



Proximity Detection & Collision Avoidance

Strata's solutions for surface, underground, and surface-to-underground



HazardAVERT®

Proximity Detection & Collision Avoidance

Strata Worldwide brings decades of R&D expertise and real-world industry experience in proximity detection and collision avoidance technology. Working closely with operations around the world, Strata continues to advance and refine its safety solutions.

HazardAVERT® is a safety system that uses electromagnetic technology to protect workers in mining and construction. It helps prevent accidents by identifying dangerous areas around moving equipment and warns people about these risks.

The system assists machine operators in seeing blind spots and moving safely in low-light or tight spaces. If a person or vehicle enters a high-risk area near active machinery, the system sounds alarms and can automatically stop the equipment. By using HazardAVERT, workplaces can improve safety and raise awareness about potential dangers.

- **Machine-to-Machine**
- **Machine-to-Person**
- **Machine-to-Stationary Equipment**
- **Perimeter creation around targeted zones**

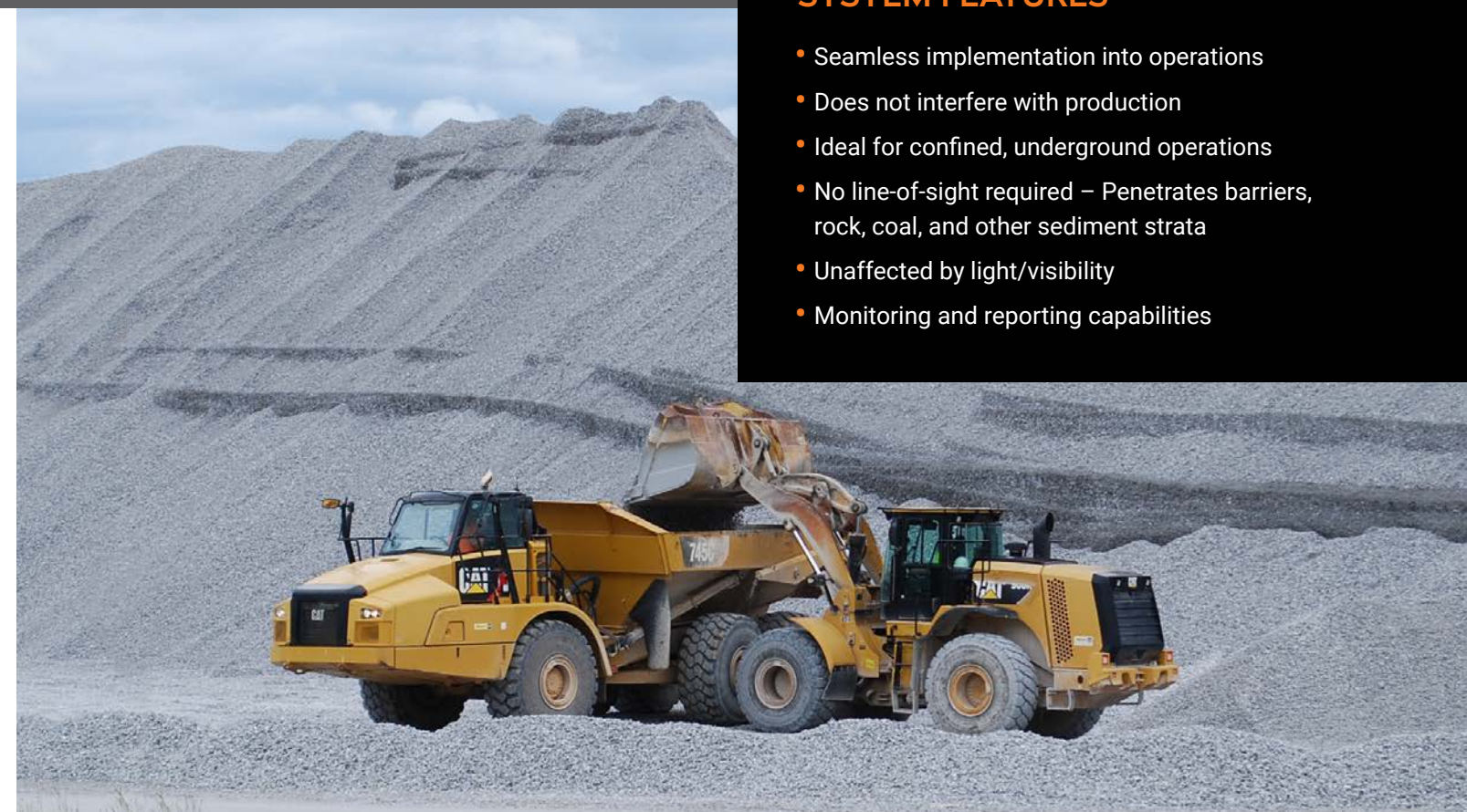
HazardAVERT® has been effectively used on all types and sizes of mobile machinery and vehicles and is OEM agnostic.

