

CASE STUDY

Seismic-Rated Enclosures for Terminal High Altitude Area Defense (THAAD)

SUMMARY:

Seismic-Rated Enclosures Safeguard Missile Defense Electronics

Advanced missile defense installations on land require the same level of ruggedization expected at sea. A prime example is the U.S. Army's Terminal High Altitude Area Defense (THAAD) system – a mobile anti-their terminal phase en.wikipedia.org. Key electronic components of THAAD (such as communication systems, battle management computers, and radar control units) are housed in equipment racks that may be deployed in fixed emplacements or transportable shelters.

CHALLENGE:

The technical challenge was ensuring these racks could withstand not only transportation stress but also potential seismic events (earthquakes) or shock from interceptor launches, all while maintaining continuous operation of this critical defense system.

SOLUTION:

Optima Stantron provided a custom "M1/T4" Rugged Seismic Cabinet Platform for the THAAD program's electronics. This enclosure system is built with heavy-gauge steel framing and braced corners to survive intense shaking. It earned a Zone 4 seismic rating (comparable to telecom NEBS Zone 4), meaning the cabinet and its payload can endure severe earthquakes or ground vibrations without toppling or internal damage. The cabinet was subjected to rigorous shake-table tests simulating seismic tremors. Internally, shock-mounted trays and dampers were used for sensitive sub-components, offering additional isolation from sudden jolts. The design also factored in MIL-STD-810 environmental requirements – covering everything from overland vibration during transport to extreme temperature ranges – to ensure global deployability.

- **Earthquake-proof design:** Seismic reinforcement allows the enclosure to remain anchored and protect equipment through high-magnitude quakes or blasts. (Tested to maintain functionality under Zone 4 earthquake conditions.)
- **Robust construction:** M1-Series steel frame with internal cross-braces and secure anchoring points prevents flexing or tipping, even when supporting heavy payloads like servers, power units, and radio gear.
- **Environmental resilience:** Qualified to MIL-STD-810 for shock, vibration, and temperature, these cabinets shield electronics from the jolts of transporter trucks and the thermal extremes of outdoor sites.
- **Easy field deployment:** The cabinet platform includes features for quick setup in the field – forklift base slots, removable side panels for service, and compatibility with standard shelter mounting systems.



Figure 1 Optima M1 Type Cabinet

Outcome:

The seismic-rated enclosures have been safeguarding THAAD's critical electronic systems in deployments worldwide for over a decade. From desert test ranges to operational batteries, these cabinets have proven their reliability under fire and earth-shaking conditions alike. By securing sensitive missile defense electronics against environmental threats, Optima Stantron's solution helped ensure that the THAAD interceptors can be guided and controlled without interruption. The result is a stronger defensive posture: vital command-and-control hardware remains protected, stable, and mission-ready even when real-world conditions are at their worst.



Elma Electronic

A global leader in embedded computing solutions including integrated chassis systems, board products, modular enclosures, equipment cabinets.

Contact Info

☎ 510.656.3400
 ✉ sales@elma.com
 📍 44350 S. Grimmer Blvd.,
 Fremont, CA 94538

www.elma.com

