

NTS FACILITY SPOTLIGHT

SAN BERNARDINO, CALIFORNIA

ABOUT NTS SAN BERNARDINO

Located at the San Bernardino International Airport, NTS San Bernardino Rocket and Fluids test laboratory provides specialized high pressure/high flow fluid and rocket engine static test capabilities. It is a robust ground test facility for aerospace propulsion development testing and staffed by experienced managers, engineers and technicians with a heritage of over 50 years of operation, a superior performance record and excellent safety record.

The facility is designed in accordance with API and ASME power piping codes and all pressure vessels are ASME coded and commissioned for use in the state of California. It meets all Federal, State and local agency requirements, including the South Coast Air Quality Management District.

ROCKET TESTING: THRUST STAND & EXHAUST DUCT

The thrust measuring system (TMS) can measure to 50,000-lbf thrust and 8,000-lbf side or asymmetric loads. Test articles are fired into a water cooled duct designed to handle a 50k-lbf thrust rocket engine. Utilizing this duct, NTS San Bernardino is able to operate larger engines while mitigating sound levels. The TMS utilizes electric motors to check load cell calibration remotely prior to hot fire testing. Our data acquisition system resolves the forces and bending movements for all three axes and logs them as calculated data channels.

LARGE RUN TANKS AND PRESSURE VESSELS

NTS San Bernardino's specialized pressure vessels, valves and components have been augmented by 18 additional pressure vessels from the former Boeing Rocketdyne Santa Susana Field Lab (SSFL). Many of the large pressure vessels are cryogenic storage tanks, steam blowdown vessels or pressurized run tanks. These unique heavy-walled ASME coded vessels range in MAWP from 2,500 to 5,500 psia.

CRYOGENIC FLUID STORAGE & VAPORIZATION SYSTEMS

Our cryogenic fluid storage area consists of three 13,000 gallon liquid nitrogen tanks, one 13,000 gallon liquid oxygen tank, and one 9,000 gallon liquid hydrogen storage tank. The tanks can be filled selectively to support independent testing activities or feed liquid to high pressure positive displacement pumps and vaporizers. The vaporizers are ASME coded for use at liquid hydrogen temperature of -423°F. All pressure piping conforms to ASME B31.3 code design and installed by certified welders with post weld x-ray inspection as required. The site has the capability to store LH2, LO2, LN2, liquid CO2 and liquid methane as well as pump and vaporize cryo fluids up to 12 lbs. per second.

GAS STORAGE & PRESSURIZATION FLOW SYSTEMS

The facility contains eight gaseous nitrogen vessels with a volume of approximately 600ft³ and a maximum allowed working pressure of 5,500 psig at -20°F to 150°F. Each pressure vessel has 3 in. ANSI Class 2,500 gate valves attached to the outlet and are manifolded together enabling maximum flow capacity to the various high flow dome loaded regulators.



Eastern view of the test facility



Front and side view of the Thrust Measuring System



LN2 and LH2 pumping and vaporization station



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PROPELLANT RUN TANKS & FLOW SYSTEMS

NTS San Bernardino has a collection of three vacuum jacketed stainless steel propellant run tanks in 2,500, 3,000 and 5,000 gallons, allowing the capability to support many different propellant combinations. They are equipped with a high flow GN2 pressurization system for tank blowdown. The tanks feature both DP and resistive type tank level indicators that output to displays, data acquisition and control systems.

STEAM & HOT WATER FLOW TEST SYSTEMS

We have a large blowdown tank capacity with over 800 ft³ of ASME coded vessels rated at 4,475 psig at 700°F. The steam/water tanks can deliver constant test pressure to 1 of 4 test pad locations. In addition to the steam system, NTS San Bernardino is able to conduct tests with cryogenic fluids, high flow gases and water at pressures ranging up to 4,500 psig.

QUIET TECHNOLOGY TEST FACILITY

NTS San Bernardino recently designed, built and verified a quiet technology test facility to MIL-STD-740-2 (SH). The 17.5' x 12' sound proof enclosure is capable of a minimum pressure of 5 psig, minimum flow of 5 SCFM and a maximum pressure of 5,500 psig with maximum flow of 20,000 SCFM. Data can be acquired up to 24-bit resolution with a sampling rate up to 100 kHz and 8 channels. It is DACS capable of automated sequences with redline control.

DATA ACQUISITION AND CONTROL SYSTEM

Our primary LabView-RT data acquisition and control systems consist of 224 analog input channels, 64 digital inputs and 192 digital output channels and is based on the National Instruments PXI/SCXI real-time architecture. Any combination of data channels can be monitored and redline control logic applied to initiate an automatic safe shut-down should customer-defined limits be measured for a prescribed period. We have 3 other NI LabView control systems to allow setup and test of a total of 4 tests simultaneously.

VIDEO DATA SYSTEMS

The NTS San Bernardino video event recording system has the ability to record up to 20 minutes of imagery, 640 x 480 resolution at 200 frames/sec. The system can also capture, compress and record up to two hours of image data from six low speed cameras. It was designed so the images from all 8 cameras can be displayed in real time. We can provide simultaneous data recording from a variety of streaming devices, synchronizing the data streams using computer time, GPS time or IRIG-B time. This has been specifically designed for test applications where requirements often extend to recording data from multiple cameras and other instrumentation.

ABOUT NTS

As one of the largest commercial test laboratory networks in North America, NTS offers test, inspection and certification services for environmental, dynamics, EMC, wireless, product safety, materials, ballistics and much more. Our client partners rely on NTS to bring quality products to market quickly and efficiently, and so can you.



5,000 ft³ of total facility gas storage at 5,500 psi



Steam test pad with high pressure steam vessels



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