ADVANTAGES of HazardAVERT Second Generation

- Enhanced noise mitigation - Improves zone detection, system function and communication
- Controls and synchronises machine generators - Ensures safe, efficient coordination and prevents interference or operational conflicts between machines
- Fail-to-safe with lower maintenance costs – Self-diagnostics provide real-time system status updates, alerts, and screen display reporting to confirm proper operation, support component functionality, and help reduce maintenance costs.
- Reporting and Data Analytics – All system data, activities, and alerts available on the SafeSITE portal at the surface. Online accessibility to data provides actionable insight into operations and incidents
- Streamlined installation – Promotes faster deployment
- Backward compatibility – New PAL+ wearable device backward compatible with all system generations, allowing incremental upgrades without disturbing operations
- Quality and reliability – Assessed and certified as meeting the requirements of ISO 9001:2015 in the United States, South Africa and Australia. Compliant with ISO 21815-2021 performance requirements.

USER EXPERIENCE & SYSTEM FEATURES

- Seamless implementation into operations
- Does not interfere with production
- Ideal for confined, underground operations
- No line-of-sight required – Penetrates barriers, rock, coal, and other sediment strata
- Unaffected by light/visibility
- Monitoring and reporting capabilities





PAL - Proximate. Alert. Locate

Arm or vest-worn Personal Alarm Device (PAD) for audiovisual proximity warning alerts and personal location tracking. Includes a push-button input for emergency notifications, remote stop, and system override.



PROXIMITY MODULE/GENERATOR

Mounted on machinery, creates electromagnetic zones (fields). Multiple generators enable custom zone shaping. Can incorporate Vehicle Alarm Device (VAD) to detect other vehicles.



DISPLAY SCREEN

User Interface display with audiovisual alarms for machine operator. Multiple modes and displays for system operating status, zone breaches, maintenance and diagnostics. Includes number of PADs and VADs within range and provides lists of Miner ID's.

