Engineering for Success in the Space Industry

A practical short course for beginning aerospace engineers!

Course Overview: This 5-day course explains the process of designing and developing a spacecraft, with emphasis on mechanical aspects, and provides valuable insight into what is expected of a new engineer on a space program. Several group team exercises are included. The course introduces and explores nine principles for effective engineering in the space industry:

1. Never stop learning: Don't become too specialized
2. Adopt the right attitude: Take responsibility for quality
3. Allow others to have ownership of their products
4. Constantly strive to improve teamwork and communication
5. Follow a sound engineering approach
6. Keep everything as simple as possible
7. Reduce risk with an effective quality system
8. Be willing to accept risks, but only those you and the other stakeholders understand
9. Don't let the fire go out!

Objectives: Help engineers new to the space industry …

- understand what it takes to design, build, and test a spacecraft that works, given the unique challenges of the space industry.
- understand how developing a spacecraft within budget and schedule requires not only good engineering, but also effective teamwork and communication.
- learn important lessons from multiple case histories.

Target Audience: Engineers (and soon-to-be engineers) new to the space industry.
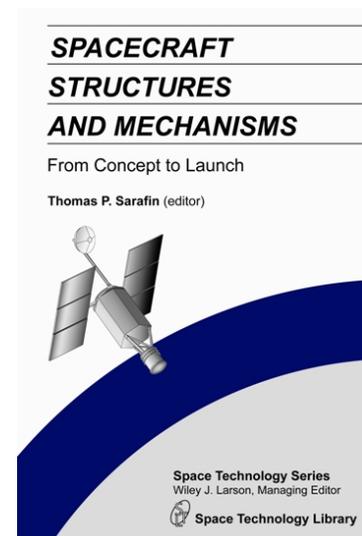
Course Topics (subject to revision)

Introduction
1. Overview of Space Missions and Spacecraft
2. Why Are Space Missions So Challenging?
3. Eight Principles for Effective Engineering in the Space Industry
4. Understanding Requirements and Verification
5. Launch and Space Environments
6. The System Development Process
7. Requirements Development
8. Configuring a Spacecraft
9. Structures
10. Designing for Producibility
11. Verification Planning
12. Teamwork and Communication
13. Managing Risk with a Quality System
14. Responsibly Accepting Risk
15. Don't Let the Fire Go Out!
Summary

Each participant will receive a copy of the instructors' 850-page reference book!

SPACECRAFT STRUCTURES AND MECHANISMS
From Concept to Launch
Thomas P. Sarafin (editor)

Space Technology Series
Wiley J. Larson, Managing Editor
Space Technology Library

Engineering for Success in the Space Industry

Course Developers and Teachers:

Tom Sarafin is President and Chief Engineer for Instar Engineering. He has worked full time in the space industry since 1979. He worked over 13 years at Martin Marietta Astronautics, where he contributed to and led activities in structural analysis, design, and test, mostly for large spacecraft. Since founding Instar in 1993, he's consulted for NASA, DigitalGlobe, Lockheed Martin, Comtech AeroAstro, Design Net Engineering, and other organizations. He's helped the U. S. Air Force Academy design, develop, and verify a series of small satellites and has been an advisor to DARPA. He is the editor and principal author of the book *Spacecraft Structures and Mechanisms: From Concept to Launch* and is a contributing author to *Space Mission Analysis and Design*. Since 1995, he's taught nearly 200 courses to more than 4000 engineers and managers in the space industry.

Poti Doukas is Vice President and a Senior Consultant at Instar Engineering. He worked at Lockheed Martin Space Systems Company (formerly Martin Marietta Astronautics) from 1978 to 2006. He served as Engineering Manager for the Phoenix Mars Lander program, Mechanical Engineering Lead for the Genesis mission, Structures and Mechanisms Subsystem Lead for the Stardust program, and Structural Analysis Lead for the Mars Global Surveyor. Since joining Instar Engineering in 2006, he has consulted for Lockheed Martin, the U. S. Air Force Academy, Comtech AeroAstro, Design Net Engineering, NASA, and other organizations. He's a contributing author to *Space Mission Analysis and Design* and *Spacecraft Structures and Mechanisms: From Concept to Launch*.

Course Length: Five full days

Testimonials from Engineers Who Have Taken Instar's Related Courses

"Every part of the course was insightful."   " 'Must take' course for all disciplines."

"Great course! I am highly recommending it to others."

"This course does a good job of relaying that no process is going to work unless the people implementing it take pride and ownership in making it work."

"Make everyone at (my company) take this! This is a great course!"

"The instructor has tremendous knowledge and conveys his points in a way that makes you want to pay attention."

"Excellent presentation—a reminder of how much fun engineering can be."

"An excellent course. It gave me a lot to think about."   "Good stuff, and a very clear presentation."

"Very valuable. Relates classroom knowledge to actual experiences in the space industry."

"Great course!"—Retired Chief Engineer who previously helped develop the Saturn family of launch vehicles

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