



Evaporative Heat Transfer Mechanisms within a Heat Melt Compactor Experiment

Problem Statement

- Evaporative heat transfer involves both fluid movement and heat transfer. First, we need to know the microgravity fluid physics of the drying process for the proposed Heat Melt Compactor. Later, based on that data, we can refine math models for overall heat transfer and effect good hardware design.
- A parabolic aircraft flight opportunity will provide test data to show fluid movement
- Heat Melt Compactor, Advanced Clothing Systems.

Technology Development Team

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- Heat Melt Compactor Technical Lead, John Fischer, John.W.Fischer@nasa.gov
- Logistics Reduction and Repurposing, James Broyan, James.L.Broyan@nasa.gov

Proposed Flight Experiment

Experiment Readiness:

- Ready Date is September 2012.

Test Vehicles:

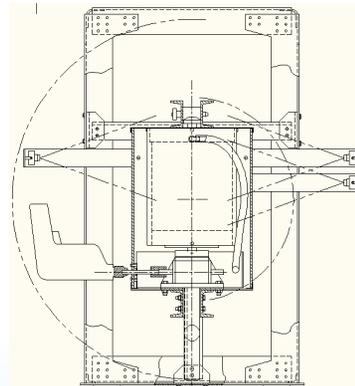
- Parabolic Aircraft

Test Environment:

- No previous microgravity testing

Test Apparatus Description:

- A clear circular test section, doubly contained within a Vertical Equipment Rack that is viewed by three cameras, is filled with simulated trash and water. A ordinary electric hand drill drives a screw that compacts the wet trash to discover when water will be expelled based on varying: 1) compaction rates, and 2) water mass fractions



Technology Maturation

- TRL 6 is accomplished by a series of microgravity tests, the last of which is the operational test aboard the ISS Express Rack in 2018.
- October 2012 – The first microgravity test is called the Water Expulsion Test (WET)
- Summer 2013 and later – Anti Carryover Test (ACT), Thermal Diffusivity Test (TDT), Isothermal Brine bag Evaluation Test (IBET)

Objective of Proposed Experiment

- Water Expulsion Test (WET) will determine if both liquid and air, or only air, is expelled during microgravity operation
- The flight video data will be reviewed and digitized to measure the amount of liquid expelled during microgravity operation