The Space Dynamics Laboratory (SDL) offers a full complement of space qualification services. Drawing on a 60-year heritage of instrumentation designed, built, and tested for space and upper atmospheric environments, SDL has the facilities and trained personnel for space simulation testing, contamination control services, and materials analysis.

**FACILITIES INCLUDE**
- Space simulation laboratory
- Environmental test facilities
- Precision cleaning laboratory
- 100 ft-long optical cleanroom
- ISO-5 cleanrooms
- ISO-7 integration high bay with ISO-5 tents
- Cold-wall (LN₂) thermal vacuum chambers
- Lifetime testing
- Thermal cycling
- Analytical chemistry & microscopy laboratories (cleanliness certifications)

**SPACE QUALIFICATION TESTING**

**EMI/EMC**
SDL’s radio frequency-shielded semi-anechoic chamber is available for emissions and susceptibility (EMI/EMC) testing of various electronic hardware and instruments per the MIL-STD-461E standard.

**CHARACTERISTICS**
- Anechoic chamber
- 15’ x 11’ working space

**TEST CAPABILITIES (MIL-STD SPECIFICATIONS)**
- Conducted emissions
- Conducted susceptibility
- Radiated emissions
- Radiated susceptibility

**THERMAL VACUUM**
Thermal vacuum testing verifies spacecraft performance through environmental extremes in a simulated space environment. This is one of the most important environmental tests to perform for mitigating risks.
- Up to 8’ diameter chambers
- Automated control with safety interlocks
- Data acquisition systems
- -269° C to 150° C temperature range
- Outgassing diagnostic (RGA, QCM, scavenger plates)
- Special test chambers
  - Ultra-high vacuum
  - Ion & neutral beam sources
  - Ion optics test facility

**VIBRATION**
SDL uses a UDC R24 vibration test system designed to provide reliable performance for medium- and high-force applications. The system is controlled by the m+p VibRunner control and analysis workstation. This powerful vibration and shock controller is configurable for the advanced control and analysis required for engineering development.
- Sine-burst, force-limiting & signal analysis
- Sine: 13,000 lbf (58 kN) pk
- Random: 12,500 lbf (56 kN) rms
- Classical shock: 25,000 lbf (111 kN) pk
- 5,000 lbs rating
- Slip table for three-axis testing of large-volume payloads
CONTAMINATION CONTROL
SDL leads the industry in the application of contamination control theory and practice to the development of high-performance electro-optical sensors. Pre-launch and on-orbit cleanliness requirements are derived from sensor performance goals and are implemented using state-of-the-art laboratory facilities.

A preventive approach to controlling contamination entails planning and implementation throughout all project phases. Effective contamination control begins at the study phase and continues through design, manufacture, integration, test, launch, and on-orbit operations to meet end-of-life performance requirements.

MODELING
- Spectral response
- Particulate fallout
- On-orbit degradation
- Spacecraft charging

MATERIALS CHARACTERIZATION
- ASTM E595 (%TML, %CVM & %WVR)
- ASTM E1559 (outgassing kinetics)
- Thermal gravimetric analysis
- X-ray fluorescence screening
- Optical microscopy with digital image analysis

CLEANLINESS CERTIFICATIONS
- ISO 14644-1 (cleanrooms)
- IEST-STD-CC1246 (sample analyses)
- Outgassing & offgassing analyses
  - Quartz crystal microbalances
  - Infrared spectroscopy

NANOSAT OPERATION VERIFICATION & ASSESSMENT (NOVA) TEST FACILITY
Proper testing reduces preflight risk and verifies requirements before flight. SDL's small satellite experts use the advanced NOVA test facility to characterize and verify satellite system and subsystem performance. NOVA augments SDL's environmental testing and calibration facilities to enable comprehensive small satellite testing.