

Performance Evaluation & Characterization Capabilities



Department of Materials Science & Engineering
The University of Alabama at Birmingham, Alabama

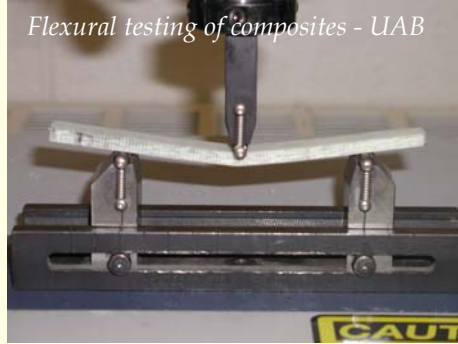
The University of Alabama at Birmingham (UAB) has several capabilities in performance evaluation & characterization of advanced materials. The focus of the work ranges from routine mechanical testing, to development of specialized test fixtures and methods, microstructure & imaging.

Universal Testing Machine

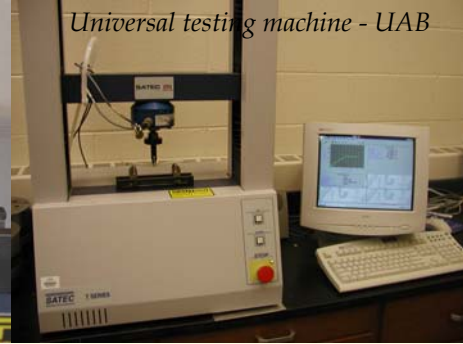
SATEC T-5000 POWER SCREW MACHINE

ASTM Test Methods for Flexure, Tension, Compression, Shear, Static Indentation

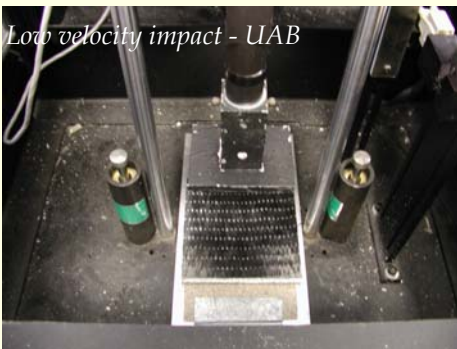
Flexural testing of composites - UAB



Universal testing machine - UAB

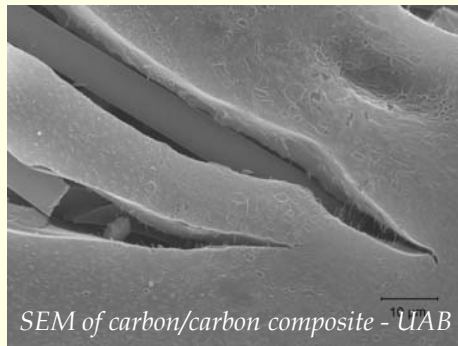


Static indentation of sandwich composites - UAB



Low velocity impact - UAB

Scanning Electron Microscope



SEM of carbon/carbon composite - UAB

JEOL JSM 5800 Scanning Electron Microscope

- Interface characterization
- Failure analysis
- Failure modes
- Material microstructure analysis

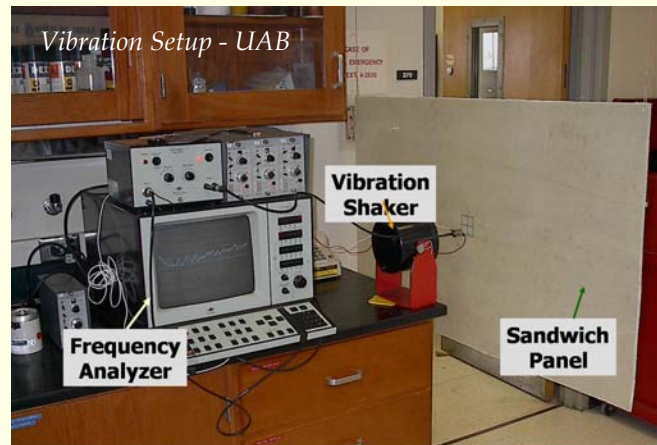
Instrumented Drop Tower Impact

Low velocity impact testing, replicates debris impact

- Energy-Time, Load-Deflection, Absorbed Energy
- Contact analysis, Indentor influence
- Rebound arrestors to prevent multiple impacts

Vibration Testing

Bending and torsional vibration excitation of large structural composite panels used in boats, buildings, aircraft and vehicles. Frequency, Damping Ratio, Mode Shape Determination



Vibration Setup - UAB

Vibration Shaker

Frequency Analyzer

Sandwich Panel



Spectroscopic Thermal Analysis & Characterization



TA DSC Q100 - UAB

- Bruker 400 MHz Fourier Transform Nuclear Magnetic Spectrometer (FTNMR)
- TA Instruments 2950 Thermal Gravimetric Analyzer
- TA Instruments 2980 Dynamic Mechanical Analyzer
- Nicolet Micro-Raman Spectrometer
- Nano-indenter
- TA Instruments AR2000 Rheometer (acquisition in process)
- TA Instruments Q100 Differential Scanning Calorimeter

Structure Morphological Characterization

- Siemens D-500 X-ray Diffractometer
- Rikert Ultramicrotome
- Vacuum Evaporator

Other Equipment

- Complete microscopy laboratory equipped with cutting edge image acquisition and analysis technology
- Structural frames for large-component testing, flexural, proof loading and buckling
- Environmental exposure chamber for submitting composites to harsh environments
- Ballistic and high velocity impact testing
- Melt Flow Index (MFI) Measuring Device
- Acoustic Impact Nondestructive Evaluation
- Grindosonic – Elastic Modulus Measurement
- Quasar – Ultrasonic NDE / Dynamic Modulus Characterization
- Dispersion mixers for Nanomaterials Research



Proof loading on large components - UAB



Mechanical Testing