Lead-Acid Battery Vent Cap Inspection with Terahertz Technology

Non-contact, Non-destructive Testing of Hidden Vent Caps in Sealed Automotive Batteries

Introduction:
In automotive lead-acid battery manufacturing, vent caps are critical for safe pressure regulation and gas release. Once assembled, these vent caps are sealed beneath plastic covers, making conventional inspection methods ineffective. TeraLumen's terahertz inspection technology enables reliable subsurface verification of vent cap presence without disassembly, surface preparation, or production disruption.

Traditional Inspection & Challenges:

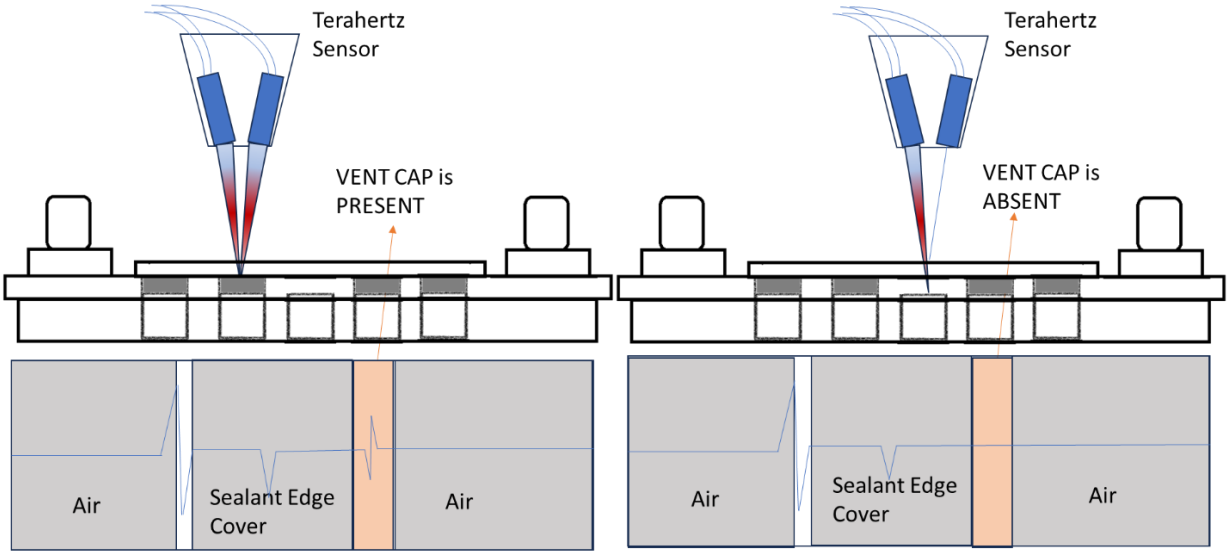
Visual Inspection: Limited to pre-assembly stages, once the battery cover is sealed, direct visual confirmation of vent cap presence is no longer possible.

Inspection Workflow:

Step 1: Scan
a terahertz pulse onto the sealed battery surface (single-side access)

Step 2: Detect
Capture reflections from internal interfaces—plastic, air gaps, and vent cap features

Step 3: Analyze
Extract signal features and classify: vent cap present vs missing (automation-ready)



THz Inspection Results & Key Advantages:

- Clear identification of acceptable and defective assemblies
- Single-side, non-contact inspection through plastic covers
- Reliable detection of vent caps beneath sealed covers
- Non-destructive and non-ionizing inspection method
- Automation-ready for inline production inspection

Conclusion:

TeraLumen's terahertz inspection technology provides a production-ready solution for verifying vent cap presence in sealed automotive battery assemblies. By enabling subsurface inspection where conventional methods fail, manufacturers can improve safety, reduce rework, and ensure consistent product quality.