senior Metal Bellows

Active Cooling Systems

Thermal Management Solutions

As today's electronics become more compact and powerful, the demand for more efficient thermal management strategies is critical to performance.

COOLANT RESERVOIR FOR HIGH ENERGY LASER(HEL)

Our customer needed a lightweight, maintenance free coolant reservoir for a vehicle mounted air defense High Energy Laser (HEL) system to defeat low observable threats (specifically Unmanned Aerial Systems) for the US Armed Services.

Thermal management is a critical component of HEL systems. Without robust cooling solutions, the massive amount of waste heat generated per laser shot would damage the weapon and support systems.

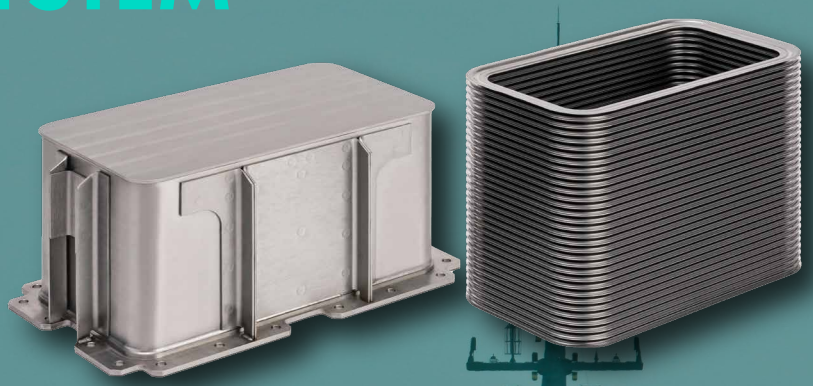
SMB developed a maintenance-free light weight titanium metal bellows reservoir that is directly integrated within the HEL system to manage the thermal expansion of the coolant fluid for the laser at a low weight and within a restrictive envelope.

RESERVOIR FOR MISSILE DEFENSE RADAR SYSTEM

In another application, our customer needed to solve a leakage problem with their existing reservoir assembly. This reservoir assembly was an integral part of the radar cooling system which used polyalphaolefin (PAO) fluid as a coolant for the radar power supply. The original reservoir included mechanical joints that were prone to leaks, resulting in increased downtime and higher maintenance costs.

SMB's dual-tank bellows design solved the leakage problem by providing an all welded hermetic construction that included two leak tight bellows joined by a flow tube for increased fluid volume in a limited installation envelope. SMB developed a maintenance-free, light-weight titanium metal bellows volume compensator directly integrated into the propulsion system. The bellows volume compensator maintains proper fluid pressure while also managing the thermal expansion of the coolant fluid.

VOLUME COMPENSATOR FOR NAVAL RADAR SYSTEM



APPLICATION

Our customer needed a volume compensator for the electronics cooling systems in a ship-board High Voltage Power Supply which needed to provide a minimum specified volumetric displacement with with a minimal change in pressure.

PROBLEM

- The application had to compensate for thermally induced volume changes with minimal pressure increase within a restricted envelope
- The assembly had to also withstand shipboard shock loads and marine environment
- The solution had to support fluid weight without motion or significantly influencing lift-off and final system pressures

SOLUTION

SMB provided an all welded stainless steel metal bellows in a housing with special rib supports to create a maintenance free volume compensator with:

- Minimal pressure increases while maintaining consistent steady fluid flow
- Lower total life cycle costs
- Zero leakage due to hermetically sealed bellows design
- Proven capabilities over extreme temperature range

LET'S TALK!

For any questions or to engage with our technical team, please contact us at

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