Iso-grid, Thermal-Structural Panel (IsoTherm)

Problem Statement

- New satellite thermal management technologies are needed to reduce non-recurring costs and enable advanced technologies to be incorporated on modern spacecraft
- The iso-grid, thermal-structural panel (IsoTherm) represents a one size-fits-most solution for satellite thermal control, but it's microgravity performance needs to be better understood
- Potential users are NASA, DoD, and commercial space companies

Technology Development Team

- PI: Greg Busch, Air Force Research Laboratory/Space Vehicles Directorate, greg.busch@kirtland.af.mil
- AFRL/RVSV
  3550 Aberdeen Ave SE
  Kirtland AFB, NM 87117
- NASA Goddard Space Center

Proposed Flight Experiment

Experiment Readiness:

- September 2012.

Test Vehicles:

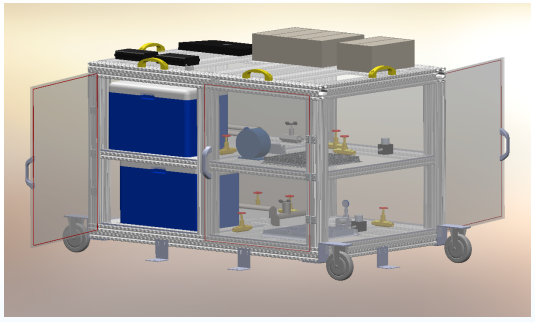
- Zero Gravity Corporation Boeing 727-200

Test Environment:

- The experiment has not flown in any previous micro-gravity flights. The flight environment requested is short duration micro-gravity to characterize pump performance.

Test Apparatus Description:

- The experiment consists of single-phase and 2-phase flow loops. Each loop will be installed on a shelf inside of a liquid-tight experiment cart (for secondary containment), shown below. Ice baths in water-tight coolers will be used to remove heat generated during the testing, and the electrical interface with the aircraft is 115 VAC single-phase.



Technology Maturation

- Microgravity and on-orbit performance characterization needed to mature to TRL 6
- Steps to Mature:
  - Characterize the pump performance in microgravity, Sep 2012
  - Integrate pumps into panel and ground-test, 2013
  - Characterize the on-orbit performance, 2016
- No deadline to mature to TRL 6

Objective of Proposed Experiment

- Characterize the micro-gravity performance of the Iso-Therm panel with specific emphasis on the electro-hydrodynamic (EHD) pump approach
- The experiment will generate pump pressure generation and flow rate data. Combined with measurements of the power power draw, these data can be used to characterize pump performance

TA14: Thermal Management Systems. TA12: Materials, Structures, Mechanical Systems and Manufacturing