



VIBRATION TESTING OF SMALL SATELLITES

Course Overview

This new course provides a tutorial, practical guidance, examples, and recommendations for testing a small satellite on an electrodynamic shaker. Addressed are sine-burst testing, random vibration testing, and low-level diagnostic sine sweeps. Notching, response limiting, and force limiting are addressed in detail, with examples. The course is primarily aimed at satellites in the 50 – 500 lb (23 – 230 kg) range, but it also applies to CubeSats. Most of the guidance applies to larger satellites as well if they will be tested on a shaker.

The objectives of this course are to improve your understanding of how to ...

- establish an effective vibration test program
- identify and clearly state test objectives
- design (or recognize) a test that satisfies the identified objectives while minimizing risk of an over test
- establish pass/fail criteria and interpret test data
- write effective test plans and reports

Target Audience

All engineers & managers involved in ensuring small spacecraft can withstand launch environments

Course Length

12 hours (16-hour version also available, with additional course material and class problems)

Course Developer & Teacher



Tom Sarafin is President and Chief Engineer of Instar Engineering and Consulting, Inc. He has worked full time in the space industry since 1979 as a structural engineer, a mechanical systems engineer, a project manager, and a consultant. Since founding Instar in 1993, he's consulted for NASA, DARPA, the DOD Space Test Program, Lockheed Martin, DigitalGlobe, Space Systems/Loral, Spaceflight Industries, and other organizations. He was a key member of the team that developed NASA-STD-5020, "Requirements for Threaded Fastening Systems in Spaceflight Hardware" (March 2012). He is the editor and principal author of *Spacecraft Structures and Mechanisms: From Concept to Launch* and is a contributing author to *Space Mission Analysis and Design*. He's also the principal author of a series of papers titled "Vibration Testing of Small Satellites." Since 1995, he has taught over 250 courses to more than 5000 engineers and managers in the aerospace industry.

Instar also offers the following courses: "Ten Principles for Successful Space Programs" (TenP), "Engineering for Success in the Space Industry" (ESSI), "Space Mission Structures, From Concept to Launch" (SMS), "Structural Test Design and Interpretation" (STD I), "Design and Analysis of Bolted Joints" (DABJ), and "Vibration Testing on an Electrodynamic Shaker" (VTES).

Go to http://instarengineering.com/available_courses.html for details.

Testimonials:

TenP: "Great presentation of how the culture of a space program should be developed."

ESSI: "I might have been able to save NASA millions of dollars if I had taken this course a year ago."

SMS: "I wish I had taken this class 20 years ago. Possibly the best course I've ever taken."

STD I: "Tom Sarafin's courses never disappoint. This class offers a well-balanced blend of fundamentals, examples, and lessons learned that any aerospace engineer involved in structural test design and interpretation would benefit from."

DABJ: "Great course! Lots of lessons learned. The examples made it that much better."

