National Aeronautics and Space Administration



Power Systems

Johnson Space Center (JSC) provides test facilities and skilled personnel for many of the fluid and energy conversion systems required for human exploration and development in space, including power generation and storage, fluid storage and distribution, and electromechanical and hydraulic actuation. Test capabilities include battery performance, abuse and life-cycle, power distribution system, fuel cell, high voltage and corona detection, connector and wire, and power quality. JSC is actively engaged in the development and demonstration of power system technologies. Expertise is available to support development of power distribution systems, battery power management systems, fuel cell systems, and integrated testing before deployment.

Services Provided

- Battery systems design, test, and analysis
 - Variety of cell chemistries Alkaline, Li-on, NiMH, Pb-Acid
 - Battery performance testing
 - Battery abuse testing
- Power system design and vehicle integration
 - From conceptual to detailed design
- Power systems modeling (SABER)
- Integrated power system verification testing
 - High-fidelity power emulators and load emulators
 - Battery, fuel cell, regulated solar array emulators
 - Active and passive load banks to represent vehicle load conditions
- Off nominal power testing
 - Envelope limit testing of hardware in system level test environment
 - Fault injection scenarios in true off nominal conditions
- Automated power quality testing
 - Rapid regression testing
 - Rapid test development using canned tests
- Fuel cell design, analysis, and test

Battery Performance Testing

Facility	Voltage Range	Temperature Range	
Abuse Chambers	0 – 80 V	-250 – 300 F	

Capabilities

- Multiple systems ranging from low current/voltage to high current/voltage
- Constant voltage, current, and power modes provided
- Long- and short-term cycling
- Determination of optimal charge and discharge rates
- Thermal capacities/vacuum tolerance

Battery Abuse Testing

Facility	Volume	Pressure Range	
2' Chamber	24‴ dia x 36" L	0.1 – 150 psig	

Temperature	Overcharge/Discharge/Short	
Range	Circuit	
Ambient – 500	Ranges up to 600 V and 7,500 A	



Hazardous vibration test stand

Capabilities

- High temperature exposure and heat-to-vent testing
- Over charge and over discharge characterization
- Positive temperature coefficient failure testing
- Short circuit testing
- Crush, drop testing
- Destructive physical analysis
- Vent/burst pressure testing

Facility	Frequency Range	Shaker Size Range	Load Direction	Displacement
Hazardous Vibration Test Stand	20 – 2, 000 Hz	11,000 lb _f RMS Up to 16,000 lb _f sine Up to 15,500 lb _f random	x, y, or z	1" stroke

Fuel Cell Testing

- Two fuel cell test stands with unattended test capability
- Oxygen flow rates up to 8 scfm and hydrogen flow rates up to 16 scfm
- Reactant supply and distribution up to 300 psig
- Programmable DC load banks to dissipate fuel cell power up to 150 kW at up to 100V

Electrical Systems

- Electrical power quality testing of International Space Station loads, payloads, and equipment
- 208 Vac to 120 Vdc power supplies
- 208 Vac to 28 Vdc power supply
- Remote Power Controller Module Emulators
- Impedance Measurement System Electrical loads (DC and electronics)
- Wire arc track testing (dry method using Abrader/wet method using saline drip)

We have developed customer-friendly agreements to streamline business relationships and are eager to share our unique facilities and expertise with new customers. We invite your inquiries regarding application or adaptation of our capabilities to satisfy your special requirements. Briefings on general or specific subjects of mutual interest can be arranged at JSC or at your business site.

Facility Testing Information http://jsceng.nasa.gov

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