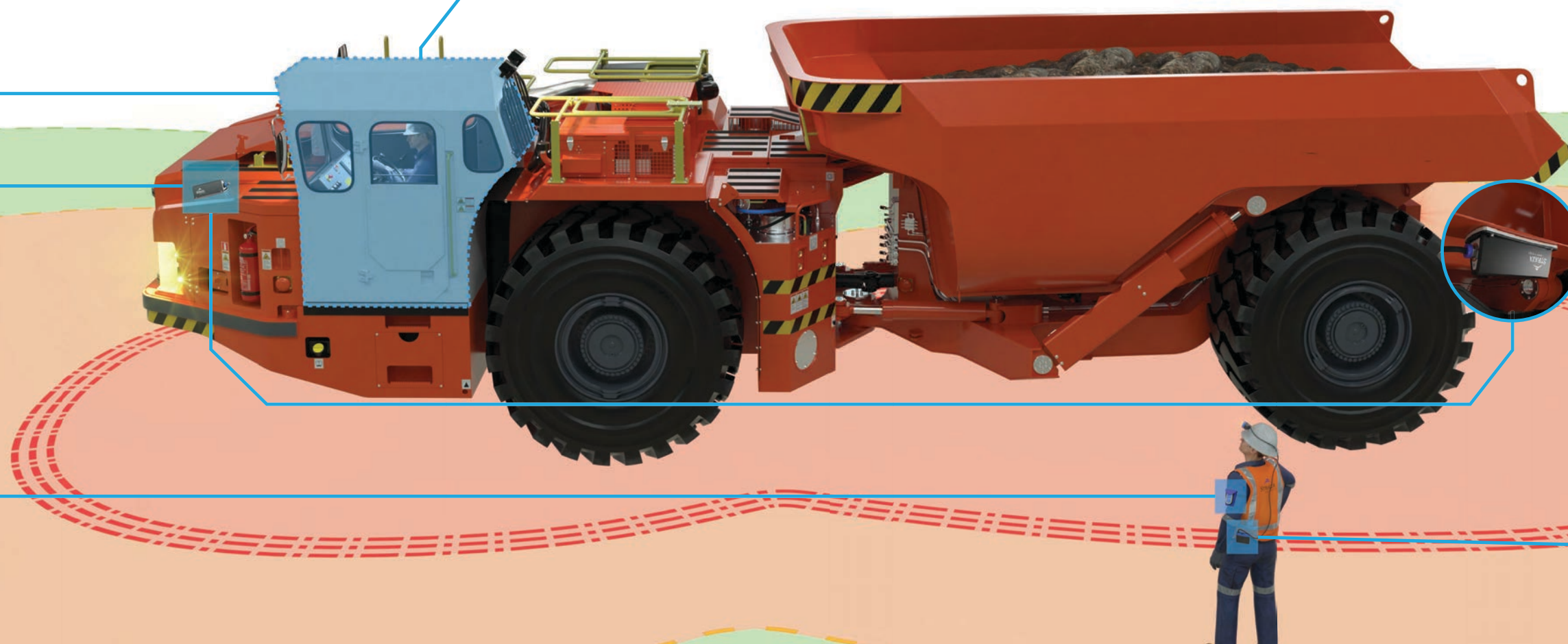
PAL+ Proximate. Alert. Locate

Belt-worn Personal Alarm Device (PAD) with LED cap lamp. Audiovisual proximity warning alerts, personal location tracking, and trapped-miner recovery sensors. Includes two push-button inputs for emergency notifications, remote stop, emergency override, and trapped-miner alerts.



INTERFACE MODULE

Central control and power management module for the system, handling logic, zone behaviour, and Silent Zone functionality with event logging and data capture. It supports machine integration via configurable relays and CANbus connectivity (ISO 21815-2021 compatible) for application-dependent interlocking or intervention. Data can be accessed via Wi-Fi or Ethernet for review and analysis.



ID ZONE

Outer zone - Up to 150m.
Used to define the range of the marker field, log miner IDs within zone, and perform other record-keeping functions. No alarms triggered. Machine operators can view miner IDs within the zone using the vehicle display screens.

