WHITE PAPER



The Use of Battlefield Lasers and the Effectiveness of KWESST BLDS



Battlefield Laser Detection System Soldier Proof of Concept 4 - BLDS SPOC4 (**Note:** the displayed form factor is subject to change and will be more adapted to its final purpose)

Provided by:

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// Executive Summary

The prevalence of laser systems on the modern battlefield is increasing and Laser Range Finders (LRFs), Laser Target Designators (LTDs), LiDAR and beam-riding weapons are posing significant threats. Laseraided weapons considerably increase lethality on the battlefield by enabling precise, rapid, and versatile strikes with conventional munitions. In Ukraine, systems like Russia's Krasnopol and Kornet, or Ukraine's APKWS, have demonstrated high lethality against armour, drones, and fortifications. Their accuracy has made them a critical asset in modern warfare. Russian forces employ laser systems to enhance precision, disrupt enemy operations and protect their own assets.

KWESST's Battlefield Laser Detection System (BLDS) offers instant warnings that buy precious seconds to take defensive action and initiate countermeasures to a laser threat. The low cost of BLDS allows it to be deployed as personal protective equipment (PPE) which enhances survivability of dismounted soldiers and force protection as a whole across the battlefield.

Compared to existing Vehicle Protection Systems the affordability allows for a wider application on logistic vehicles in addition to tactical vehicles. The price allows to dispense with costly in-service support (ISS) and turns the BLDS into a consumable. BLDS offers flexible deployment options on personnel and vehicles and will be offered in appropriate form factors.

By the fall of 2025 BLDS will be networked and integrated with existing battle management applications thereby increasing situational awareness across tactical and operational levels.

In addition to providing real-time detection, BLDS captures the laser pulse-train data enabling identification the laser to determine friend or foe (IFF) or initiate countermeasures.

// Key Technologies

At the core of the BLDS concept are three critical technological components that enable its effectiveness on the modern battlefield:

- Advanced Laser Detection Sensors: The BLDS detects laser emissions as low as 10 µW across the 900–1550 nm wavelength range, effective at over 2 km in all conditions. Ongoing advancements in signal processing continue to extend this range, ensuring reliable detection of laser-guided munitions and optical sensors.
- Networked Force Integration (coming fall 2025): The BLDS is designed for compatibility with existing battlefield management systems, including the Nett Warrior and ATAK systems, providing real-time situational awareness across command echelons. This connectivity allows for immediate threat communication, enabling rapid responses across the entire operational area.
- Laser Pulse Train Capture: A software-defined enhancement to BLDS, this feature will allow analysis
 of laser pulse patterns to identify the source, intent, and affiliation of laser emitters. By comparing
 real-time detections with a customer-built library of known allied and adversary signatures, the system
 can distinguish between Blue and Opposing Force and identify specific systems—supporting rapid,
 informed tactical decisions. Continuously updated through operational learning, the LPT capture
 ensures adaptability to evolving laser threats.

Significantly, the BLDS is designed as a low-cost, consumable product that requires no in-service support, offering a scalable and sustainable capability across large formations. Its affordability allows for widespread deployment at the individual soldier, vehicle, or infrastructure level, making it a practical solution for modern high-threat environments. BLDS will integrate easily with standard soldier and vehicle power systems.

// Current Operational Context

Recent conflicts, particularly those in Ukraine and other high-intensity, peer-to-peer environments, have highlighted the need for advanced protection against laser-guided threats. Modern warfare increasingly involves a complex spectrum of laser-based systems designed to guide, track, and disable enemy assets. These threats pose unique challenges to conventional defensive systems, which were not originally designed to handle the rapidly evolving nature of lasers.

Laser-guided threats have become a prominent method of precision targeting, and while laser technology has been in use for decades, recent advancements have increased both the range and accuracy of these systems.

Furthermore, the increased prevalence of lasers underscores the necessity for military forces to adopt laser detection technologies capable of operating in a wide range of environments, including rapidly moving platforms, urban settings, and in the presence of countermeasures.



