CASE STUDY

Evolving Precision Across a Multi-Generation EO/IR Gimbal Program

Netzer Precision supports leading defense EO/IR systems developers and their compact gimbal subsidiaries across multiple generations of stabilized imaging platforms deployed in airborne, land, and maritime environments.

By delivering ultra-thin absolute rotary encoders engineered for high-shock, high-vibration, and EMI-dense operating conditions, Netzer provided stable angular position feedback from early R&D through active production across multiple platform generations.

The result: precision that scaled with the program and the platforms it protects.

Case Study Snapshot

- **Industry** Defense & Aerospace
- **Application** Precision-guided missile sub-system (position sensing within guidance / stabilization assembly).
- **Environment** High shock (launch), extreme vibration, EMI-dense electronics, wide thermal range.
- **Program Context** Full-rate production defense program deployed across multiple platforms.
- **Why Failure Was Not an Option** Position error or signal corruption during operation can directly affect targeting accuracy and mission reliability.

The Challenge

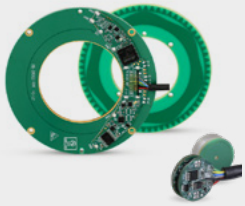
EO/IR stabilized gimbal systems operate in some of the most demanding environments in defense. Mounted on UAVs, armored vehicles, and naval platforms, these systems must maintain continuous and precise Line-of-Sight control while exposed to shock, vibration, and broadband electromagnetic interference.

As the customer's product roadmap evolved toward smaller, lighter, and more capable payloads, mechanical constraints became increasingly challenging. New platform generations required high-accuracy position feedback within compact, weight-sensitive assemblies without sacrificing reliability or environmental resilience.

Traditional optical encoders offer high accuracy but can be vulnerable to vibration-induced misalignment and contamination. Magnetic encoders tolerate harsh environments but introduce sensitivity to electromagnetic interference. The challenge was to achieve optical-class accuracy with the robustness required for real-world defense deployment.

The Netzer Solution

Netzer deployed its Electric Encoder™ technology, based on non-contact capacitive sensing, to provide absolute rotary position feedback across multiple generations of EO/IR gimbal platforms. The solution combined two complementary product families:



VLP Series

Sealed and encapsulated encoders for larger stabilization and rotation axes

DS Series

Ultra-thin hollow-shaft encoders optimized for compact and weight-sensitive gimbal assemblies

Models ranging from the DS-16 through DS-130, together with the compact VLP-25 platform, enabled the customer to standardize on a single sensing technology while supporting multiple payload sizes and performance requirements.

Unlike optical or magnetic alternatives, Netzer's capacitive sensing technology provides absolute position feedback with no mechanical wear, immunity to magnetic interference, and stable operation under vibration-intensive conditions. The technology bridges the gap between optical-class accuracy and the environmental robustness traditionally associated with magnetic solutions.

Supported by Netzer's EVL (Engineering Validation Level) methodology, the encoder platforms were successfully integrated from early development through qualification and production deployment across multiple generations of EO/IR systems.

Results & Reliability

Across multiple platform generations, Netzer encoders delivered stable angular position feedback under the vibration, shock, and EMI conditions that define real-world EO/IR deployment.

Capability	Performance
Accuracy & Repeatability	±0.006° to ±0.020° (axis and model dependent)
Operating Temperature	−55°C to +125°C (extended ranges per model)
Position Output	Absolute, no homing required on power-up
Shock Resistance	Qualified to military platform shock requirements
Vibration Resistance	Qualified to airborne and vehicle vibration profiles
EMI Immunity	Capacitive sensing with no magnetic field sensitivity
Mechanical Design	Hollow-shaft, sealed or encapsulated, ultra-low-profile options
Form Factor Range	DS-16 (16 mm OD) through DS-130 (130 mm OD); VLP from 25 mm OD

Over the course of the program, Netzer's encoder technology evolved alongside the customer's platform roadmap, supporting the transition from larger stabilization systems to increasingly compact gimbal architectures. This enabled the customer to maintain a common sensing technology across multiple generations of EO/IR platforms while continuously improving size, weight, and performance.

By combining high accuracy, environmental robustness, and scalable integration options, Netzer provided a sensing solution capable of supporting multiple generations of EO/IR systems from development through production deployment.

Key Takeaway

Modern EO/IR systems require position feedbacksolutions that maintain accuracy under continuous vibration, shock, EMI, and demanding SWaP constraints.

By combining non-contact capacitive sensing, absolute position output, and harsh-environment encoder architectures, Netzer enabled reliable Line-of-Sight stabilization across multiple generations of mission-critical EO/IR platforms.

Precision engineered to hold the line of sight through every environment the mission demands.

Netzer

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