# COMMERCIAL TRANSPORTATION

## Energy

The analysis indicated several structural issues for two battery packs. The team proposed several design recommendations that will help our client modify its design to ensure structural integrity.

### KEY DATA
Team Size: 1 Engineer
Time: May–June 2021
Location: Greensboro, NC
Project Package

### KEY TOOLS & TECHNOLOGIES
CAE Tools: ANSA, META, and Nastran

**ALTEN TECHNOLOGY**

# BATTERY PACK STATIC AND DYNAMIC ANALYSIS

## OVERVIEW
- Our client is developing a family of battery packs. These packs must operate reliably in a dynamic environment—the undercarriage of a truck. The structure must, therefore, survive dynamic loads
- Our client sought to validate the design via computer simulation before launching production

## PROJECT DETAILS
The emphasis of the finite element analysis is on the behavior of the enclosure of the battery packs as the main load-bearing element. The team performed the following set of analyses:

- **Inertia load**—Linear static analysis
  Structural analysis of battery cell strut enclosure to validate design and identify areas of improvement
- **Modal analysis**—Identification of resonance frequencies and the root cause
- **Modal transient analysis**—Durability analysis of battery cell enclosure; HVAC system mounts with respect to proving ground duty cycle
- **UN38.3 (Testing Requirements for Lithium-Ion Cells/Batteries)**
  > 38.3, T4—Shock Test: Analysis of entire battery pack structure subjected to half-sine shock peak and identification of structural issues
  > 38.3, T3—Vibration Test: Frequency response analysis of entire battery pack structure at 2 g excitation from 2 Hz to 200 Hz; identify key resonance frequencies and provide recommendations for improving the design concept