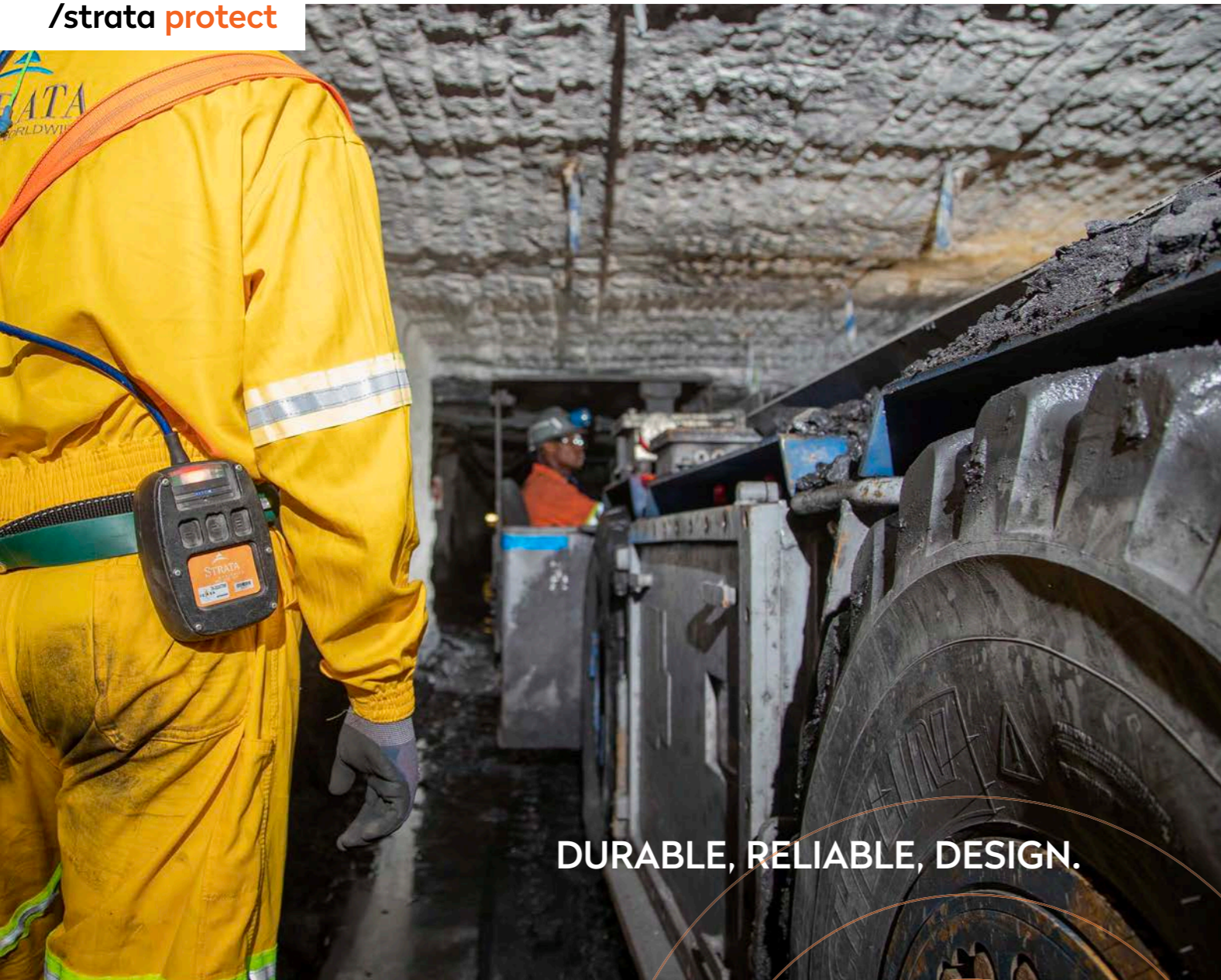




## Proximity Detection & Collision Avoidance for Underground Coal Mines



/strata protect



DURABLE, RELIABLE, DESIGN.