// Threats from Lasers

Laser-Guided Missiles and Precision Targeting Systems

- **Technical Details:** Laser-guided missiles use lasers to "illuminate" a target, with the missile tracking the reflected light to home in on the target. These systems often employ Class 3B or Class 4 lasers that emit high-powered beams in the near-infrared spectrum. Their range can exceed several kilometres, depending on the power of the laser and the accuracy of the targeting system.
- BLDS Response: The highly sensitive BLDS detects laser illumination from such systems emitting signals down to 10 µW across the 900–1550 nm wavelength range, including both pulsed1and continuous wave lasers 2. Accurate detection enables the system to deliver critical early warning, allowing for timely activation of countermeasures such as evasive manoeuvres or the deployment of electronic warfare tactics to disrupt or deceive hostile tracking systems

Blinding and Dazzling Lasers

- Technical Details: Some laser systems are designed to temporarily blind or dazzle optical sensors, causing disorientation or damage to the target's visual systems. These lasers typically operate in the visible or near-infrared spectrum (around 800–1100 nm) and can have power levels in the Class 3B to Class 4 range, depending on the specific type of system used. The purpose of these systems is to impair the enemy's ability to see or effectively use their targeting equipment, particularly on vehicles and aircraft.
- BLDS Response: The BLDS can detect these high-intensity near-infrared lasers with rapid precision. With a detection time of under 300ms, operators receive immediate feedback, enabling them to employ countermeasures.

Range finding and Targeting Lasers

- **Technical Details:** Range finding lasers are often employed by adversaries to calculate distances or Class 3R) and operate in the near-infrared spectrum. Though they are not inherently destructive, they provide crucial data to targeting systems, making them a critical component of modern military precision strike capabilities.
- BLDS Response: The BLDS reliably detects even these low-powered lasers, as low as 10 µW, across the 900–1550 nm wavelength range. This early warning allows operators to anticipate and disrupt the adversary's targeting calculations, either by altering the target's position or by deploying appropriate countermeasures to interfere with the laser's accuracy.

Tracking and Surveillance Lasers

Technical Details: Tracking lasers are commonly used for surveillance purposes, including the tracking
of movements or the identification of targets. These lasers typically operate between 900 – 1550nm
and include rangefinders, short, medium and long-range LIDAR, target designators and drone-based
trackers. The information gathered by these systems is used to maintain continuous surveillance and
track the movement of personnel, vehicles, or entire formations.

 BLDS Response: The BLDS can detect these tracking lasers. The system's high sensitivity ensures that even low-intensity laser threats, designed to provide intelligence rather than immediate damage, are detected with enough time for counteraction.

// The BLDS Advantage

The integration of the BLDS with military platforms provides several key advantages:

- Real-Time, Actionable Intelligence: The system delivers exceptional sensitivity and ensures reliable identification of low-power threats in diverse conditions. Tested at distances beyond 2 km under all ambient environments, it continues to push the limits of detection range through advanced signal processing—providing unmatched situational awareness and enabling rapid, informed threat responses.
- **Seamless Integration:** The BLDS integrates with existing battlefield networks, ensuring that threat data is disseminated quickly across all command levels, providing coordinated, timely responses.
- Flexible Deployment: Whether mounted on vehicles, worn by personnel, or integrated into infrastructure, the BLDS adapts to a wide range of mission requirements, offering protection across air, land, and sea.

// Conclusion

In an era marked by the rapid proliferation of advanced laser-based targeting and guidance systems, the ability to detect and counter these threats is critical to force protection, tactical flexibility, and mission assurance. KWESST's Battlefield Laser Detection System (BLDS) delivers a cutting-edge, real-time solution for laser threat detection and response. Designed for seamless integration into existing C5ISRT3 architectures, the BLDS acts as a force multiplier, enhancing individual soldier survivability and increasing the combat effectiveness of manoeuvre elements and fixed installations in contested environments.

Engineered as a low-cost, consumable asset, the BLDS requires no in-service support, enabling scalable deployment across dismounted troops, combat vehicles, and critical infrastructure. Its affordability and simplicity support mass fielding across large formations, delivering a sustainable and adaptable countermeasure against modern laser threats in high-tempo, high-threat operational settings.

