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WE ENGINEER SUCCESS

Huntsville- Aerospace Testing & Engineering Services

7800 Highway 20 West
Huntsville, AL 35806

Facility Overview

Huntsville Facility Overview

Site:	92 Acres
Total Square Footage:	160,000 sq. ft. of Laboratory Space
Employees (Full-time/Part-time):	200

Facility Highlights

- More than 50 chambers, up to 55’x37’x15’ EMI, up to 32’x18’x18’ Environmental
- Radioactive Material License from the State of Alabama
- Huntsville has a DoD Secret Security Clearance and is a NSA ComSec cleared facility
- On-site engineering, fabrication and calibration capabilities
- Wide range of electrical power loads, cryogenic fluids, high pressure/high volume steam

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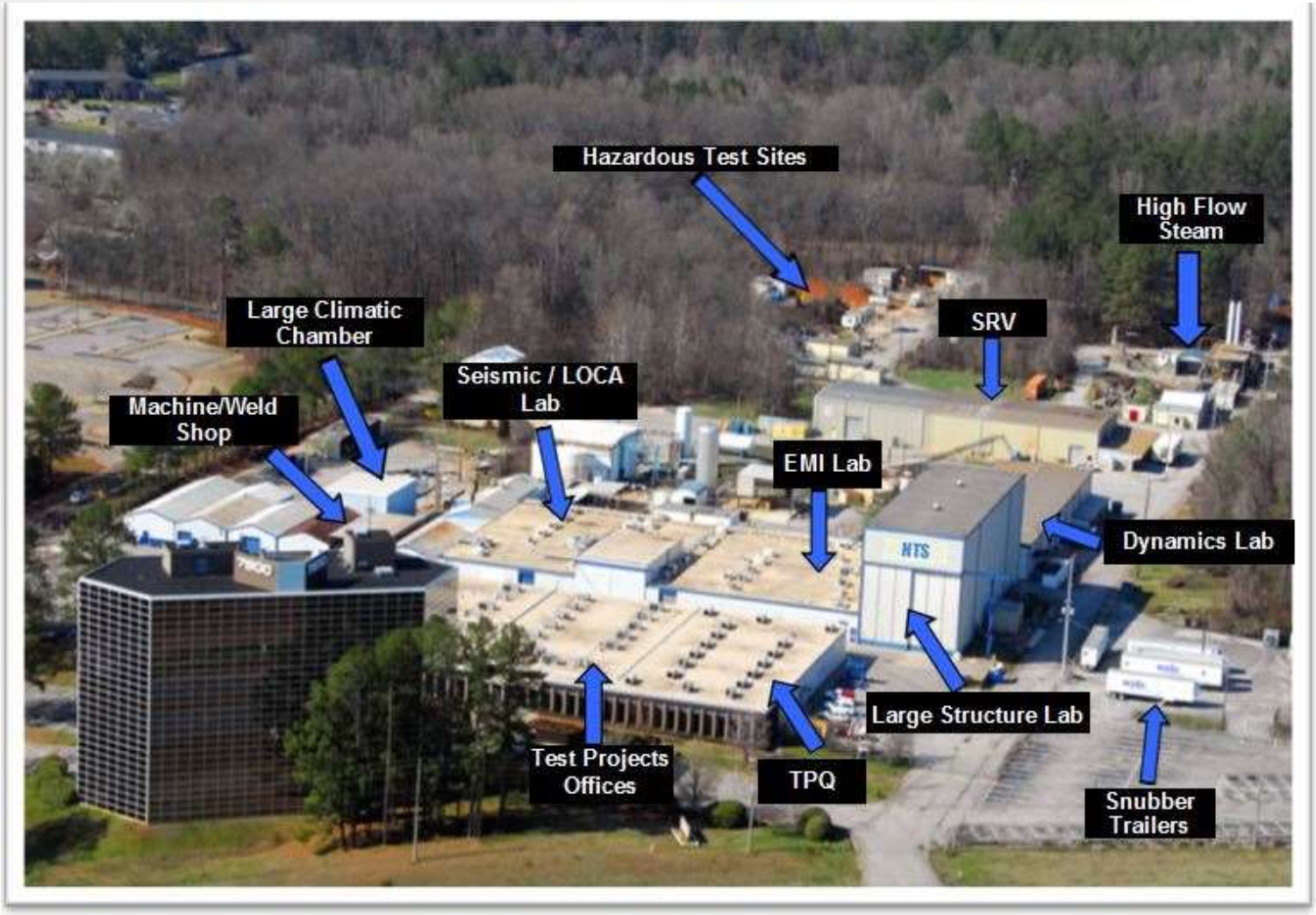
Facility Map