SILENT ZONE

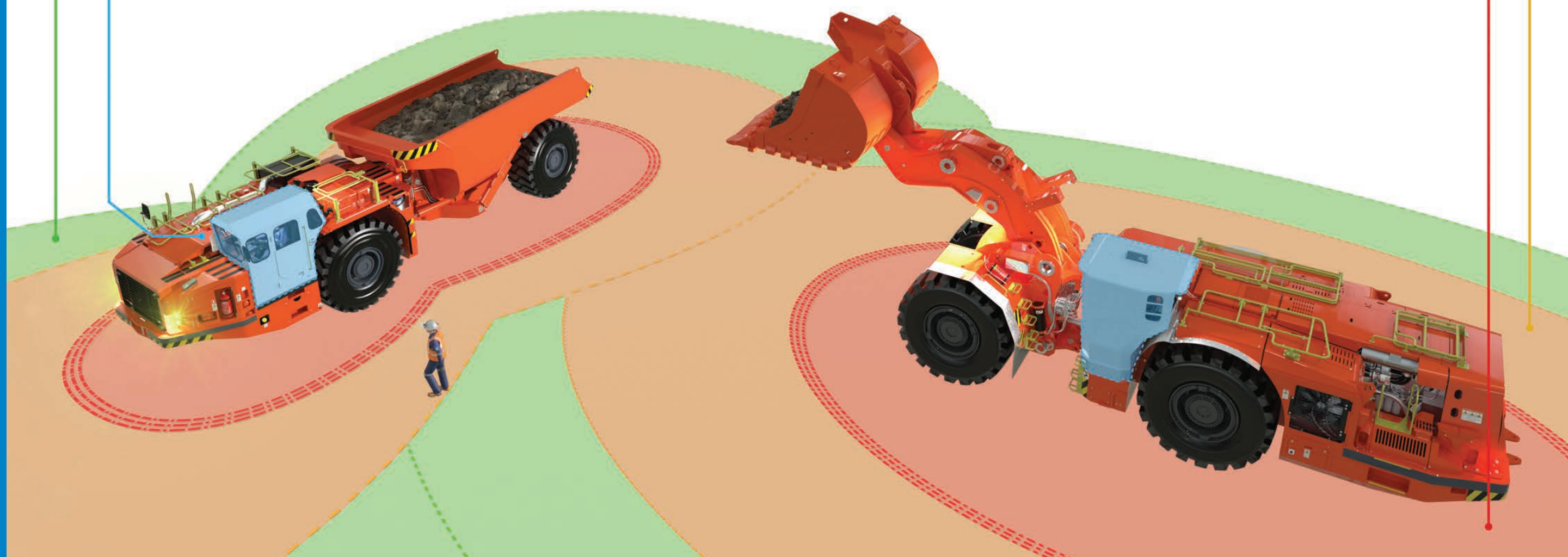
Exclusion area within hazard zone to enable operators to work on machinery without triggering the system. As soon as the operator exits the silent zone, the hazard zone will be triggered.

WARNING ZONE

Middle zone - Up to 45m.
A breach triggers audible and visual warnings on individual PADs and vehicle display screen simultaneously. Vehicles with level 9 interfacing will automatically slow/crawl without operator intervention.

HAZARD ZONE

Inner zone.
A breach triggers audible and visual alerts on individual PADs and vehicle display screens simultaneously. Vehicles with level 9 interfacing will automatically stop without operator intervention.





Integrated underground technologies optimize operational connectivities and enhance worker safety.

Strata’s next-generation HazardAVERT system elevates safety by seamlessly integrating multiple safety functions into a single wearable device. The new personal alarm devices, PAL and PAL + (Proximate. Alert. Locate), work in conjunction with StrataConnect’s wired and wireless networks to enable the sending and receiving of alerts and real-time location tracking. Instant data is displayed on the SafeSITE™ user dashboard and interactive mine map at the surface.

SafeSITE™
SafeSITE Portals



PAL

Arm- or vest-worn personal alarm device (PAD) for audiovisual proximity warning alarms, emergency notifications, and location tracking. Rechargeable lithium-ion battery with 19hr battery-life.

FEATURES

- Compatible with Gen 2+ systems
- BLE tracking via SafeSITE server
- Multi-colored LED ring for system status notifications and alerts
- Single push button for various functions
- Emergency remote stop and temporary emergency override capabilities
- Magnetic field range 40m (adjustable)
- Wi-Fi connectivity on charger for wireless software updates and configuration
- IP 65 Housing

PHYSICAL DIMENSIONS

Length	100.6 mm
Height	66.1 mm
Depth	21.2 mm

PAL+

Belt-worn personal alarm device (PAD) with LED cap lamp. Audiovisual proximity-warning alarms, emergency alerts, location tracking, and trapped-miner recovery. Rechargeable lithium-ion battery with 24 hour battery life (20 hr at full beam, 4 hr in reduced power mode)

FEATURES

- Gen 1, Gen 2, Gen2+ and future Gen 3 compatible
- BLE, Wi-Fi or CommTrac tracking via SafeSITE server
- Sounder, and display for system notifications, alerts
- Two buttons for various functions
- Emergency remote stop and temporary Emergency Override capabilities
- Magnetic field range 45m (adjustable)
- Wi-Fi connectivity on charger for wireless software updates, configuration, and pre-planned battery maintenance
- IP 67 Housing