HazardAVERT® is a proven safety technology designed to overcome some of the most prevalent causes of injuries and fatalities in mining today: accidents and collisions involving operating machinery.

HazardAvert is an electromagnetic, near-field system with both alerting (Level 7) and equipment interlocking (Level 9) safety functions for the prevention of accidents. The system works by producing electromagnetic fields that fully encompass the host machinery, and when these fields are breached by a person or another piece of equipment, audible and visual warning alarms are triggered.

Equipment interlocking capabilities automatically slow and stop machinery, ensuring the highest level of personnel safety.

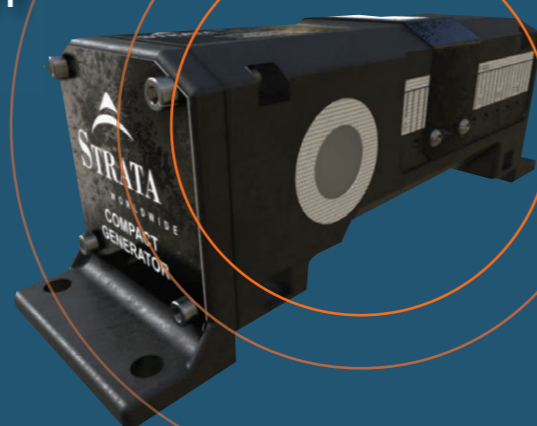
#### SAFETY FEATURES & USER EXPERIENCE

- Machine-to-Person and Machine-to-Machine detection
- Promotes safe working practices
- Highly stable, reliable, and repeatable zones
- Equipment interlocking for autonomous slowing and stopping
- Detects people and machinery no matter position, direction of travel or orientation
- Unaffected by visibility
- Penetrates coal, rock, gravel, mud, water, ventilation curtains and barriers
- Functions with multiple vehicles and workers in close proximity without latency
- Wireless monitoring and reporting capabilities

#### HAZARDAVERT® SEES WHAT PEOPLE CAN'T AND REACTS WHEN PEOPLE DON'T.

Strata Worldwide has years of R&D and real-life experience with proximity detection and collision avoidance technologies. Working closely with mine managers and personnel around the world, the company continues to expand and enhance its safety technologies.

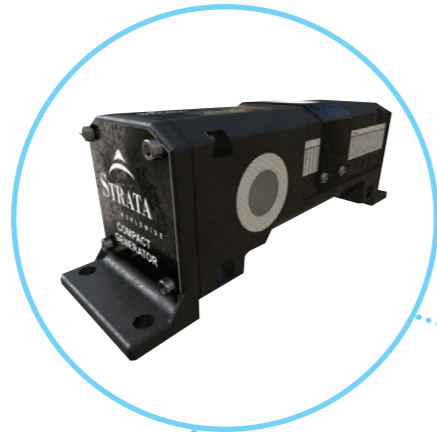
HazardAVERT® - Near-field electromagnetic detection, alarm and interlocking system for surface and underground



# HazardAVERT® System Components

## GEN2 GENERATORS

- Installed on machinery
- Generate and detect electromagnetic zones
- Warning and Hazard
- Machine-to-Person Detection
- Machine-to-Machine Detection



## ALERT FLASHER

- Machine mounted visual alarm
- Flashing LED when zones are breached
- Flashing LED when the system put in temporary emergency bypass



## GEN2 CONTROLLER BOX

- Monitors system status
- Coordinates interaction between generators
- Controls equipment interlocking
- Supports camera input
- Wi-Fi for data system configuration, field adjustments