Organization Overview

Huntsville Employees by Occupation (as of January 2014)		
	# of Employees	Average Tenure
Management	14	17 yrs
Engineers, Analysts, Designers	58	12 yrs
Technicians / Snubber Field Technicians	89	9 yrs
Maintenance & Support	19	12 yrs
Environmental Health, Safety & Quality	4	13 yrs
Administrative	6	22 yrs
Sales and Business Development	3	10 yrs
Contracts, Purchasing, HR, Other	7	17 yrs
Total	200	12 yrs

Dynamics Lab; Vibration, Shock, Structural Load

Aerospace/Defense Capability Overview

Huntsville offers a diverse array of testing services to the Aerospace / Defense markets that can be customized to match even the most extreme operating conditions including:

- Over 50 environmental/simulation chambers
- Structural test facilities
- Drive-in size combined environment chambers
- Expert work in strain gauge accelerometer placement

Capability Overview

Dynamics	Structural	Climatics	Fluid Flow	EMI/EMC	Acoustics	Voting/HIT Systems
Vibration	Static	Temperature	Air	Electro-magnetic Testing:	High Intensity Sound	Certification
Classical Shock	Compliance	Humidity	Water	Interference	Special Test Equipment	EMI/EMC
Acceleration	Dynamic	Altitude	Hydraulics	Compatibility		Audits
Pyrotechnic Shock		Solar	Pneumatics			Usability
		Sand/Dust	Fuels			Software Validation & Verification
		Salt Fog	Steam			Environmental
		Rain	Cryogenics			Vibration
		Wind				
		Explosive Atmosphere				
		Fungus				

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Dynamic Testing

Electrodynamics

Seismic

Vibration Systems

- **Electrodynamic**
  - **3,000 Hz @ 150g Maximum**
  - **36,000 Force-lbs.**
  - **2-Inch Displacement**
  - **Developed Triaxial System for the US Army (installed and commissioned at base)**
- **Electrohydraulic**
  - **100 Hz @ up to 30g and 80 ips Velocity**
  - **18” Displacement Maximum**
  - **20 ft. x 18 ft. (Biaxial)**
  - **9 ft. x 9 ft (Triaxial)**
  - **Payloads up to 60,000 lbs.**

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Shock Testing

- Parallel Pendulum
  - Half Sine, Terminal Sawtooth, Square Wave
  - 100g Maximum Amplitude
  - 60 ms Envelope
  - 8’ x 8’ Specimen Footprint
- Shock Synthesis
- Pyroshock
  - Ordnance to 50 kg and 20,000 Hz
  - Electrodynamic to 2 kg and 10,000 Hz
- Drop & Pre-Accelerated Drop
  - Half Sine, Terminal Sawtooth, Square Wave
  - 3,000g Amplitude
  - 100 ms Envelope
  - 4’ x 4’ Specimen
- MIL-S-901D Lightweight High Impact Shock

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Other Dynamic Capabilities

Acoustic Test

Large Centrifuge

High Intensity Acoustic Noise

- Chambers up to 10’ x 14’ x 17‘
  - 1,500 ft^3 Reverberant Wave
  - 157 dB Overall Sound Pressure Level
  - 20 to 10,000 Hz
- Progressive Wave
  - 173 dB Overall Sound Pressure Level
  - 20 to 10,000 Hz
- **Acceleration**
  - Centrifuges to 22’ radius
  - Payload 3000 lbs.

