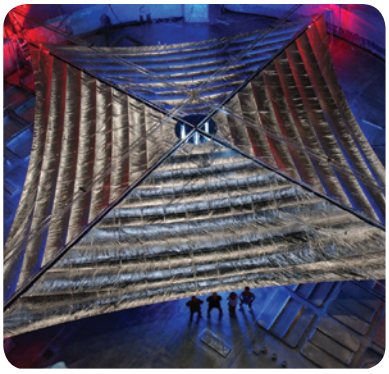
National Aeronautics and Space Administration

NASA GLENN RESEARCH CENTER:
THE SPACE POWER FACILITY

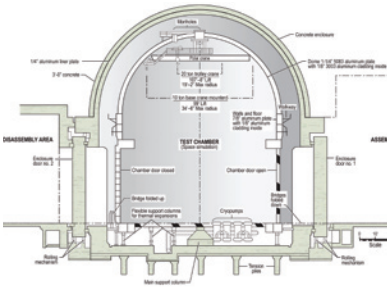
A Part of NASA's Strategic Capabilities Assets Program



Deployment testing of the 20-meter L'Garde Solar Sail in SPF vacuum chamber

The Space Power Facility (SPF) is the world's largest space simulation chamber. Measuring 100 feet in diameter by 122 feet high, it is capable of performing full-scale spacecraft integrated environmental tests. The SPF performs a wide variety of tests for the verification and qualification of spaceflight systems. Examples include deep space and low-Earth orbit thermal vacuum testing, rocket fairing separation testing, planetary landing system performance testing, structure deployment testing, and aerodynamic deployment testing. The facility is also ideally suited for terrestrial surface environment simulation testing.

The SPF vacuum chamber utilizes mechanical blowers, turbomolecular pumps, and cryopumps to reach high-vacuum pressures of 10^{-6} Torr in approximately eight hours. The facility includes contamination-monitoring instruments and LN_2 scavenger plates to assure a clean test environment.



Cross-section of the SPF vacuum chamber

FACILITY BENEFITS

- Chamber size permits full-scale integrated vehicle testing with excellent accessibility
- Large high bays are adjacent to the test chamber for test hardware processing
- Variable geometry cryogenic shroud system can be tailored to specific tests
- Staffed by experienced mechanical and electrical engineers and technicians
- Data system incorporates the latest technology in a flexible, modular configuration to satisfy the most demanding test configurations that are capable of acquiring DC and transient data
- Vacuum chamber penetrations permit various instrumentation and power transfers
- Chamber load-points permit the use of large, heavy test articles, and/or ground-support equipment

FACILITY APPLICATIONS

- Launch vehicle, upper stage, and payload fairing testing
- Mars entry, descent, and landing system testing
- Terrestrial surface environment simulations
- On-orbit environment simulation with deep space cooling and solar heat flux
- Supports extremely diverse groups of customers, including NASA, DOD, private industry, universities, and foreign government agencies

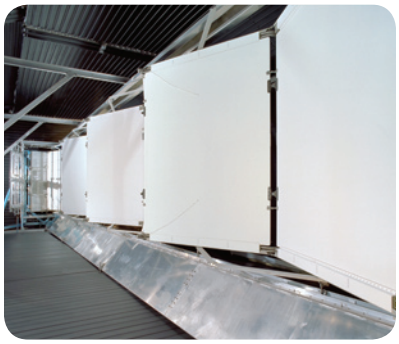
U.S. Army parachute deployment testing with photogrammetric targets

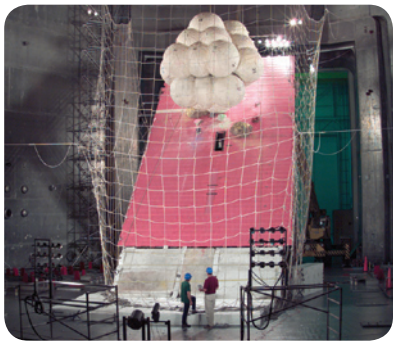
DATA ACQUISITION AND PROCESSING

Channel count	1024 channels @ max bandwidth
Analog bandwidth	DC to 20 KHz
Monitoring	Real-time display and analysis
Signal conditioning instrument types	Microphones, thermocouples, strain gages, accelerometers, voltage
Aggregate sampling rate	51,200,000 samples/second maximum
Real-time analysis	Power Spectral Density (PSD), spectrum average analysis, octave analysis, time history, FFT, oscilloscope mode, RMS, peak-peak results, alarming/limiting individual channels, plotting

CHARACTERISTICS

Vacuum chamber size	100 feet in diameter x 122 feet high
Vacuum chamber volume	827,286 cubic feet
Pressure	740 Torr to 10^{-6} Torr
Coldwall temperature	+70 F to -250 F
Heat flux simulation	7 megawatt power input maximum
Chamber access	50 feet x 50 feet





CONTACT INFORMATION

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