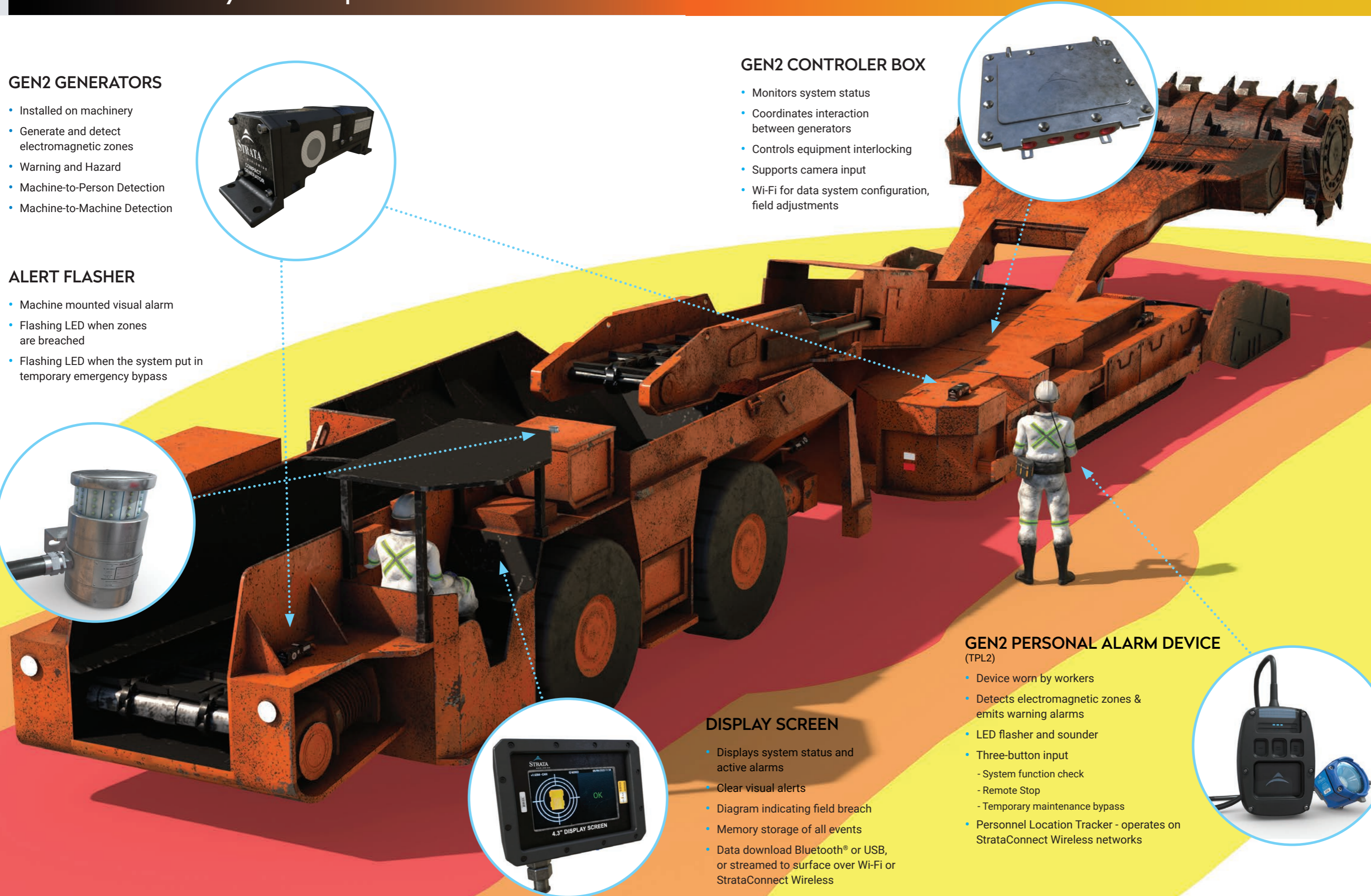
## GEN2 PERSONAL ALARM DEVICE (TPL2)

- Device worn by workers
- Detects electromagnetic zones & emits warning alarms
- LED flasher and sounder
- Three-button input
  - System function check
  - Remote Stop
  - Temporary maintenance bypass
- Personnel Location Tracker - operates on StrataConnect Wireless networks



## DISPLAY SCREEN

- Displays system status and active alarms
- Clear visual alerts
- Diagram indicating field breach
- Memory storage of all events
- Data download Bluetooth® or USB, or streamed to surface over Wi-Fi or StrataConnect Wireless

