



DIRECTED ENERGY



DECADES OF DISCIPLINE.
DESIGNED FOR WHAT'S NEXT.

Avion applies its legacy of over 30 years in disciplined engineering and program execution to one of the Department of Defense's most rapidly evolving mission areas: Directed Energy. With decades of experience supporting defense and aviation, our teams are uniquely positioned to grow and adapt in the High-Energy Laser (HEL) domain.

Core Capabilities

High Energy Laser (HEL) Systems Engineering

- Avion personnel possess comprehensive expertise spanning the complete High Energy Laser system integration lifecycle, from initial requirements development through final integration and testing phases. This end-to-end capability ensures seamless project execution and optimal system performance across all development stages.
- Beginning with vigorous requirements development and systematic mapping verification methods in the Requirements Verification Test Matrix (RVTM), our team possesses deep understanding of the most appropriate and cost efficient methods to prove and verify HEL systems are performing to specification.
- Avion's team recognizes that comprehensive Interface Control Documents (ICDs) form the foundation of effective system integration. These documents must precisely define mechanical, electrical, and communications interfaces across all subsystems to ensure seamless operation. Drawing from extensive laser system testing experience, Avion personnel also emphasize the critical need for detailed ICDs when interfacing with external systems, including sensor networks, battle management platforms, and safety systems.

Laser Safety

- High Energy Laser weapons demand an elevated understanding of safety protocols and their implementation. Avion maintains the Army's most experienced team of Board of Laser Safety certified laser safety officers who are uniquely positioned to address the complex safety requirements of HEL systems and BLS standards.
- HEL weapons necessitate specialized coordination with the Federal Aviation Administration and the Laser Clearinghouse for space object protection, areas where Avion has demonstrated extensive operational experience and proven capabilities.

Test Planning and Execution

- Avion is the Go-To organization for planning HEL system tests, training, and demonstrations. Our personnel have extensive experience in all aspects of HEL systems on DoD test and training ranges.
- Avion's employee-owners emphasize the importance of system diagnostics every day to verify systems are performing properly.
- Avion develops and deploys software tools to shape ballistic trajectories and UAS flight paths that meet HEL test engagement parameters while satisfying FAA, range safety, and Laser Clearinghouse requirements. These advanced modeling and control capabilities enable comprehensive testing against diverse threat profiles, including unmanned aircraft systems, rockets, artillery, mortars, and cruise missiles, providing realistic engagement scenarios for thorough HEL system validation.
- Our team maintains active collaborations with multiple government UAS test organizations and possesses comprehensive knowledge of Group 1-3 UAS operational constraints, including altitude limitations and airspeed parameters. This expertise is seamlessly integrated with Requirements Verification Test Matrix protocols and safety standards to deliver efficient, compliant High Energy Laser system testing, training, and demonstration programs that meet all regulatory and operational requirements.

HEL Test Component Design and Development

- During laboratory integration and testing phases, HEL systems require full power operation—such as 50 kW emissions—to validate complete support system functionality. Avion has engineered and supported the integration and testing of laser systems utilizing beam dumps with capacities up to 100 kW, ensuring safe and effective high-power operations.
- To enhance passive sensor tracking algorithm development and validation, Avion personnel designed and constructed a remotely operated random motion tracking target capable of safe deployment at laser test ranges. This innovative solution provides realistic target dynamics while conserving valuable resources during laser system testing campaigns.
- Avion has also developed specialized HEL beam analysis tools that enable rapid evaluation of HEL system performance, delivering immediate feedback during developmental testing of emerging weapons systems.

HEL System Deployment

- As HEL prototype weapons enter the Army, growth is required in DOTMLPF-P to properly and efficiently deploy laser weapons. This includes effective integration into Army battle management systems as well as specific laser weapon fire control algorithms. It also requires weapon controls to be tailored for the operational environment. Avion has provided critical personnel and expertise in establishing HEL weapons for key infrastructure protections, including working with the FAA and the U.S. Army.
- Avion has engineered advanced modeling and simulation tools that optimize threat engagement planning across diverse operational scenarios. These sophisticated systems account for multiple critical engagement parameters, including target classification and priority levels, target velocity profiles, laser weapon system characteristics, established laser keep-out zones, and real-time environmental conditions.

UAS Targets for HEL System Development, Test, and Training

- Avion maintains a team of certified UAS pilots with extensive Group 1 and Group 2 UAS operational experience. Given the concentration of UAS detection and defeat technology development within the Huntsville Research Park, there is a critical need for cost-effective preliminary testing capabilities before progressing to expensive government test and training ranges. Avion personnel possess years of specialized experience collaborating with Redstone Army Airfield and the FAA to secure airspace waivers for controlled flight operations in RAA airspace.
- The Army has provided two unmanned aircraft systems to Avion for modification and flight operations in support of Army HEL system development programs. Responding to specific Army requirements, Avion personnel successfully modified two rotary-wing UAS platforms to incorporate command-activated payload carriage and release capabilities, which were subsequently demonstrated and validated during Army test range operations.

Work With Us

From early systems engineering through operational deployment, Avion supports the full lifecycle of HEL weapons systems. We bring advanced capability in requirements development, interface control, verification testing, range coordination, and laser safety. We provide real-world solutions in the lab, on the range, and in theater—shaping test architecture, modifying unmanned systems, developing HEL test components, and designing simulation tools to inform mission planning.

Avion is expanding in Directed Energy to meet emerging threats across the Joint Force. We understand what it takes to deliver proven capability in complex and evolving environments—and we are actively investing in the people, tools, and technologies that will define the future of laser weapons.



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