

# National Aeronautics and Space Administration

LYNDON B. JOHNSON SPACE CENTER  
WHITE SANDS TEST FACILITY



## SPACE FLIGHT COMPONENT PROCESSING CAPABILITIES (SHUTTLE)

### SUMMARY

White Sands Test Facility (WSTF) can provide a variety of repair, refurbishment, and decontamination processes for flight or ground components. This includes handling of components that have been exposed to hazardous propellants. WSTF has existing facilities, procedures, and expertise that are adaptable to individual customer requirements.

### EXPERIENCE

WSTF experience in component processing has been developed for more than 30 years. WSTF is currently certified to perform depot repair for the following components (most of which comprise the hypergolic propellant wetted components on the shuttle, but also include components from oxygen and hydrogen systems):

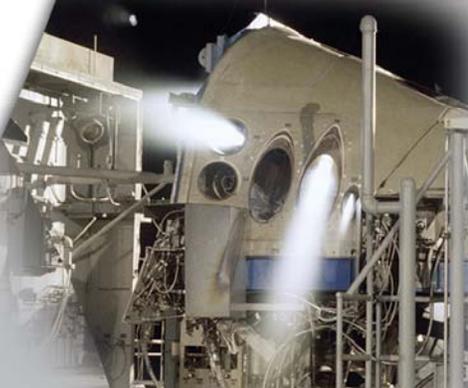
- Primary and Vernier Reaction Control System (RCS) Thrusters
- Pilot Operation Valve (POV) and Direct Acting Valve (DAV) Fuel and Ox Thruster Valves
- Orbital Maneuvering System (OMS) Engine, Series Valve, and Pneumatic Pack
- OMS Tank
- Quad Check Valve
- Alternating Current Motor Valve
- Manual Valve
- Pressure Relief Valve
- Hydrogen and Oxygen Flow Control Valve
- Atmospheric Revitalization Pressure and Control Subsystem (ARPCS) Panels
- Future Craft Valve Components (in work)
- Liquid Hydrogen Recirculation Pump (in work)

These components require a variety evaluation and repair work, such as:

- Water decontamination of propulsion engines, valves, and components
- Radiographic inspections
- Flight engine, thruster, valve refurbishment
- Flight component removal and replacement
- Throat plug refurbishment
- Combustion chamber removal and replacement
- Air and ground-half couplings/quick disconnect refurbishment
- Flight-certified crimping, safety wiring, and potting
- Adhesive bonding applications
- Dynatube polishing
- Lapping and honing
- Flight part machining and welding
- Flight hardware piece part fabrication

Following the repair process, acceptance testing is performed, which includes:

- Bi-propellant engine injector-flow visualization
- Flight-certified engine mass flow verification and balancing
- Valve leakage, low and ambient temperature
- Force deflection measurement of valves and quick disconnects
- Valve response testing in gas and water
- Component leakage testing and proof pressure testing
- Hot fire acceptance testing under altitude or ambient conditions
- Electrical resistance testing
- Electrical component functional verifications
- Hydrogen and oxygen high pressure, high flow, and high temperature testing
- Oxygen component wetting and functional testing



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## EQUIPMENT

- Class 100 laminar flow benches
- Class 100-10,000 clean rooms ranging in size from 10 by 8 by 8 ft to 20 by 20 by 15 ft
- Flight thruster/valve deionized water flush benches
- Fume hoods for oxidizer and fuel decontamination
- Inspection optics Borescopes from 0.020" outside diameter (flexible and rigid); super VHS video and digital image and video storage
- Controls
  - Certified valve control consoles, 0 to 32 vdc, variable with over-voltage/current protection operating under LabViews<sup>®</sup> and Opto-22
- Data recording
- LabViews (with Jazz format disks) Western Graphtec model Mark 12 (16-channel)
- Yokogawa
- X-Y plotter

## FACILITIES

- Gas systems
  - Nitrogen at 3000 psig (with ability to pump up to 9000 psig)
  - Helium up to 3000 psig and 850 scfm (with ability to pump up to 9000 psig)
- Deionized water up to 7 gal/min at 38 psig
  - 5000 gal tanker rated for 30 psig
  - 75 gal run tank rated for 400 psig
  - 150 gal run tank rated for 400 psig
  - 200 gal run tank rated for 50 psig
- Bonded storage and logistics areas for controlled storage of critical hardware
- Fabrication area for buildup of test panels and support equipment

## SUPPORT SERVICES

- Chemistry laboratory
- Metallurgical laboratory
- Environmental chamber laboratory
- Machine shop
- Weld shop including tungsten arc, sleeve, and butt welding (Astro-Arc<sup>®</sup> and Weldogic<sup>®</sup> equipment)
- Heavy equipment
- Non-destructive testing, inspection, and analysis including: radiological, dye penetrant, ultrasonic, Acoustic Emissions, Neutron Activation, Holographic interferometer, Infrared Thermographic, Eddy current, microwave image scanners, and visual inspection with 0.020 to 0.340 in. outside diameter boroscopes.
- Precision cleaning to level 50A
- Calibration laboratory traceable to National Institute of Standards and Technology (NIST)
- Large Thermal Vacuum Conditioning Chambers
- Micrometeoroid/Orbital Debris Impact Crater Analysis Expertise
- Video and photographic laboratory
- Product quality assurance
- On-site NASA and USA quality inspectors
- On-site Boeing technical representatives

## CONTACT

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