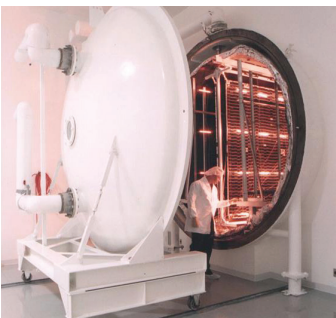


NTS MARKET SPOTLIGHT

# AEROSPACE AND SPACE



Contamination analysis and leakage tests are critical to space programs



1500 cubic foot thermal vacuum chamber

## ENGINEERING AND EVALUATION

NTS' advanced test capabilities have allowed our participation in every major space project since the inception of manned space exploration. NTS performs research and development, testing and system evaluations on a wide range of aircraft, vehicles, systems and components. Test capabilities include dynamic response, acoustic intensity and modal analysis on aircraft structures and systems; evaluation of electronic and hydraulic systems for advanced aircraft and vehicles; severe environment and hazardous flow tests.

## EXTREME ENVIRONMENTAL SIMULATION

NTS leads the industry in testing associated with space vehicles, hardware, and satellite technology. For fuel cells, solar panels, composite antennas, batteries and various mechanical and electronic devices, NTS can design and develop custom chambers and fixtures to conduct a complete range of space related phenomena. Capabilities include: vacuum, space simulation, vibration, shock, acoustic noise, acceleration, structural, pressure, helium leak and EMC. Climatic and space simulation with combined environments of temperature, altitude and humidity. Thermal vacuum chambers provide temperature extremes from -320°F to 1000°F, with combined ambient pressures of  $1 \times 10^{-8}$  TORR. Salt/fog, Sulfur Dioxide, and Copper Chloride chambers are sized up to 6' x 10' x 8'. Explosive atmosphere chambers simulate 100,000 feet and temperatures to -320°F.

## PRECISION CLEANING

NTS has extensive capabilities in the precision cleaning of component parts, assemblies, piping, pressure vessels, heat exchangers and an array of other space hardware. Other processes include pickle and passivation, deoxidation, cryogenic testing, helium leak testing, pressure testing, vacuum bake-out, and many other ancillary specialized services. NTS services range from commercial oxygen cleaning to ultra high purity processing, including analysis for particles and non-volatile residue on virtually any material including stainless steel, aluminium, titanium, beryllium and modern composites. NTS also provides specialized packaging of cleaned and tested hardware.

## ABOUT NTS

As one of the largest commercial test laboratory networks in North America, NTS offers test, inspection and certification services for environmental, dynamics, EMC, wireless, product safety, materials, ballistics and much more. Our client partners rely on NTS to bring quality products to market quickly and efficiently, and so can you.



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## HIGHLIGHTS AND PRIMARY SPECIFICATIONS

### Vibration

- Range: Small (100 force pounds) to Large (dual shaker 70,000 force pounds)
- Type: Sine, Random, Classical Shock, External Pulse, Sine on Sine, Sine on Random, Random on Random, Tear Drop Sine Pulse, Transient Capture
- Displacement: Up to 1 3/4" electrodynamic and 15" hydraulic
- Instrumentation: Accelerometers, force transducers and strain gauges.
- Data Capture: 96 channels active, unlimited with digital tape deck.
- Seismic system with 10.5 inch stroke, 14,000 force-lb, DC to 500 Hertz

### Acceleration

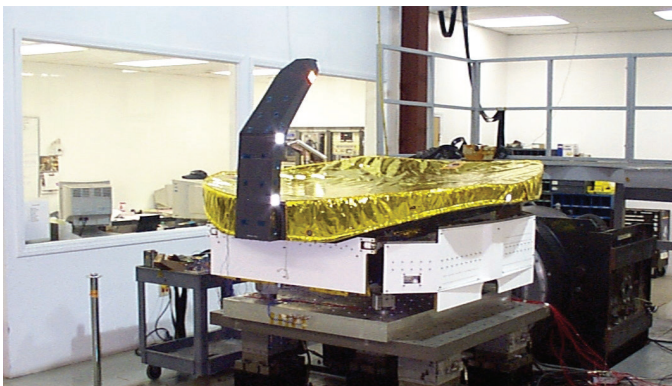
- Acceleration up to 750 g's, from 2 to 25 foot radius, 200 channels of slip rings
- Centrifuge load capacity up to 5,000 lbs

### Pyro Technical and Mechanical Shock

- Simulated pyro shock (hammer and beam) to 6,000 g's
- Metal to metal impact
- True ordnance
- Drop tower 120 g's at 11 ms
- Shaker Shock UD R24 high velocity 2" displacement

### Acoustic Noise

- Progressive wave, reverberant chambers: emission measurements or high level noise



Cloudsat Spacecraft Radar Antenna undergoes Force Limited Vibration Testing

### Acoustic Noise Continued

- 3 Reverberation Chambers: 90, 126, 5000 cubic feet, sound levels to 165 dB
- 3 Progressive Wave Tubes, Greater than 174 dB using progressive wave tube
- Primary specifications
  - » MIL-STD-810, MIL-STD-740
  - » MIL-STD-1540
  - » Custom

### Thermal Vacuum

- Size: Small (12" diameter) to Large (10' diameter, 12' long)
- Temperature Ranges: -170°C to +375°C, Pressure range to below: 1e-7 Torr
- Up to 300 channels mixed (voltage, thermal couple, RTD, strain, resistance, current)
- Analysis: TQCM, CQCM and RGA available
- Pumping system: Roughing: Oil free or oil with molecular trap. High Vacuum: Turbo molecular or cryogenic.

### Ambient Pressure Cycling

- Size: Small (1 cu. ft.) to Large (4100 cu. ft.) Temperature Range: -185°C to +250°C
- Ramp/transition rate up to +/-125°C per minute (controlled not temperature shock)
- Dew Point: Measured to below -50°C (maximum)
- Oxygen content: Measured to less than 5 parts per million
- Up to 300 channels mixed (voltage, thermal couple, RTD, strain, resistance, current)

### Explosive Decompression & Explosive Atmosphere

- MIL-STD-810 compliant (less than 100 milliseconds)
- Up to 6' diameter 20' long, MIL-STD and RTCA/DO-160 compliant

### Helium Leak, Proof Pressure, Cryogenic Proof

- External Pressure to 50,000 PSI hydrostatic
- Internal Pressure to 50,000 PSI hydrostatic to 20,000 PSI pneumatic
- Ultra Test Helium Leak Test Rate 1 x 10<sup>-5</sup> to 1 x 10<sup>-10</sup> scc/sec
- Rupture and Burst Test

