



LIGHTWEIGHT AND MAINTENANCE-FREE COOLANT RESERVOIR FOR SATELLITES

CHALLENGE

In the realm of space applications, cooling electronic payloads presents a significant challenge. Satellites face difficulties in effectively dissipating heat due to the absence of a medium for heat transfer. Additionally, exposure to direct sunlight can result in superheating, further exacerbating the cooling dilemma. A leading satellite company approached Senior Metal Bellows (SMB) with the critical task of designing a coolant reservoir capable of accommodating the volume fluctuations inherent in their system while maintaining positive pressure on their pump as the system underwent heating and cooling cycles. Additionally, the reservoir needed to be designed with weight in mind in order to minimize fuel costs. The utmost reliability was paramount, considering the mission's extended 15-year duration and the limitations of repairing satellites in orbit.

OUR SOLUTION

To aid our customer in tackling the cooling challenges in space, SMB developed a weight-optimized reservoir design that minimizes fuel costs, with an all-metal construction that utilizes an edge-welded bellows to provide leak-tight robustness and durability for extended missions. The custom design of the reservoir maintains a stable pressure, optimizing the cooling performance of the system. The reservoir configuration includes an integrated sensor which allows for precise monitoring of fluid levels during system set-up to ensure accurate performance during operation. These features helped to overcome the challenges of cooling the satellite's electronic payload as well as mitigating the harsh impact of direct exposure to sunlight and radiation. Working in collaboration with the customer, SMB's Engineering team designed a weight-optimized coolant reservoir, providing an innovative solution for a key component of the satellite's liquid coolant system to ensure efficient and reliable cooling of the electronic payload in the demanding environment of space.



RESULTING PRODUCT FEATURES

Key features of our mission-critical coolant reservoir:

- **Weight-Optimized**

SMB's coolant reservoir can be manufactured from a variety of high strength alloys that allows for a lightweight design, minimizing fuel costs

- **All-Metal Design**

With its robust all-metal construction utilizing an edge-welded bellows with zero elastomeric components, the reservoir ensures maintenance-free reliability and durability over the life of the mission

- **Stable System Pressure**

Custom engineered design enables the reservoir to maintain a stable system pressure over a wide temperature range, optimizing the cooling performance of the system

- **Integrated Sensor for Fluid Level Monitoring**

Integrated sensor allows the customer to precisely monitor fluid levels to ensure reliable performance during operation

OUR ENGINEERING TEAM SPECIALIZES IN PROVIDING
CUSTOM-ENGINEERED SOLUTIONS FOR CHALLENGING APPLICATIONS



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- **LET'S TALK!**

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

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