

Lubricant Manufacturer Reduces Product Loss Using Continuous Leak Detection of Aerosol Cans

RESULTS

- Ensured 100% automated inline leak testing and simplified quality control
- Eliminated the need for water bath, visual inspection and realized significant cost savings:
 - Over \$200,000 in capital cost savings
 - Over \$35,000/year in energy, consumables, and maintenance cost savings
 - Valuable space gains on the plant floor



APPLICATION

Monitoring and identifying leaks in aerosol cans of R134A refrigerant propellant without the use of a water bath.

CUSTOMER

TSI Supercool™, a specialty lubricant manufacturer in Lake Worth, Florida, U.S.A.

CHALLENGE

TSI Supercool is a specialty lubricant manufacturer that designs, formulates, tests, blends, packages, and distributes synthetic and semi-synthetic solutions for a variety of industrial and automotive markets worldwide. One of its products for the automotive industry is R134A, a refrigerant propellant that is charge-packaged in an aerosol can and is used to replace lost refrigerant in vehicle A/C systems.

The U.S. Department of Transportation (DoT) requires that all aerosol cans be tested for leaks—whether during transport, at the point of sale, or with the consumer—as leakage of a flammable propellant poses a very dangerous hazard. Can leakage also increases the risk of product recalls and brand reputation damage.

TSI Supercool partnered with an aerosol filling company to package the R134A, but the process the supplier used resulted in a 2.5% to 5% product loss per load. The company decided to move its filling process in-house in order to eliminate this loss, but doing so required that the company design and install the appropriate equipment.

“We’re investing in the best performance for our process by installing Emerson’s Rosemount Aerosol Microleak Detection System to help us ensure product safety and quality, meet regulatory requirements, and avoid very high capital and maintenance costs. Emerson’s innovative technology has also enabled us to meet our company’s sustainability goals by reducing our environmental footprint.”

Mark Eggen, CEO/Founder

TSI Supercool™

Packaging & Filling

To become a filler, TSI Supercool would traditionally have been required to use a water bath for leak detection and pressure testing. Water bath, a large vat of heated water, has several very costly disadvantages:

- Expensive to buy and install: upwards of \$200,000
- Requires a large footprint in a space-constrained plant
- Requires a large energy investment to keep the water heated to 50 °C/122 °F continuously
- Extremely high maintenance requirements since the water bath is prone to corrosion, requiring constant use of expensive chemicals to keep it clean

Once TSI Supercool evaluated these costs, they decided to look for an alternative solution to the water bath that would also help their operation reduce waste and foster sustainability.

SOLUTION

TSI Supercool worked to determine if a reliable leak detection system, along with other testing processes, could replace the water bath and still meet DoT regulations at a lower cost. TSI Supercool contacted the DoT to determine what methods and technologies would meet the following regulatory requirements ¹:

(D) Leakage test.

*(1) **Pressure and leak testing before filling.** Each empty container must be subjected to a pressure equal to or in excess of the maximum expected in the filled containers at 55 °C (131 °F) or 50 °C (122 °F) if the liquid phase does not exceed 95% of the capacity of the container at 50 °C (122 °F). This must be at least two-thirds of the design pressure of the container. If any container shows evidence of leakage at a rate equal to or greater than 3.3×10^2 mbar L/s at the test pressure, distortion or other defect, it must be rejected; and*

*(2) **Testing after filling.** The person filling each container must ensure that the crimping equipment is set appropriately and the specified propellant is used before filling a container. Once filled, each container must be weighed and leak tested. The leak detection equipment must be sufficiently sensitive to detect at least a leak rate of 2.0×10^3 mbar L/s at 20 °C (68 °F). Any filled container which shows evidence of leakage, deformation, or overfilling must be rejected.*

For pressure testing, TSI Supercool confirmed that the contracted can manufacturer pressure tests every can unfilled in compliance with the regulation. However, a leak detection system on the filled cans was the key element in making the water bath alternative system work.



Certified for use as a water bath alternative, the Rosemount CT2211 Aerosol Microleak Detection System improves productivity and efficiency by providing 100% aerosol can leak testing in real time.

TSI Supercool selected Emerson's Rosemount CT2211 Aerosol Microleak Detection System, a laser spectroscopy system based on Quantum Cascade Laser (QCL) technology. The system can instantly detect, identify, and reject a faulty can at the line speed, which, in TSI Supercool's case, is 300 cans per minute. When a can passes through the sample arch, the system draws in the air around the can and directs it through the measurement cell. In the measurement cell, the laser beam passes through the sample gas and is ultimately reflected to the detector. Variations in light intensity are measured and the leak rate is calculated using IR spectroscopy.

Laser-based microleak detection systems are designed to test the entire can regardless of shape or size, ensuring all the failure points—valves, crimps, triple points, and seams—are tested. When a leaking can is detected, a signal is activated so the individual can is automatically rejected from the line for containment. These systems can also be configured with an alarm when multiple cans are leaking to prevent ongoing production of faulty product that might be caused by a systemic filling or sealing issue. This allows operators to address abnormal situations before they become critical.

The Rosemount CT2211 Aerosol Microleak Detection Solution has enabled TSI Supercool to use an alternative to the water bath while meeting DoT regulations, thus ensuring the safety and quality of its product. The system has allowed TSI Supercool to optimize process control using actionable insights and visibility into batch quantities and rejection rates. Leveraging the Rosemount CT2211 has also helped automate the packaging operation of TSP Supercool and reduce waste, contributing to the company's environmental stewardship.

RESOURCES

Rosemount CT2211 Aerosol Microleak Detection System

[Emerson.com/RosemountCT2211](https://emerson.com/RosemountCT2211)

Learn more about continuous, laser-based packaging leak detection systems

[Emerson.com/PackagingLeakDetection](https://emerson.com/PackagingLeakDetection)

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