# Equibiaxial Flexural Testing of Advanced Ceramics at 1000C

Advanced ceramics are generally defined as a highly engineered, high performance typically non- metallic, inorganic, ceramic material having specific functional attributes.

Engineering applications of ceramics frequently involve biaxial tensile stresses and a proven way to test for strength and deformation under multiple tensile stresses is the equibiaxial strength test.

Generally, resistance to equibiaxial flexure is a key measure of the lowest flexural strength of a monolithic advanced ceramic. Multiaxial stress states are required to effectively evaluate failure theories applicable to component design, and to efficiently sample surfaces that may exhibit anisotropic flaw distributions. Equibiaxial tests can minimize the effects of test specimen edge preparation as compared to uniaxial tests because the generated stresses are lowest at the test specimen edges.

For quality control purposes, results derived from standardized equibiaxial test specimens may be considered indicative of the response of the bulk material from which they were taken for any given primary processing conditions and postprocessing heat treatments or exposures.
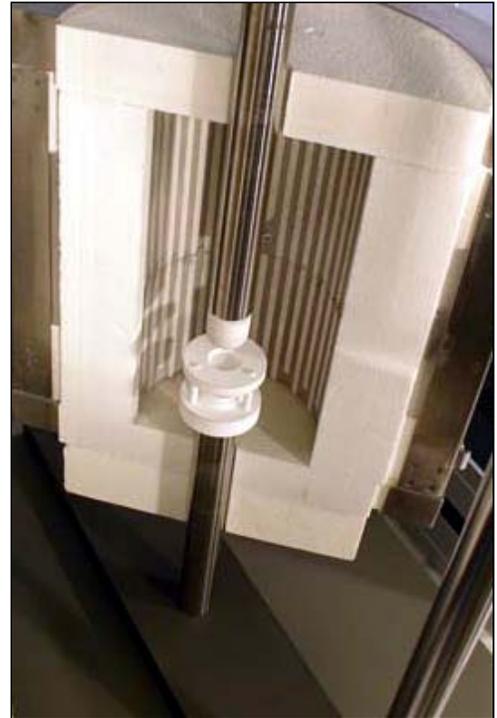
ASTM C1499 defines equibiaxial flexural strength as the maximum stress a material is capable of sustaining when subjected to flexure between two concentric rings. Flexure cupping of a circular plate is caused by loading an inner load ring and outer support ring. Equibiaxial flexural strength is calculated from the maximum-load of a biaxial test carried to rupture, original dimensions of the specimen, and Poisson's ratio.
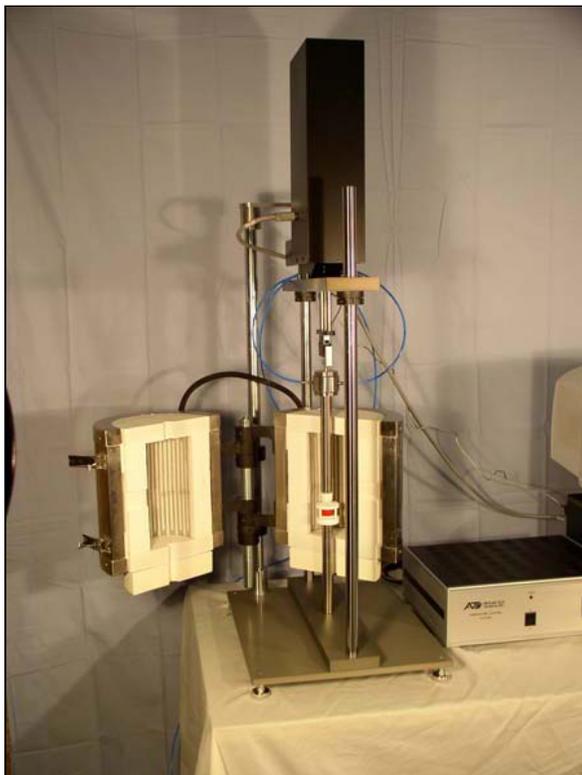
Researchers at The Ohio State University use a TestResources dual column 100R PC Controlled test system to perform tests at low forces. The modular actuator includes a position encoder (0.007 micron resolution) that enables slow constant rate of loading and position control. The system includes furnace and high temperature extensometry for strain control.

Horizontal Setup for use with microscope