Compact, Two-Sided Structural Cold Plate Configuration

Lyndon B. Johnson Space Center, Houston, Texas

In two-sided structural cold plates, typically there is a structural member, such as a honeycomb panel, that provides the structural strength for the cold plates that cool equipment. The cold plates are located on either side of the structural member and thus need to have the cooling fluid supplied to them. One method of accomplishing this is to route the inlet and outlet tubing to both sides of the structural member. Another method might be to supply the inlet to one side and the outlet to the other. With the latter method, an external feature such as a hose, tube, or manifold must be incorporated to pass the fluid from one side of the structural member to the other. Although this is a more compact design than the first option, since it eliminates the need for a dedicated supply and return line to each side of the structural member, it still poses problems, as these external features can be easily damaged and are now new areas for potential fluid leakage.

This invention eliminates the need for an external feature and instead incorporates the feature internally to the structural member. This is accomplished by utilizing a threaded insert that not only connects the cold plate to the structural member, but also allows the cooling fluid to flow through it into the structural member, and then to the cold plate on the opposite side. The insert also employs a cap that acts as a cover to seal the open area needed to install the insert. There are multiple options for location of o-ring style seals, as well as the option to use adhesive for redundant sealing. Another option is to weld the cap to the cold plate after its installation, thus making it an integral part of the structural member. This new configuration allows the fluid to pass from one cold plate to the other without any exposed external features.

This work was done by Mark Zaffetti of Hamilton Sundstrand for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809.

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457(f)) to Hamilton Sundstrand. Inquiries concerning licenses for its commercial development should be addressed to:

Hamilton Sundstrand
Space Systems International, Inc.
One Hamilton Road
Windsor Locks, CT 06096-1010
Phone No.: (860) 654-6000
Refer to MSC-24880-1, volume and number of this NASA Tech Briefs issue, and the page number.

AN Fitting Reconditioning Tool

John F. Kennedy Space Center, Florida

A tool was developed to repair or replace AN fittings on the shuttle external tank (ET). (The AN thread is a type of fitting used to connect flexible hoses and rigid metal tubing that carry fluid. It is a U.S. military-derived specification agreed upon by the Army and Navy, hence AN.) The tool is used on a drill and is guided by a pilot shaft that follows the inside bore. The cutting edge of the tool is a standard-size replaceable insert. In the typical Post Launch Maintenance/Repair process for the AN fittings, the six fittings are removed from the ET’s GUCP (ground umbilical carrier plate) for reconditioning. The fittings are inspected for damage to the sealing surface per stan-
The Active Response Gravity Offload System (ARGOS) provides the ability to simulate with one system the gravity effect of planets, moons, comets, asteroids, and microgravity, where the gravity is less than Earth’s gravity. The system works by providing a constant force offload through an overhead hoist system and horizontal motion through a rail and trolley system. The facility covers a 20- by 40-ft (≈6.1- by 12.2-m) horizontal area with 15 ft (≈4.6 m) of lifting vertical range.

The overall design and implementation of the ARGOS system is unique and at the time of this reporting the only known system of its kind. The interface of ARGOS to the human test participant is critical and is provided by a gimbaled system that was developed to align the pitch, yaw, and roll axes, and offload force provided by ARGOS, with the center of gravity of the object or person being lifted. This gimbaled system greatly improves the realistic feel of the simulated gravity to the person in the simulation. Therefore, the system allows the person to perform tasks such as walking as if the individual was on the surface of the celestial body being simulated. The system has been used for bipedal walking robots and human testing in a variety of simulated gravitation fields.

This tool provides a quick solution to repair a leaky AN fitting. The tool could easily be modified with different-sized pilot shafts to different-sized fittings.

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