

Test Laboratory Facilities and Capabilities

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The Test Laboratory at NASA's Marshall Space Flight Center, located inside the boundaries of 40,000 acre Redstone Arsenal military reservation, has over 50 test facilities across 400+ acres, many inside an additional secure, fenced area. About 150 Government and 250 contractor personnel operate test facilities capable of all types of propulsion and structural testing, from small components to engine systems and structural strength/dynamic and environmental testing. We have tremendous engineering expertise in research, evaluation, analysis, design and development, and test of space transportation systems, subsystems, and components.

Major Facilities and Capabilities

Cryo-Structural Facility evaluates the structural integrity of cryogenic tanks with hazardous liquid propellants on board.

Advanced Engine Test Facility is a 1 Mlb thrust LOX/RP-1 and LOX/LH2 test facility.

Advanced Fuels/Laser Ignition facility is a dual-propellant test bed used for comparison testing of hydrocarbon fuels, subscale combustion devices, and new technologies.

Aerodynamic Research Facility is an intermittent tri-sonic blow down tunnel, operating from pressure storage to vacuum or atmospheric exhaust. The test section measures 14x14 inches with interchangeable sections. The transonic section provides for Mach numbers of 0.2-1.3, 1.46, and 1.96. The supersonic section provides for Mach 2.74 - 4.96.

Environmental Test Facility provides thermal vacuum environments for development, qualification, acceptance and research testing of space flight hardware.

Hydrogen Cold Flow is a low-pressure, high-flow-rate (up to 5000 gpm) closed loop cold flow test facility with two 225,000 gallon hydrogen storage tanks.

Inducer Test Loop Facility is a fluid flow facility for conducting suction performance studies of turbopumps.

Materials Environment Test Complex is a Mach 4 combustion-driven wind tunnel, a half million pound uniaxial tension test station, and a thermal acoustic test station.

Nozzle Test Facility is an air flow facility for conducting nozzle performance studies.

Optical Propagation Tunnel Facility is a 330 meter still-air line-of-sight tunnel for testing optical systems, sensors and components.

Pump Test Equipment Facility conducts suction performance studies.

Solid Propulsion Test Facility is a solid propellant hot-fire environment generator for testing solid rocket motors to 100,000 lb thrust vertical, 172,000 lbs horizontal.

Structural Dynamics Test provides experimental data to verify and correlate analytical finite element models of flight hardware and dynamic loads environments for vibration, vibroacoustics, and pyrotechnic shock testing.

Structural Strength Test provides load environments to simulate launch, on orbit, and landing conditions for development, qualification, acceptance and research testing of space flight hardware.

Test Cells (15' x 15' x 10' high) for up to 5000 lb thrust solid and hybrid test articles.

Test Facility 115 evaluates medium-pressure, small-flow-rate engine subsystem components and combustion devices.

Test Facility 116 evaluates high-pressure, medium-flow-rate engine subsystem components and combustion devices to 150,000 lbs thrust.

Test Facility 300 has three vacuum chamber facilities used to conduct hazardous tests using cryogenics and heat loads: a 20' dia x 30' tall vacuum chamber capable of 10^{-8} torr; a 12' dia x 14' long vacuum chamber capable of 10^{-3} torr and 20 BTU/ft²/sec radiant heat load; and a 15' dia x 15' tall vacuum chamber capable of 10^{-3} torr and deep space temperatures.

Test Facility 500 is a multi-position test facility for liquid and hybrid systems, as well as bearing materials/seal testing, and cryogenic system component cold flow tests.

Turbine Test Equipment Facility (TTE) air flow facility for conducting performance studies of turbine hardware.

Test Lab also has a **Special Test Equipment Design** branch capable of designing fire suppression systems, lab equipment, mechanisms, piping systems, pressure vessels, structures, tooling, and transportation/handling equipment.

Recent Test Programs

External Tank Foam Return to Flight (RTF) Qualification Testing-**Hot Gas Facility and Test Facility 300**

Space Shuttle Main Engine (SSME) liquid air insulation (RTF)-**Hydrogen Cold Flow Facility**

Northrop-Grumman Tank Test series-**Cryo-Structural Facility**

Multipurpose hydrogen test bed 23 consecutive day test-**Test Facility 300, 20' Chamber**

24" solid rocket motor with real time radiography-**Solid Propulsion Test Facility**

Solid fuel torch with real time radiography testing weekly -**Test Cells**

ISS Control Moment Gyro Flight Support Equipment Adjustable Shims Thermal Vacuum Test-**Environmental Test Facility**

External Tank Development Flight Instrumentation Relay Assembly Thermal Cycle Qualification and Acceptance Tests-**Environmental Test**

Reinforced Carbon Carbon Crack Repair Deliquification-Environmental Test

Solid fuel torch real time radiography testing-**Test Cells**

Modular Combustor Test Article Staged Combustion Injector Technology -**Test Facility 115**

KT Engineering Thruster tests-**Test Facility 500**

Advanced Video Guidance Sensor Tests (AVGS)-**Optical Propagation Tunnel Facility**

Demonstrator for Autonomous Rendezvous Technology (DART)-**Optical Propagation Tunnel Facility**

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