



# CERAMIC COMPOSITE AND CERAMIC TESTING LABORATORY

## Purpose:

To provide mechanical (high frequency, creep, and low cycle fatigue, tensile, compression, 4-point bend, and interlaminar shear) characterization of ceramic composite and ceramic materials in high temperature air and cryogenic environments.

The Ceramic Composite and Ceramic Testing Laboratory (CTL) located in Building 4612 provides an environment for the material selection of advanced ceramics for 2<sup>nd</sup> and 3<sup>rd</sup> Generation

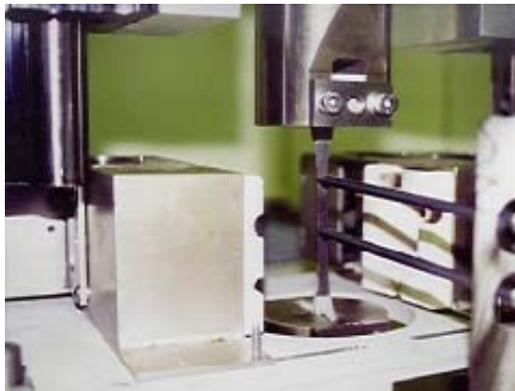
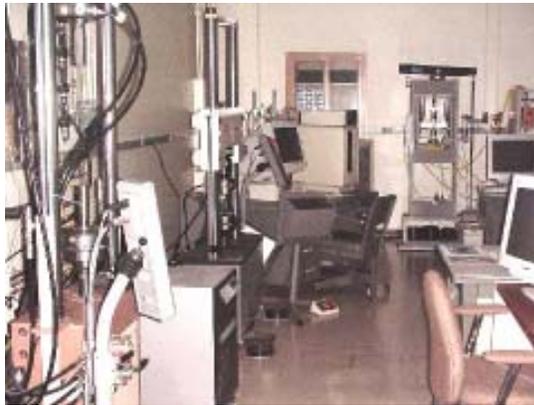
s p a c e transportation applications. These ceramic composites are expected to play a major role in cost reduction and increasing safety and reliability of

the Space Launch Initiative (SLI) program. This laboratory will create a very significant database for advanced ceramic composite materials. It is necessary to identify processes and to select material constituents in order to obtain durable ceramic matrix composites, which would be initially verified by testing in this laboratory. Analysis of failure mechanisms is conducted to support process development and to determine suitability for specific applications. The CTL supports several projects at MSFC: 3<sup>rd</sup> Generation Nondestructive Characterization Life Determination, 3<sup>rd</sup> Generation TBCC & ISTAR, and Various SBIR Programs.

The CTL tests fracture and fatigue of these materials in variable environments. The laboratory's capabilities include testing at room

elevated temperatures. Testing facilities include:

- Slow cycle Electromechanical Tester  
Test Rate: 1 micron/hour to 350mm/min
- Fast cycle Servohydraulic Mechanical Tester  
Test Rate: 0 to 1000 Hz, with accelerometer and piezoelectric load cell
- Two Dead Weight Creep Frames with Linear Bearings to prevent parasitic strains, for ultimate strain materials
- Four Point Bend Testing Fixtures for ceramics (0° - 1400°F)
- Environmental Chamber for Mechanical Testing (-150°-315°C).



The CTL provides a unique opportunity to test ceramic materials at a much higher fatigue cycle. The specialized MTS Servohydraulic Mechanical Tester has a frequency of 0 to 1000 Hz, whereas most machines only go to 100Hz. This machine will allow the

opportunity to establish high frequency trends that will better represent the vibrations endured by space transportation components.

## POINT-OF-CONTACT:

Sarah Howse/ ED34  
(256) 544-7418  
sarah.howse@msfc.nasa.gov