



# **Pneumatics Test Facility**

Santa Clarita, CA



# Pneumatics Test Facility

The Pneumatics Test Facility at NTS Santa Clarita is designed to conduct testing of air flow, pressure and temperature management subsystems and components requiring compressed air in a controlled environment. Other environments can be combined (external thermal control, structural stress, vibration, etc.) with pneumatic testing.

Typical systems and components tested include:

- ▶ **Jet engine bleed air systems** and associated components (valves, instrumentation, etc.)
- ▶ **Aerospace environmental control systems** and associated components (heat exchangers, valves, instrumentation, etc.)
- ▶ **Transportation and industrial combustion and exhaust management systems** and associated components (heat exchangers, valves, turbo chargers, instrumentation, etc.).
- ▶ **Other subsystems and components** that require compressed air at varying pressures, flows and temperatures for sustained periods.



# Pneumatics Test Facility

The test system is comprised of the following major components:

- ▶ Control room
- ▶ Data Acquisition & Control (DAC) System
- ▶ 4 each High capacity convection heaters
- ▶ 7 air compressors with boosters
- ▶ 2 compressed air receivers (ullage tanks), air distribution piping and controls
- ▶ High flow, low pressure air blowers
- ▶ Other supporting capabilities (thermal chambers, small air compressors, LN2, GN2, etc)



# Control Room & DAC System

- ▶ Capacity to support up to 10 tests in parallel at seven workstations; including four large/complex test programs
- ▶ Equipped with data acquisition and control systems to monitor, control, and record UUT requirements
  - General purpose LabView based data acquisition & control software developed by NTS for testing
  - Virtually unlimited capacity for temperature, pressure, flow and other customer and facility data channel requirements
  - Portable data interface, signal conditioning, and control cabinets at each test cell
  - Multiple direct ethernet data connections from test cell to control room, allowing easy reconfiguration and expansion of localized data interface cabinets
- ▶ Modern heater control panels with PLC based user interface, including control, diagnostics and safety functions
- ▶ Video displays for the various cameras in each test cell
- ▶ Workstations can be configured for independent customer data viewing and analysis
- ▶ Control room can be segmented to isolate proprietary customer usage when needed
- ▶ Auxiliary small control room available to augment new control room



# Process Convection Heaters

## Heaters 3 and 4

- ▶ Discharge air up to 1200F at UUT, 300 psi, 300 lbs/min air input.
- ▶ Heaters can be operated in parallel to support one test cell or separately to support two test cells.
- ▶ Pressure drop across heaters varies with flow, temperature and pressure. It is projected to be approximately 20 psi at design conditions as stated above.
- ▶ State of the art, low NOx burners (Zeeco GLSF 8) and Flue Gas Recirculation (FGR) to meet very stringent 9 ppm SCAQMD NOx requirement.
- ▶ Control system provides fully automatic start-up sequencing; control of VFD driven induced draft, FGR, and forced draft fans; firing rate and safety oversight.
- ▶ Primary control loop is closed on process air outlet temperature.
- ▶ Oxygen analyzers in the flue gas and oxidant streams facilitate very accurate combustion control.
- ▶ The main control panel based on the Honeywell ML-50 PLC is located in the control room and gives the operator full visibility (including trending) of operating parameters.



## Heaters 1 and 2

- ▶ Discharge air up to 1000F, 2 lbs/sec air input
- ▶ Discharge air up to 300 psi \*50 PPM at 1000°F
- ▶ Example: Flow rate of 220 PPM at 400°F
- ▶ Automated control for test point temperatures using ambient mix valve.
  - Allows for continuous feedback temperature control and dynamic control of cycling temperatures.



# Air Compressor Systems

The system is capable of supplying compressed air from both banks to one test cell or to several test cells in parallel depending on individual test pressure and flow requirements.

## Ingersoll Rand Compressor Bank

- ▶ 4 each: Single stage rotary screw air compressor R160i-145 PSI (200 HP)
- ▶ w/ air dryer, coalescing and particle filter
- ▶ 3 each: Kaeser booster (N2001-G/GW, 50HP), 145 PSI inlet / 290 psi discharge

## Kaeser Compressor Bank

- ▶ 3 each: DSD150-175psi (150 HP)
- ▶ Air dryer, coalescing and particle filter
- ▶ 3 each: Kaeser booster (N2001-G/GW, 50HP), 170 PSI inlet / 290 psi discharge

## Compressed Air Pressure Receivers (ullage)

- ▶ Air Receiver #1, carbon steel, 13,696 gallons (US liquid), 1831 ft<sup>3</sup>, 300 PSI
- ▶ Air Receiver #2, carbon steel, 7,500 gallons (US liquid), 1,002 ft<sup>3</sup>, 300 PSI



# Other Supporting Capabilities

- ▶ Thermal control chambers
- ▶ High pressure compressors up to 42 PPM at 1000 PSIG
- ▶ High temp oven up to 2000°F
- ▶ House GN2 at up to 2300 psi
- ▶ Low volume pneumatic pumps up to 40,000 PSI for burst tests
- ▶ Several methods of heating pneumatic systems besides our flow heaters, such as electrical and gas burners, SuE burners
- ▶ SuE burners and combustors capable of temperatures in excess of 2000°F, at full flow capability (300 PPM)
- ▶ Air delivery at flow, temperature and pressure to large vibration exciters (45K lb/Force)
- ▶ 5,000 SCFM low pressure blower for ram air & other low pressure applications



# Various Test Setups



Thermal Endurance Testing of an Anti-Ice Valve with ambient conditioning



Thermal Endurance Testing of a bleed air heat exchanger



Thermal shock testing of a bleed air/cabin air valve



Lifetime endurance testing of large, multi-circuit bleed air heat exchanger

# South Pneumatics Test Facility



The new pneumatics facility opened in 2016, increasing air testing capacity and capabilities

# South Pneumatics Test Facility

## Flow Facility Highlights

- ▶ Up to 300 lbs/min at 300 psi and 1,200°F temperature delivery to UUT
- ▶ 3 test bays
- ▶ 15,000 SCFM low pressure blower



Compressor bank



Test cells with air flow drops



3M btu/hr low-NOX burner

# South Pneumatics Test Facility

## High Pressure Facility Highlights

- ▶ GN2 and Ghe testing up to 6,000 psig
- ▶ High pressure blow downs for rated flow, pressure drop, etc.
- ▶ High temperature furnace for testing up to 2,000°F
- ▶ Helium recovery system to reduce program costs



Three high pressure gas test cells



High pressure GN2 and Ghe storage tanks with LN2 pump



High volume LN2 storage for gas conversion



Our talented team of engineers and technicians are ready to support your pneumatic and fluids testing needs.

For questions on capabilities or to request a formal quote email [sales@nts.com](mailto:sales@nts.com) or call (800) 270-2516