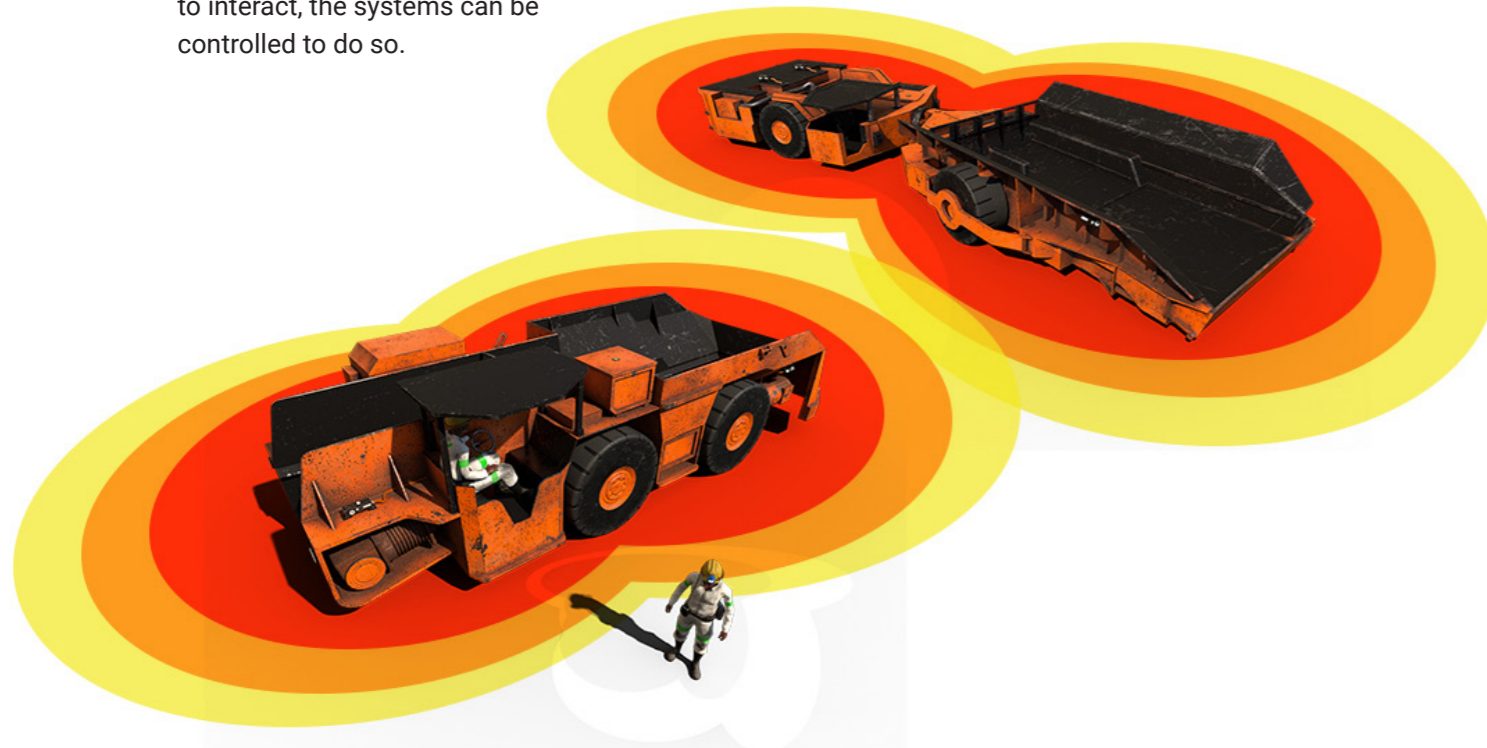


## HazardAVERT® Gen2 Collision Avoidance

HazardAVERT® Gen2 for underground coal mining provides vehicle-to-vehicle collision avoidance. Gen2 system generators installed on machinery both create and detect electromagnetic fields. Operating machinery will detect the presence of other equipped machinery in close proximity, including units hidden from view. Warning alarms will be triggered, and equipment interlocking will enable the system to safely over-ride operation and automatically slow or stop machinery when necessary.

System interlocking and specific machine functions controlled are determined by the customer and the equipment OEM.

