Progress on NASA Johnson Space Center

Suborbital Experiments

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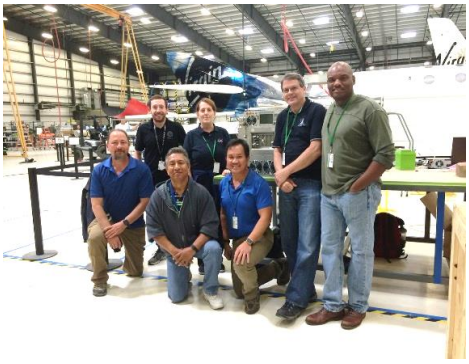
Poster Abstract

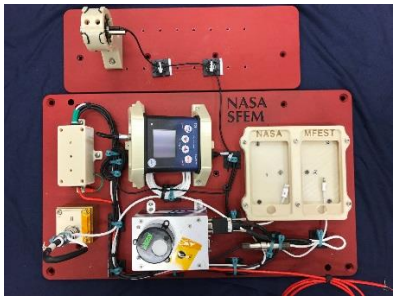
The NASA Johnson Space Center (JSC), Crew and Thermal Systems Division (CTSD), continues to develop experiments for suborbital testing, including the Multi-Phase Flow Experiment for Suborbital Testing (MFEST) and the Suborbital Flight Experiment Monitor (SFEM-2). Both of these experiments are manifested for suborbital flights expected in CY 2017-18.

The MFEST (originally called the Immobilized Microbe Microgravity Water Processing System, IMMWPS) was previously developed as a Space Shuttle flight experiment to 1) test the feasibility of a water purifier for use in zero-gravity conditions, and 2) demonstrate sustained operation of a two-phase flow system with a passive gas/liquid separator. It was never flown due to mass, crew time, and other mission limitations. By design, the influent fluid was kept under pressure to saturate the water with gas; however, farther downstream, the fluid mixture is returned to near atmospheric pressure and fed into a vortex separator. The separator and overall system function was designed for operation in both Earth- and zero-gravity conditions. The gas within the system is designed to be vented off downstream of the separator, and most of the liquid is re-circulated in the processing loop over the duration of operations.

MFEST was proposed to the NASA Office of Chief Technologist (OCT) Flight Opportunities Program (FOP) and selected for parabolic and suborbital flight testing. Ground testing has been completed, including at Virgin Galactic in Mojave, California. Multiple parabolic test campaigns were also completed from 2012–16, in preparation for flight on SpaceShipTwo.



The SFEM-2 is an augmented version of the current SFEM being flown to characterize the test environment in suborbital vehicles. This new integrated package provides not only acceleration data, etc., but cabin temperature, pressure, CO2 and acoustic measurements. The SFEM-2 will employ a Modular Integrated Stackable Layers (MISL) instrument and a COTS acoustic sensor under evaluation for the Orion capsule and/or the International Space Station.



SFEM-2 was proposed to the NASA FOP and selected for suborbital flight testing. The experiment design is complete, and final integration and pre-flight testing is underway in preparation for two flights on Blue Origin's New Shepard.

This poster will provide an overview of these experiments, which are both ready to proceed to suborbital flight testing.