PHYSICAL DIMENSIONS (Base)

Length	130 mm
Height	108 mm
Depth	49 mm

PAL+ CAP LAMP

- Cap lamp includes a front-angled proximity warning LED to alert wearer and surrounding users
- Communication with PAL+ base allows monitoring and control of cap lamp
- Three brightness settings for main cap lamp LED that can also be processor-controlled for additional signaling



Strata Last Known Location and PAL+ Trapped Miner Locator

Strata’s Last Known Location and PAL+ Trapped Miner Locator systems help mine operators and rescue teams quickly locate personnel in an emergency.

Integrated with Strata’s tracking system, Last Known Location displays miners’ positions on a control room’s digital mine map to help narrow down the search area. Underground, rescue teams use a lightweight handheld scanner to detect signals from miners’ PAL+ cap lamps and receive audiovisual feedback for directional guidance.

Rapidly Locate Trapped Miners When Every Second Counts.



KEY FEATURES

- Pinpoint miners’ last known location
- Directional search capability for underground rescue operations
- Up to 100 m last known location accuracy
- Up to 30 m signal detection range
- Audible and visual alerts guide rescuers
- Rapid deployment during emergency response



HazardAVERT® Display Screen

Display screens function as the machine operator's interface. They incorporate a sounder and five (5) soft-key push buttons to toggle through various modes of information.

- Generator field status (off/on)
- Audio/visual alerts for zone breaches
- PAD and vehicle ID listings – Including outermost ID zone
- System maintenance and diagnostics, including potential fault conditions

Screens include CANbus capabilities.

AUDIOVISUAL WARNING ALARMS

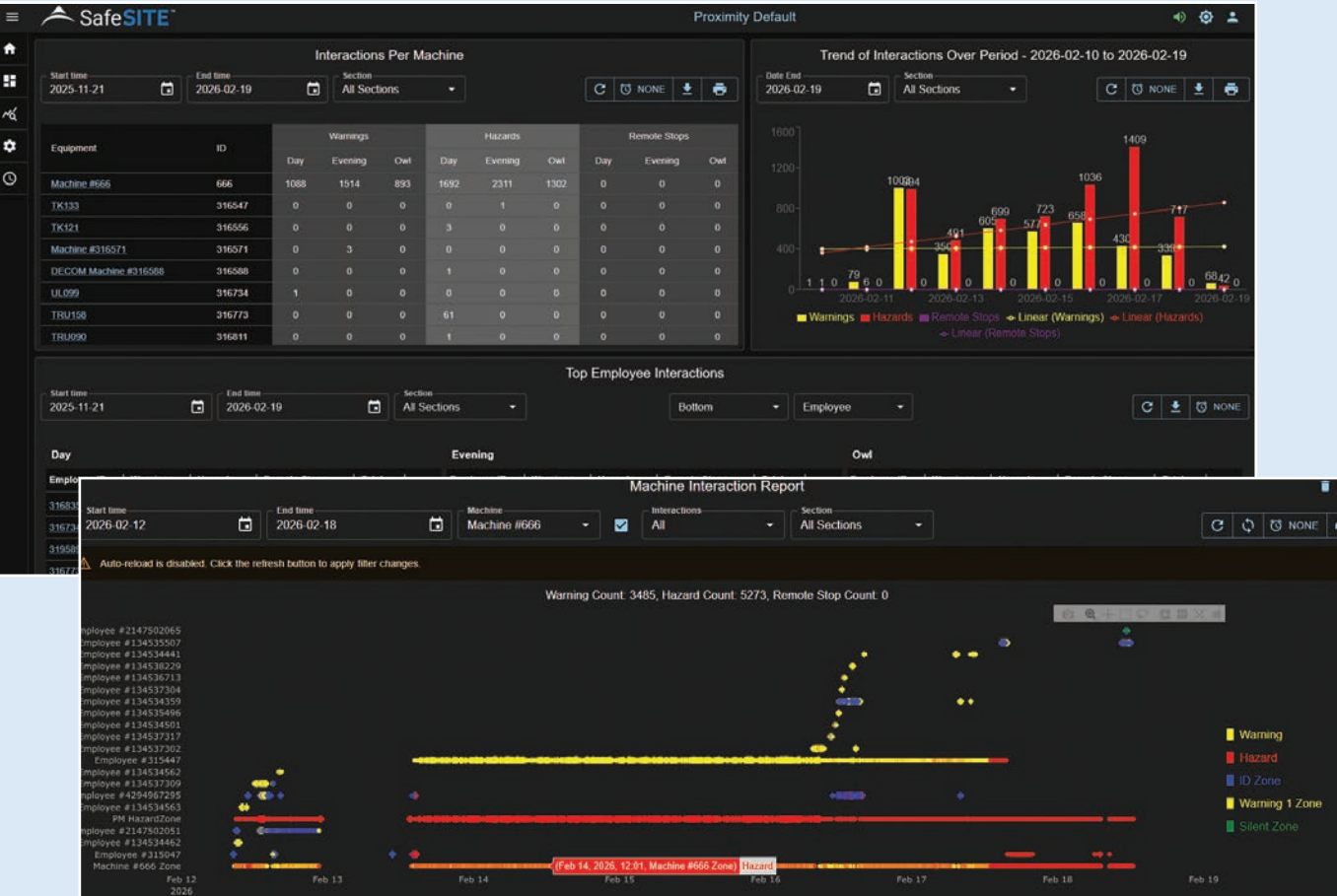
- Immediately alert the operator of zone breaches - warning or hazard zone
- Indicates the position of the hazard if a multi-generator system is installed
- Differentiates between persons and vehicles
- Detects and identifies all PADs and vehicles, and indicates the number of each within range
- Enables customized machine interactions
- Allows field configuration

