Mechanical/Aerospace Sustainability Project

Heat Rejection System

Mission Statement

Conducting research initiated by NASA and Hamilton and Sundstrand. Our mission is to investigate and research possible methods of thermal rejection allowing NASA to create a capsule or habitat that can withstand the large change in thermal variability from Low Earth Orbit (180 mi) to the geostationary orbit (24k mi).

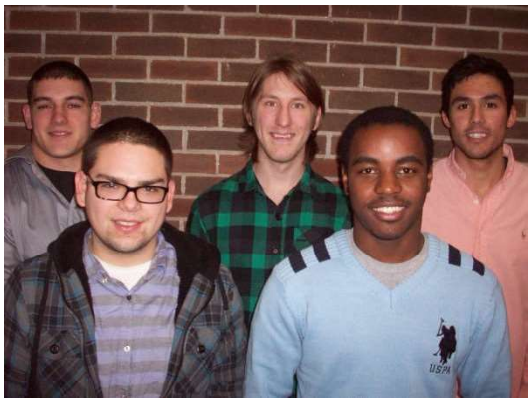
Synopsis

NASA intends to deploy long term research missions to greater distances from Earth in order to expand research capabilities. Currently, NASA has been restricted to sending manned missions to Earth's inner orbit because they have not yet developed a manageable heat rejection system for a geostationary habitat.

The current heat rejection systems that are implemented are designed for different parameters that do not require automation and do require regular maintenance. The company is now seeking a new, autonomous system that will be able to withstand constant radiation while providing a stable, livable habitat for crew members. The habitat will maintain this stable environment for as long as the crew members will be on board for their mission. Upon the crew's departure the habitat will enter a hibernation state in which the lowest operational workload will take place.

Several different thermal control systems are being analyzed and compared. While considering thermal control systems and their effectiveness, factors such as the system's geometry and impact preparedness must be considered. Experimental data suggests that a two phase capillary action heat transfer system with rod shaped geometry is an optimal candidate for implementation. Project elements are:

- Studying previous heat rejection systems.
- Calculating unknowns vital to system.
- Preliminary ideas.
- Analysis
- Decision and refinement
- 3D modeling using SolidWorks



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