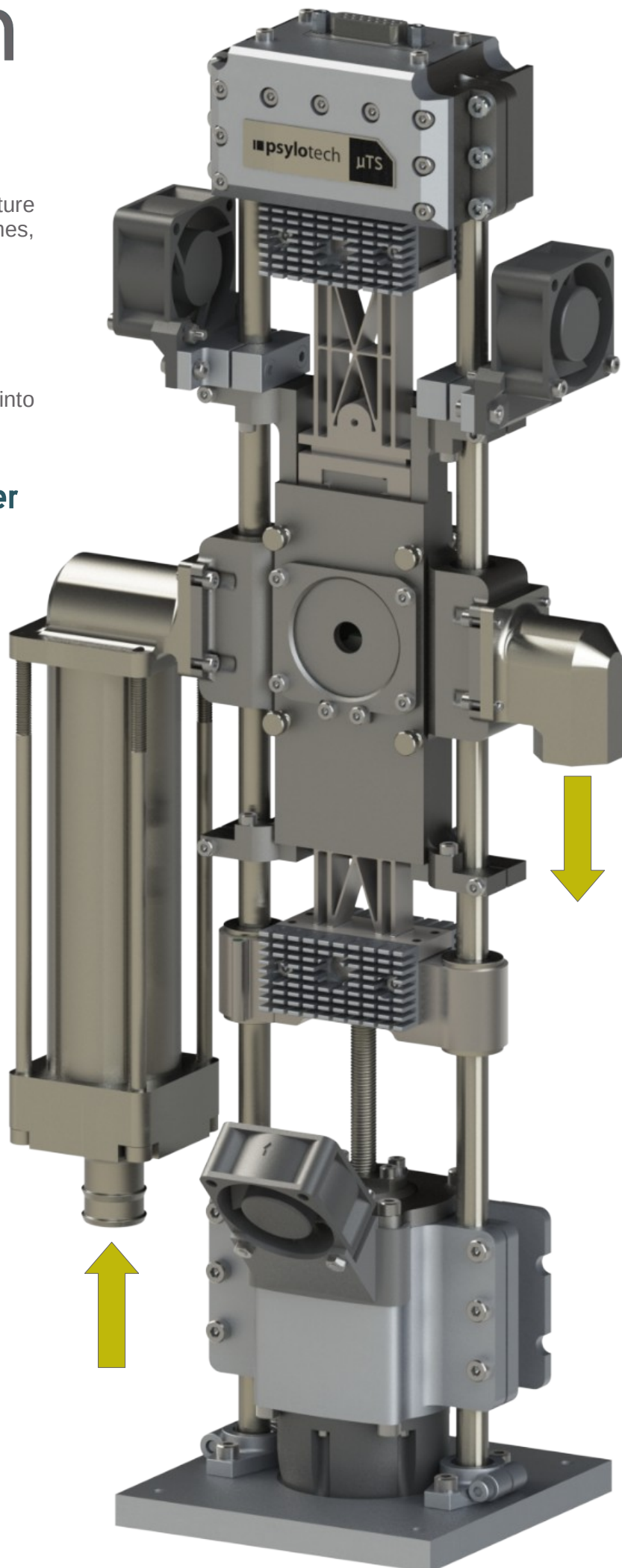
Heating Rate

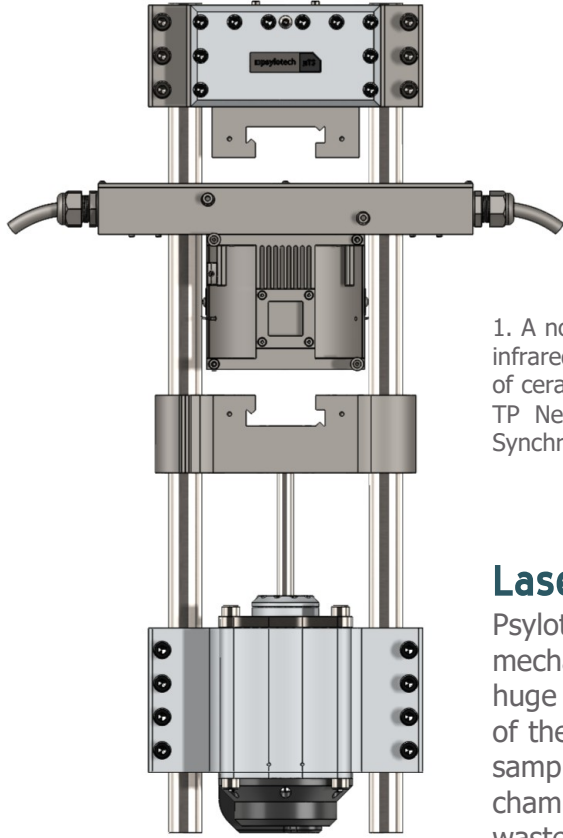
The convective chamber heating rate is as high as 5°C/s. Air temperature can reach a stable 200°C within 2 minutes. Air temperature is controlled from the average of measurements taken at the inlet and the outlet. Alternatively, a thermocouple can be attached directly to the sample or on a grip for control.

Compatibility

The convective temperature chamber is compatible with:

- X-ray tomography
- optical microscopes up to 1.6kN
- XRD with widened windows
- Dual moving cross-head systems





Furnaces

Psylotech licenses an 800°C and a 1600°C furnace design from the University College London¹. The image on the left shows the 1600C model placed inside a 200 series 10kN uTS. These furnaces were originally designed for parallel beam X-ray tomography, but they are also compatible with conical beam CT scanners and optical measurements. Samples are gripped in air outside of the chamber.

1. A novel high-temperature furnace or combined in situ synchrotron X-ray diffraction and infrared thermal imaging to investigate the effects of thermal gradients upon the structure of ceramic materials, JB Robinson, LD Brown, R Jervis, OO Taiwo, J Millichamp, TJ Mason, TP Neville, DS Eastwood, C Reinhard, PD Lee, DJL. Bretta and PR Shearinga, J of Synchrotron Radiation, V.21, part 5, Pp 1134-1139, 2014.

Laser Heating

Psylotech is licensing an existing laser heating system, designed for mechanical testing of materials. Leveraging small scale samples provides huge throughput potential. Localized heating means only a small amount of thermal energy is require to reach very high temperatures. Setting up samples is much quicker and no chamber is needed. Eliminating the chamber means no waiting to reach equilibrium and no need to manage waste heat. Tens of tests can be completed in the same time traditional techniques need for a single experiment. Moreover, the load frame is small enough to fit inside an inert or vacuum chamber.

High-Resolution Load Cell

Psylotech’s proprietary high resolution load cell offers two advantages specific to high temperature testing. First, it offers superior bending stiffness when the frame is mounted horizontally. High bending stiffness facilitates long extension hanging off the load cell grip interface. Without it, samples are more prone to move out of plane, losing focus under optical microscopes. Secondly, the high-res. load cells monitor internal temperature and thermal gradient, making them less less susceptible to drift during high temperature tests.

