OAK RIDGE NATIONAL LABORATORY

Technical Testing and Analysis Center

The Technical Testing and Analysis Center (TTAC) offers testing of radiological, environmental, and electromagnetic compatibility, and mechanical environments to ensure equipment meets application needs.

TTAC staff set standards-based testing protocols and characterize field environments to establish the technical basis of requirements in radiation environments. Protocol validation testing verifies that requirements can be met in a reasonable amount of time. Testing through TTAC ensures radiological and environmental vulnerabilities and operational limitations are understood and either eliminated or mitigated prior to fielding a device. TTAC can also perform comparisons of commercial-off-the-shelf equipment capabilities, vulnerabilities, and limitations prior to procurement.

Semi-Anechoic Chamber at TTAC

Facilities

Oak Ridge National Laboratory's TTAC is divided into two laboratories where staff perform systematic and repeatable testing for customers both internal and external to the lab.

Research Application

TTAC's capabilities benefit research efforts and prototypes expected to be exposed to environmental, mechanical, radiological, or electromagnetic stressors such as high heat and humidity, extreme cold, mechanical impact, gamma radiation, and radio-frequency (RF) interference. TTAC can identify susceptibility to these effects in products applicable to many research areas, including electrical systems and electronics, building technologies, and transportation.

Capabilities and Experience

TTAC has a broad range of capabilities for simulating the following environmental conditions that can span 24-hour cycles, if necessary:

- Temperature
- Humidity
- Air pressure (altitude)
- Dust
- Moisture
- RF immunity
- RF emissions
- Line noise
- Voltage variation
- Vibration
- Shock

TTAC has a full-time staff of engineers and technologists with over 25 years of combined experience. Our staff is active in standards development, including contributions to International Electrotechnical Commission (IEC) and Institute of Electrical and Electronics Engineers (IEEE) standards. Additional experts are available when needed.

Accreditation

TTAC is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to the ANSI/IEEE N42 Homeland Security Standards in the radiological, mechanical, environmental, and electromagnetic areas as well as to IEC radiation protection instrumentation standards. The TTAC scope of accreditation, NVLAP Lab Code 200861-0, is available on request or at nist.gov/nvlap.

Customers

- Advanced Fuel Research Inc.
- Advanced Measurement Technology
- Countering Weapons of Mass Destruction Office
- Defense Threat Reduction Agency
- Innovative American Technology
- Kno-Rad Inc.
- Landauer Inc.
- MGP Instruments
- Mirion Technologies Inc.
- Northrup Grumman Information Technology
- Oak Ridge National Laboratory
- Polimaster
- RAE Systems Inc.
- Science Applications International Corp.
- Sensor Technology Engineering
- Teledyne FLIR
- Thermo Fisher Scientific
- Transportation Security Administration
- US Department of Defense
- US Department of Energy
- US Department of Homeland Security

Resources

Environmental Chambers

- Two temperature/humidity chambers
- Operational temperature range of –60°C to +160°C (±2°C)
- Relative humidity controlled from 5% to 98% (±5%)
- Atmospheric pressure evaluations from 760 Torr to 8.28 Torr

Dust

- 162 ft^3 test volume
- Circulates dust (talc) at rate of 560 ft^3/minute

Moisture

- Ingress Protection (IP) 53/54 shower nozzle
- IP 55 and 56 water jets

Salt spray/fog

- Test volume of 30 ft^3
- Temperature range up to +50 °C

Radio Frequency

- Gigahertz Transverse Electromagnetic wave cell–DC to 18 GHz
- Semi-anechoic chamber–26 MHz to 18 GHz

Magnetic Fields

- 10 gauss DC and 1.3 gauss AC

Electrostatic Discharge

- Air discharge (up to 15 kV) or contact/current injection (up to 8 kV)

Power Line Test Systems

- Frequency source
- Voltage source
- ECAT pulsed-EMI test system

Ionizing Radiation

- Gamma
- Beta
- Alpha
- Neutron
- X-ray
- Special nuclear materials
- Moderators/shielding
- Phantoms

Vibration Systems

- Sine and random vibrations from small packages to 1,600 lb
- Maximum output force from 100 lb to 14,109 lb
- Frequency range from DC to 7 kHz
- Maximum acceleration of 26.8 g to 100 g
- Maximum velocity from 70 in./s to 70.8 in./s
- Displacement from 0.5 in. to 2.5 in., peak-to-peak

Additional vibration capabilities at the National Transportation Research Center include a floor-mounted system capable of sine and random vibrations of specimens weighing as much as 2,500 lb.

Linear Motion System

- Controlled linear movements at speeds up to 5.5 mph to characterize response of devices that measure or detect movement

Specialized Testing

- Microphonics/impact
- Acoustic measurements
- Ambient light

Type of Components and Systems Tested by TTAC

- Electronics
- Backpacks
- Handheld instruments
- Portal monitors
- Sensors
- Containers
- Personal radiation detectors
- Cameras
- Radionuclide identifiers
- Transportable radiation detectors
- Neutron counters
- Ion chambers
- Dosimeters and readers
- Electromechanical wheel
- Spreader bar
- Tamper-indicating devices and enclosures

CONTACT

Christina D. Forrester
TTAC Program Lead

forrestercd@ornl.gov
865-241-5519

One Bethel Valley Road,
Oak Ridge, TN 37830

ornl.gov/ttac

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