

STANLEY
Engineered Fastening



CASE STUDY

Electrolyte Fill Hole Sealing Application
For Battery Cells In EVs

CHALLENGE



Pain Point Discovery

Conventional solutions for electrolyte fill hole sealing led to safety & performance issues

Poor sealing of cells could potentially result in:

- Ingress of moisture into Li-ion cells, leading to loss in performance
- Release of toxic fumes in EVs

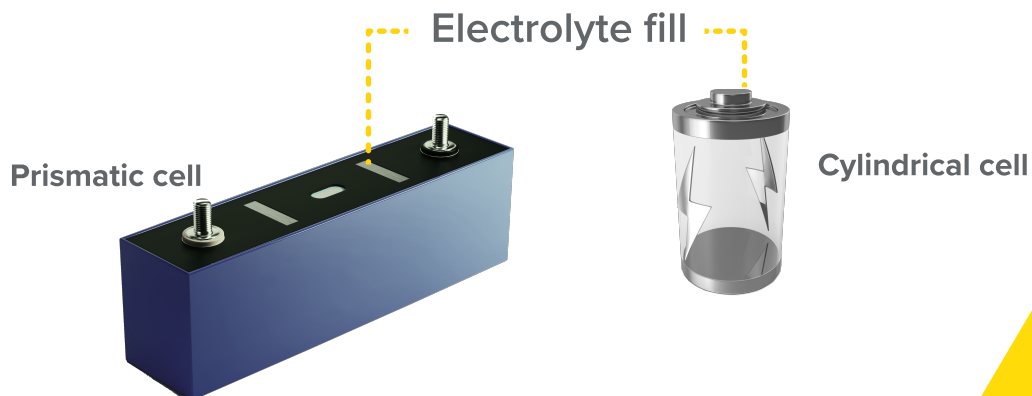
Application Understanding & Analysis

Worked with customer to:

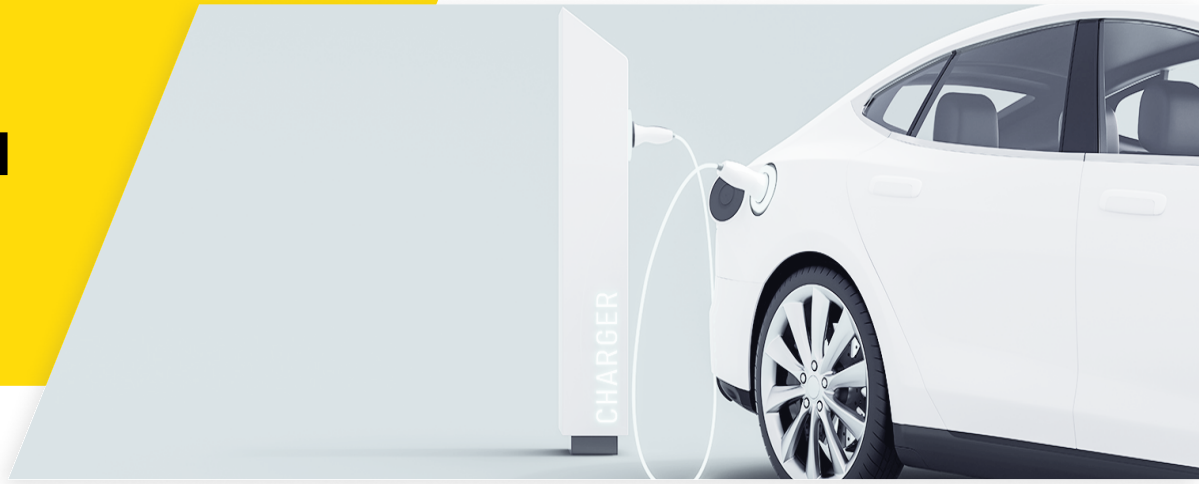
- Analyze requirements for seal performance, cycle time, precision & other factors
- Identify test criteria to validate solutions

Prismatic & Cylindrical Cell Structures

- Thermal damage to battery vent in case of laser sealing in prismatic cell
- Cylindrical cell design requires electrolyte fill after lid welding



SOLUTION



Development & Prototype Testing

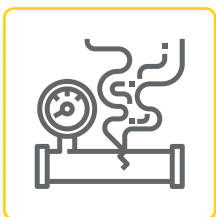
STANLEY's R&D team conducted detailed evaluations:

- Testing customized rivet options for EV cells with a mix of materials (copper, aluminum, stainless steel, etc.)
- Evaluating sealing performance
- Creating prototypes & production tools for rivets
- Developing a high-speed rivet installation process

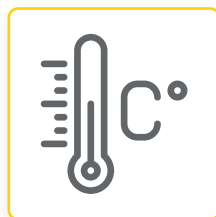
Providing Superior Mechanical Solutions

STANLEY's customized closed-end sealing rivets for EVs chosen because they:

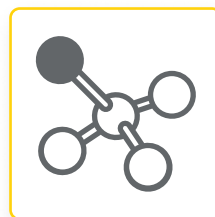
- Provide safe & reliable sealing solutions that are technologically superior
- Can be used with & without sealant
- Creating prototypes & production tools for rivets
- Ensure no thermal damage to the vent during production processes
- Are leak-tight to helium
- Resistant to vibration, chemicals, climate, aging



Helium leak test



Temperature cycle testing
(-40°C to 80°C)



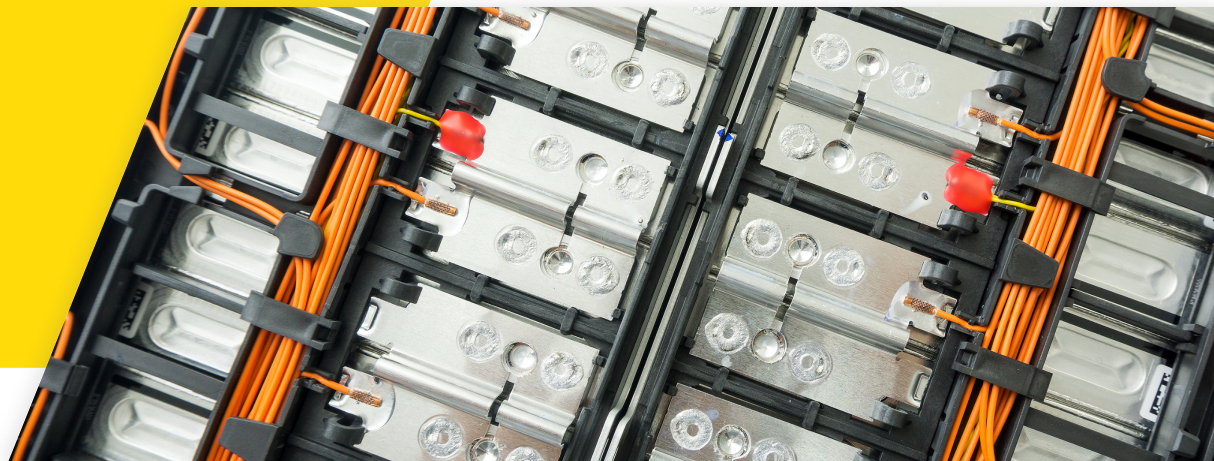
Contamination analysis



Microscopic & X-ray evaluation of the joint



RESULTS



Reliable, safe rivet solutions & production processes for Battery cells in EVs lead to:

- Improved vehicle reliability
- Reduced warranty exposure
- Sealing rivet & automation machine processes from a single source
- High-speed riveting solutions capable of handling large volumes
- Applications for both prismatic & cylindrical metal can cells
- Significant reduction in cell costs

