



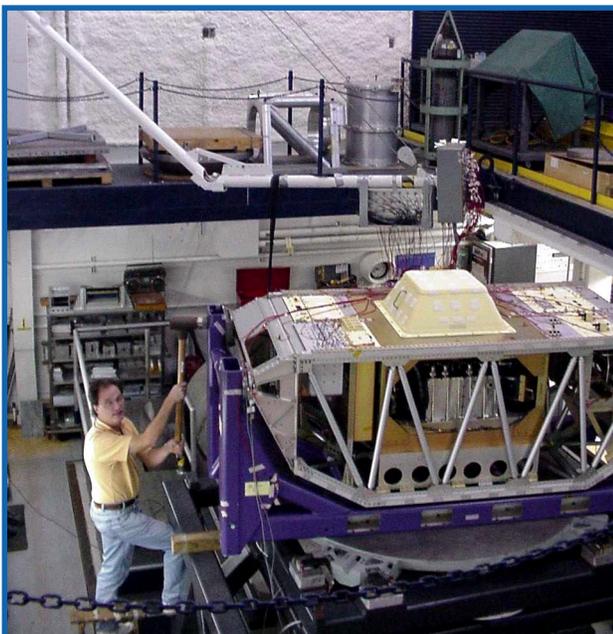
Structural Dynamics Laboratory (SDL)

Technology

The Structural Dynamics Laboratory (SDL) at NASA Glenn Research Center performs tests to verify the survivability of a component or assembly when exposed to vibration stress screening or a controlled simulation of the actual flight or service vibration environment.

Benefits

- Saves money by uncovering design or construction weakness in a laboratory environment before actual use of the article.
- Examination of article response is more accurate than would be possible in the use environment (especially crucial with "one-of-a-kind" systems).
- Customers in need of measurement capabilities from 1×10^{-7} g's up several hundreds of g's depending on test article weight.



Structural Dynamics Laboratory, NASA Glenn Research Center

- Payload developers in need of additional microgravity emissions testing will meet all of their testing needs in one facility at GRC.

Commercial Applications

- Aircraft or space flight qualifications of electrical components or structural system
- Automotive and marine component testing
- Uses in industries where vibration response is considered critical

Technology Description

SDL combines an expert engineering staff, modern test facilities, extensive computer systems, and advanced software to provide vibration problem solving capabilities.

The dynamic environment of the laboratory offers turn-key test services to those programs and facilities requiring vibration test or measurement. Services offered include:

- Vibration tests: random, shock, modal, sine, and fatigue
- Requirements definition and planning
- Fixture design and fabrication
- Test operations
- Data acquisition, interpretation, and analysis
- Test documentation and reports

Vibration tests are employed to ensure the suitability of structural hardware for its intended use. Suitability is established with respect to at least one of the following three criteria: 1) structural integrity, 2) adequate functional performance and 3) workmanship quality assurance.

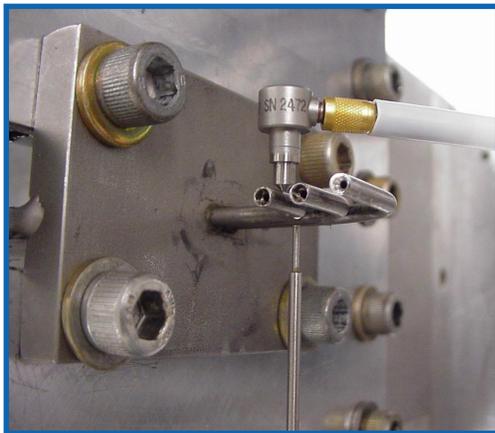
Many programs require vibration testing of structural systems to be considered flight qualified. Project verification documents indicate the test vibration requirements and levels. SDL can assist in developing these requirements. Currently, SDL flight

qualifies hardware for the space shuttle, launch vehicles, the International Space Station and wind tunnel environments.

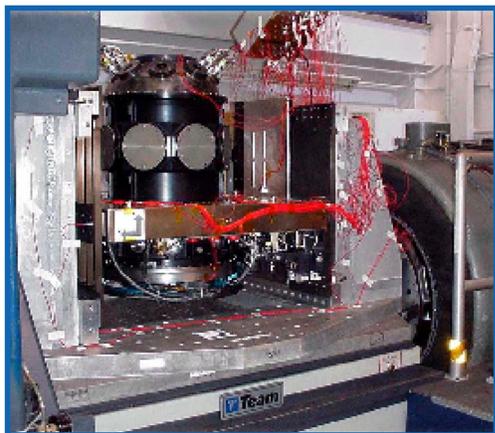
The electro-dynamic shakers in SDL are capable of providing 40,000 lbf sine and 35,000 lbf random testing. SDL can acquire up to 160 channels of accelerometry, and has performed more than 100 vibration tests per year.

The vibration testing service can support all phases of the hardware development process, including:

- Engineering evaluation
- Design qualification
- Service hardware acceptance
- Verification and certification of flight hardware



Non-contact displacement measurement of a total pressure rake via an optical probe. Excitation source is the instrumented hammer on top.



Random vibration testing of Fluids and Combustion Facility (FCF) optics bench with combustion chamber in place, on MB Dynamics C-220 shaker.

Contact

Technology Transfer & Partnership Office
NASA John H. Glenn Research Center
at Lewis Field
Mail Stop 4-2
Cleveland, OH 44135-3191
Phone: 216-433-3484
Fax: 216-433-5012
E-mail: cto@grc.nasa.gov
<http://technology.grc.nasa.gov>

References

www.grc.nasa.gov/WWW/Facilities/int/sdl/

Key Words

Flight acceptance
Flight qualification
Quality assurance
Structural dynamics laboratory
Structural integrity
Vibration testing



Tap-testing of instrumentation rake for vibration response.