Facility Tour Description
Ohio Space Forum
4/29/24

Lewis Field Facilities:

Aero-Acoustic Propulsion Laboratory

The Aero-Acoustic Propulsion Laboratory (AAPL) is a world-class facility for conducting aero-propulsion noise reduction research.


Nozzle Acoustic Test Rig (NATR) in the Aero-Acoustic Propulsion Laboratory (AAPL).

With over 20 years of testing experience in acoustic research and development, the AAPL, located at NASA's Glenn Research Center, is a world-class facility providing outstanding testing services in aircraft propulsion acoustic noise reduction and performance research.

Unique in testing capabilities and size, the AAPL dome is 65 ft high by 130 ft in diameter, providing an anechoic testing environment for engine component research and development. To provide a reflection free acoustic environment, 17,000 custom-designed 2-ft thick fiberglass wedges are mounted on the dome's interior walls and floor areas adjacent to the test rigs. The acoustically treated dome walls are designed specifically to attenuate sound. Together, these elements provide an acoustic testing environment that exceeds the acoustic research testing objectives set forth by NASA and industry.

AAPL houses three state-of-the-art acoustic test rigs, the Nozzle Acoustic Test Rig (NATR), Small Hot Jet Acoustic Rig (SHJAR), and the DGEN Aero-Propulsion Research Turbofan (DART).

Lunar Mars Technologies: Fission Surface Power

The Fission Surface Power display area at Building 301 showcases test hardware developed at Glenn Research Center from over 20 years of R&D on space reactors. Included among the featured projects is the Prometheus-era Jupiter Icy Moons Orbiter (JIMO) power technologies, the Constellation-era FSP test equipment, and the Kilopower reactor prototype models. The centerpiece is a full-scale FSP Technology Demonstration Unit (TDU) that stands over 20 feet tall and includes all the major components required for a 40-kW nuclear power plant on the Moon. The TDU was successfully tested at GRC under simulated thermal-vacuum conditions in 2015 and provides a technical foundation for current development efforts with industry aimed at delivering a FSP flight system for Artemis.

Lunar Mars Technologies: Electric Propulsion & Power Laboratory

The Electric Propulsion and Power Laboratory (EPPL), formerly known as the Electric Propulsion Laboratory (EPL), supports research and development of spacecraft power and electric propulsion systems.

EPPL features two very large space environment simulation chambers; intermediate and smaller environment simulation chambers suitable for testing small engines or components; bell jars used for development and small-scale component testing; and support areas including an electronics shop, machine shop, clean room, and office space.

The space simulation chambers have been enhanced to support the unique requirements of electric propulsion and power system testing. VF-5 cryopumps 3.5 million liters of air per second with its 33.5 sq meter of 6 K helium cryopanels. Several of the chambers have multiple air-locked access ports. These ports allow several tests to be conducted simultaneously in each chamber without cycling the chamber back to atmospheric pressure during introduction or removal of test hardware. Conditioned DC power is supplied to VF-5, VF-6 and VF-12 for powering ion, hall and MPD thrusters.

The staff of EPPL have been supporting electric propulsion and power system testing for over 40 years and have developed technology leading techniques with precision thrust balances, thruster erosion diagnostics, plume characterization, and EMI/EMC.

Zero Gravity Facility

The Zero Gravity Research Facility is NASA’s premier facility for ground based microgravity research, and the largest facility of its kind in the world. The Zero-G facility is one of two drop towers located at the NASA site in Brook Park, Ohio. The Zero-G facility has been operational since 1966. It was originally designed and built during the space race era of the 1960s to support research and development of space flight

components and fluid systems, in a weightless or microgravity environment. The facility is currently used by NASA funded researchers from around the world to study the effects of microgravity on physical phenomena such as combustion and fluid physics, to develop and demonstrate new technology for future space missions, and to develop and test experiment hardware designed for flight aboard the International Space Station or future spacecraft.

The Zero-G facility provides researchers with a near weightless or microgravity environment for a duration of 5.18 seconds. Microgravity, which is the condition of relative near weightlessness, can only be achieved on Earth by putting an object in a state of free fall. NASA conducts microgravity experiments on earth using drops towers and aircraft flying parabolic trajectories. Allowing the experiment hardware to free fall a distance of 432 feet (132 m) creates the microgravity environment at the Zero-G facility.