



Pyrotechnics

Johnson Space Center (JSC) has a long heritage of providing safe, reliable pyrotechnic solutions for aerospace applications. The Pyrotechnics Test Facility offers testing of pyrotechnically actuated devices and includes the capability to subject hardware to vibration environments encountered during launches and landings. The facility includes explosive loading and handling room and pyrotechnics storage in earth-covered bunkers. The facility provides the unique capability to perform NASA Standard Initiator (NSI) testing at -420°F and is responsible for lot testing and providing the NSIs for all spacecraft applications for NASA.

Services Provided

- Remote test cells for pyrotechnic firings
- X-ray, dimensional inspection, proof pressure and functional testing of pyrotechnic devices and full systems
- Loading of propellants, pressure cartridges, and explosives
- Vibration of hazardous test articles, including pressurized systems and explosive materials
- Non-Linear Finite Element Analysis utilizing LS-DYNA and DYTRAN
 - Detonation and shock wave simulations
 - High explosive modeling
 - Structural analysis
 - Penetration analysis
- Internal ballistic analysis
 - Navy CADPROG ballistic code
 - Fortran codes
- VISAR velocity measurements up to 10,000 meters/second
- High speed digital video up to 4 million frames/second
- Pyrotechnic storage



Hydraulic Loading/Firing

Work Envelope	Orientation	Temperature Range	Unique Features
12" Dia x 3' L	Horizontal	-300 – 350 °F	<ul style="list-style-type: none"> Tensile loads up to 680,000 lb_f Moment loads up to 240,000 in - lb_f

Pyrotechnic Auto Ignition Chamber

Work Envelope	Orientation	Temperature Range	Unique Features
4" Dia x 12' L	Vertical	Ambient – 1,500 °F	Remote operation, programmable ramp rates and hold periods

Thermal Testing

Work Envelope	Temperature Range
2' x 3' x 3'	-100 – 350 °F
20" x 20" x 18"	-100 – 350 °F
34" x 34" x 32"	-100 – 390 °F
22" x 22" x 22"	-100 – 600 °F
1' x 1' x 1'	-100 – 350 °F

High Speed Firing

Temperature Range	Unique Features
-450 – 1,000 °F	<ul style="list-style-type: none"> Piezoelectric pressure transducers Pyroshock accelerometers; 1 GHz data sampling Capacitive discharge, programmable constant current or custom firing sources

Hazardous Vibration Testing

Frequency Range	Shaker Size Range	Load Direction	Displacement
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

Additional Capabilities

Capability	Work Envelope	Unique Features
Detonation velocity measurement	Any	Measures detonation velocity of linear explosive components to 10,000 meters
Lathe for live pyro machining	3" Dia x 8" L for cartridges	<ul style="list-style-type: none"> Linear explosive components of unlimited length Used for device disassembly for failure analysis and facing of linear explosive components for booster cup attachment
Explosive cord cutter	1" Dia x unlimited length	Remote operation
Helium leak detection	3" Dia x 6" L	<ul style="list-style-type: none"> Flow through or bombing method for sealed items Leak rates down to 1×10^{-10} sccs

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>

Point of Contact

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