Space Applications: ThermOmegaTech's Thermostatic Valves Reduce Strain on Critical Power Supplies

Harsh conditions in space present development challenges so engineers rely on mission-critical components to ensure proper functioning in extreme environments.

ORMOND BEACH, FLORIDA, USA, November 3, 2022 /EINPresswire.com/ -- Designers need to prepare for the extreme temperatures found in space, but the intricacies of space travel are not limited to extreme thermal variation. For systems sent into the upper atmosphere and beyond into the stars, considerations must be made for reducing payload weight, prolonging service life, and minimizing battery drain.

First, weight: The cost to launch 1 lb. of anything into space – food, medical supplies, etc. – is from $1,200 to as much as $10,000. (To put this into perspective, a single block of butter that is in your kitchen right now is 1 lb.) Designers must do all they can to keep payload weight down. This is primarily achieved by swapping out raw material for lighter ones, such as high-strength 7075 forged aluminum in place of steel and designing components as compactly as possible.

Next, service life: Most systems sent up into space are intended to stay in the atmosphere for more than 24 hours – think satellites, the International Space Station, and the Mars Rover – and so they must be designed with a long service life in mind.

Designers should include high quality parts that have extensive cycle tests to withstand many modulations and constant operation over years or even decades.

In addition, for eventual human-crewed long-haul space voyages, vital components should be designed to be easily swapped out with a spare, without having to dissect and disassemble the entire system in which it resides.

Electricity in space is generated from solar power or fuel cells. In either case conserving fuel is an important requirement. Designers should consider using mechanically operated thermostatic valves in their temperature regulation systems to reduce strain on critical power supplies. These

valves operate with no power source, based solely on thermal variations, and thus do not put a strain on central power sources. Unlike electrical components, thermostatic actuators monitor and respond to temperature variations media such as air, water, glycol, steam, and others.

An example of thermal actuator technology in action would be a space vehicle that uses self-powered mixing/diverting valves for Environmental Temperature Control.

When the ambient temperature is below the valve's "setpoint," the internal spool adjusts to maintain the desired setting. This is accomplished by the valve's internal actuator which senses the change and adjusts accordingly via phase change technology.

By utilizing a self-contained thermal actuator triggered by real-time and continuous temperature variations, power needs for cabin air temperature regulation are eliminated, thereby reducing overall strain on on-board batteries and fuel cells.

Extreme conditions of space require extreme creativity on the part of design engineers. By factoring in and planning for these hazards, they can give their systems a best shot for successfully operating under mission-critical conditions.

About ThermOmegaTech

Established in 1983, ThermOmegaTech® is a leading designer and manufacturer of self-actuating temperature control valves and thermal actuators. Experts in phase-change thermostatic actuator technology, ThermOmegaTech® specializes in manufacturing prototypes/small volumes and highly engineered custom products for the Aerospace & Defense industry. AS9100D certified, they provide innovative thermally controlled custom solutions that can seamlessly integrate into your system for applications such as thermal bypass in hydraulic systems, avionic electronics cooling, fluid and airflow control, fuel cell battery cooling, and more. Through their electronics division they offer custom PCB assembly, electro-mechanical assembly, and box build contract manufacturing. For more information visit www.tot-ad.com

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John Knott
JD Technologies Global, LLC
+1 781-864-2220
email us here
Visit us on social media:
LinkedIn
