Southern Research - 501-c-3, not-for-profit Scientific Research Institute, AL 82,000 ft² facility with 3,000 ft² of Special Access Program Space

Independent materials characterization

Characterize materials and components – realistic environments

- Cryogenic ~10K
- High temperatures 5500°F
- Physical properties
- Mechanical properties
- Dynamic loading
- Multiple load environments
- Modelling
  - Materials, Process, Response
Thermal Vacuum Characterization Chamber

Chamber Specifications

- Large cryopump for rapid sample/article exchange
- Automatic gate valve, roughing to cryopump transition
- Support platform for test article set-up and operation
- Cryogenic, ‘dirty’ vacuum environment.
- 30” internal diameter by 36” length
- LN$_2$ shroud cooled – operating temperature 80K – 100K
- Directional radiant heating to >1700 °C
- Large ΔT gradient possible >1400 °C
- Working vacuum (~1x10$^{-6}$ Torr)
- Video capture and relay
- Direct strain gauge measurements
- Direct load cell measurements
- WiFi-Bluetooth comms links
Potential Applications
- Simulated hypersonic flight – severe $\Delta T$
- Space simulation testing
- Reliability tests for robotic platforms
- Thermal cycling for day/night transition
- Reliability testing for space sensors
- Life predictions – planetary components
- Regolith measurements
  - dust-resilience
  - tribological
  - dust mitigation
  - locomotion
  - other

Instrumentation/Measurements
- Multiple viewing ports and feed-throughs
- Wired for multiple T and K-type thermo-couples
- External stereo digital image correlation (DIC)
- Other possible instrumentation;
  - Interferometry, spectroscopy,
  - thermal imagery (NIR and WMIR),
  - RF, static charge etc.,