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Climatic Testing

- Temperature -300°F to 1000°F
- Temp/Humidity: 35°F to 185°F, RH to 98%
- Temp/Alt/Humidity: to -100°F to 350°F, 100,000 ft.
- Temp Cycling: -300°F to 1000° F
- Sand up to 100 mph and Dust up to 40 mph at 200°F
- Salt Fog: to 95°F, up to 20% concentration
- Wind & Rain: up to 100 mph and 30 in/hour
- Fungus Chambers: 86°F, 90 to 95% RH
- Vacuum to 10^{-6} Torr, -300°F cold plate to 300°F infrared heat
- Explosive Atmosphere: to 55,000 ft. and 160°F

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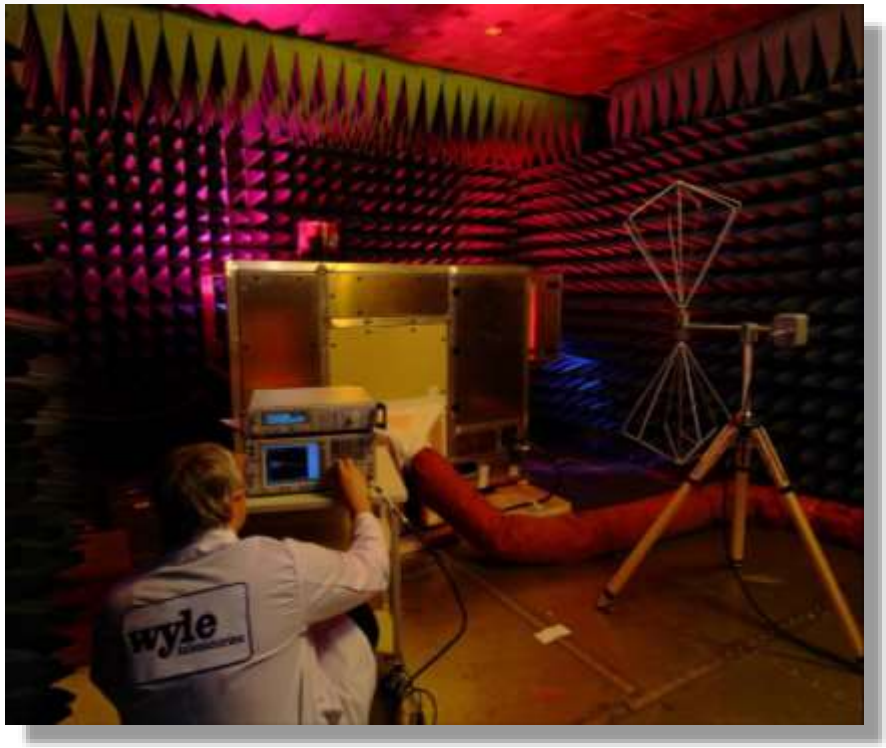
EMI Testing

- 4 EMI Chambers
- Emissions Testing to 44 GHz
- Susceptibility Testing to 18 GHz @ 200 volts/meter
- Screen Rooms for large items/vehicles
  - Overall Dimensions - L x W x H (feet)
    - 24 x 12 x 10
    - 18 x 18 x 10
    - 24 x 18 x 10
    - 60 x 40 x 17
- MIL-STD-461, MIL-STD-464 EMI Testing
- Power Quality Testing
- Nuclear Power Industry EMI Testing per EPRI TR-102323 and NRG 1.180
- Multiple Power Sources at Various Voltages and Frequencies
- Special R&D Daily Rates



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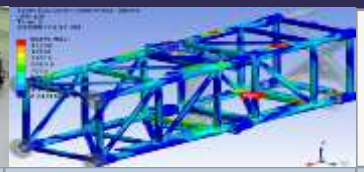
Engineering Overview

Integrated Test Systems & Facilities Overview				
				
Dynamic Systems	**Analysis**	**Software Development**	**Test Facilities**	**Acoustics**
Vibration Shock Acceleration Seismic	Finite Element Analysis Computational Fluid Dynamics MATLAB/ SIMULINK Signal Processing	ISO/IEC12207 National Instruments LabVIEW PLCs and Motor Controllers Real-time Data Acquisition and Controls UNIX/Windows environments Real-time C/C++ Flight Simulators Control Consoles	Design of support systems (cryogenic, gas, fluids, power) Reaction masses Systems Engineering System safety Repurpose and upgrade existing facilities New facilities	Reverberant Acoustic Test Chambers Chamber Safety Systems

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