Monitoring and Reporting with SafeSITE™

UNLOCK INSIGHTS INTO YOUR OPERATIONS, ENSURING SAFETY AND EFFICIENCY

All system events are logged in real-time, with data readily available for analysis and reporting. In underground applications, data is transmitted using open-standard Wi-Fi, Ethernet or StrataConnect. For surface applications, data can be downloaded and reviewed on various devices.

- Generate comprehensive reports that provide operational insights.
- Enhance training programs and optimise workflows to improve overall performance.



MONITOR

- System interactions by personnel and by machinery
- Working and safety practices
- System breaches by zones and duration of breach
- Remote stops
- Emergency overrides

REPORTING OPTIONS

- Safety activity and trends
- Productivity efficiency and trends
- Last known location for miners

Hazard**AVERT**® Sees What People Can't, and Reacts When People Don't.

Hazard**AVERT**® satisfies the Earth Moving
Equipment Safety Round Table (EMESRT)
level 7, 8 and 9 requirements*

Level 7/8 – Audible and visual alarms to enhance operator awareness and provide the ability to understand potential hazards in close proximity. Operator is required to intervene.

Level 9 – Intervention Controls – Automatic intervention to take control of equipment to prevent or lessen an unsafe interaction. Hazard**AVERT**® can slow, stop or disable hydraulics of machinery without operator intervention.

* Level 9 machine functions that may be controlled by the proximity system CANbus are determined by the customer and the equipment OEM.

Proximity Detection & Collision Avoidance

Strata's solutions for surface, underground, and surface-to-underground



AFRICA

Unit 15, Saligna Business Park
3 Saligna Street, Boksburg, 1459
T: +27 12 450 0960
marketing@strataworldwide.com

AUSTRALIA

Unit 3, 52 Riverside Drive
Mayfield West, NSW 2304
Tel: +61 1300 054 469
info.au@strataworldwide.com

AMERICAS

8800 Roswell Road, Suite 145
Sandy Springs, GA 30350 USA
TF: 800-691-6601
T: 770-321-2500
F: 770-321-2520
info@strataworldwide.com

www.strataworldwide.com