// About KWESST

KWESST develops and commercializes proprietary next-generation tactical systems that advance operational effectiveness and survivability for military and public safety personnel deployed at the Tactical Edge: those commanders, soldiers, operators, and first responders conducting operations primarily in the dismounted domain (on foot and on and off vehicles). KWESST capabilities and market offerings are grouped into three main lines of business: Digitization, Counter-Threat, and Less-Lethal

Digitization encapsulates KWESST's focus on the Integration and Exploitation of Digital Information at the Tactical Edge and represents the company's core offering to the military and public safety market. KWESST's team of highly experienced systems, software, mechanical and electrical engineers, as well as military veterans, have hundreds of years of collective experience in the military systems integration market leveraging the ground-breaking and force-enabling advantages of Team Awareness Kit (TAK).

Counter-Threat products are TAK-integrated and include: the Battlefield Laser Detection Systems (BLDS) designed to counter the growing threat of weaponized lasers and laser designators against ground personnel vehicles and infrastructure.

Non-Lethal products include the PARA OPS and ARWEN less-lethal product lines for personal defence, public safety, and realistic training. Product offerings such as low-energy cartridges, specialized projectiles, and launchers for personal and professional use collectively introduce a new era in safe, reliable, and effective tools for next-generation non-lethal missions.

KWESST is headquartered in Ottawa, Canada; KWESST trades on the TSXV and Nasdaq under the symbol KWE.

BLDS SPOC4 BATTLEFIELD LASER DETECTION SYSTEM HIGH-SENSITIVITY, REAL-TIME LASER THREAT DETECTION FOR THE MODERN WARFIGHTER

ENGINEERED FOR PRECISION, BUILT TO PROTECT

Battlefield Laser Detection System – Soldier Proof of Concept 4 (BLDS) empowers military operators with the speed and situational awareness required to survive and dominate in a laser-threat environment. Whether on foot or in a vehicle, soldiers equipped with BLDS gain a decisive edge through early warning, threat identification, and integration with the broader tactical network.

Applications:

- Dismounted soldiers Vehicles Vessels
- Command posts Forward operating bases
- Critical infrastructure protection



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// PRODUCT OVERVIEW

Laser-enabled threats—such as Laser Rangefinders, Laser Target Designators, and Beamrider Missiles—are increasingly present across modern battlefields. These systems pose significant risks to personnel, vehicles, and critical infrastructure.

To address this evolving threat landscape, KWESST Inc., has developed the BLDS SPOC4. This advanced sensor provides realtime alerts on the presence, location, and type of laser threats, enhancing operator survivability and enabling future capabilities such as automated threat classification and coordinated response.

Crucially, the BLDS is designed to be low-cost, fully consumable, and maintenance-free—making it ideally suited for scalable deployment across dismounted forces, vehicles, and fixed installations. Its affordability and ease of use ensure sustained readiness and operational flexibility in high-threat environments.

// KEY FEATURES

Broad Spectrum Detection

 Detects laser threats across a wide operational spectrum (900–1550 nm / 0.9–1.55 µm)

Extended Range

 High-sensitivity sensors detect lasers at ranges beyond 2 km

Interference-Free Operation

 Designed to operate in high-clutter environments without causing false alarms

Modular & Scalable

 Easily integrates with Nett Warrior systems and soldier-worn or vehiclemounted platforms

Network-Ready (TAK Compatible, 2025 Roadmap)

- BLDS leverages the Tactical Assault Kit (TAK) framework for real-time networked alerts and situational awareness
- Seamless integration with existing Battle Management Applications (BMA)

Actionable Intelligence

- Laser pulse-train capture to identify and classify laser sources
- Differentiates between blue
 force and opposing force emissions
- Enables precise, informed decisionmaking at all echelons

Current Readiness

• Technology Readiness Level 6 (TRL6) Future Development

- Expanded deployment on both soldier and vehicle platform
- Full integration with battlefield networks
 Enhanced threat identification and
- classification features