In situations where machinery are required to interact, the systems can be controlled to do so.



## HazardAVERT® Gen2 Tracking & PAD Lamp (TPL2)



### USER EXPERIENCE

Personnel carry a Personal-Alarm-Device (PAD) known as the TPL2. This is the system receiver. It features a built-in cap lamp as well as audible and visual warning alarms. Alarms alert the wearer when they enter dangerous positions around operating machinery.

- Detects electromagnetic fields of machinery
- Initiates automatic slowing and emergency stopping of equipment when programmed to do so
- Three-button input for user commands
- Rechargeable lithium-ion batteries with automatic shut-off when units fully charged
- Charge time: 7.5 Hours
- AC Input Voltage: 85-265 VAC 50/60Hz



### TPL2 FEATURES:

- LED Visual Alarm
- Audible Alarm Sounder
- 3 Button Input

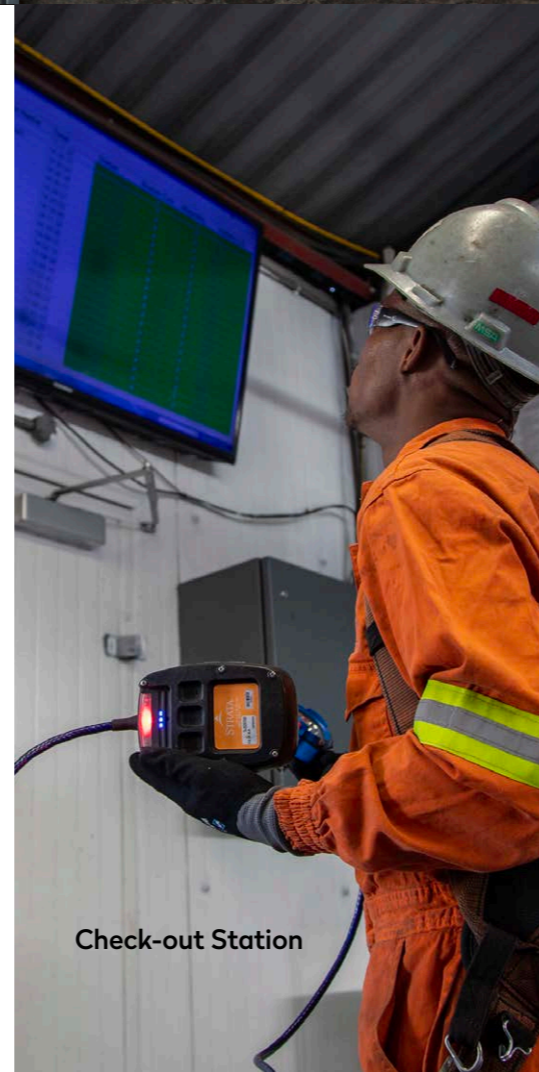


# HazardAVERT® Gen2 Display Screen



The HazardAVERT® Gen2 4.3" Display Screen is mounted in the operators cab and serves as the system user interface. It includes visual and audible warning alarms when the fields of the machine have been breached.

- Diagram for visual representation of field breaches, highlights position and proximity of the breach
- Screen displays system operating status and active alarms
  - Overall system status
  - Individual generator status
  - Warning and Hazard zone breaches
  - Remote Stops
  - Troubleshooting & maintenance notifications
- Records all events to be later downloaded using Bluetooth® or USB, or streamed to surface over Wi-Fi or StrataConnect Wireless
- Intrinsically Safe and MASC approved



Check-out Station



HazardAVERT® Intrinsically Safe User Display Screen



# HazardAVERT® Monitoring & Reporting

HazardAVERT® continuously monitors and logs all system events. Data can be downloaded on-site via serial (USB) or Bluetooth®, or wirelessly streamed to the surface/control room over Wi-fi or StrataConnect™ Wireless. Data is displayed on the StrataConnect user interface and downloadable for analysis, reporting and training evaluations. Dangerous and/or unproductive working practices can be identified, and specific training and guidance put in place.

## StrataConnect GUI features and capabilities

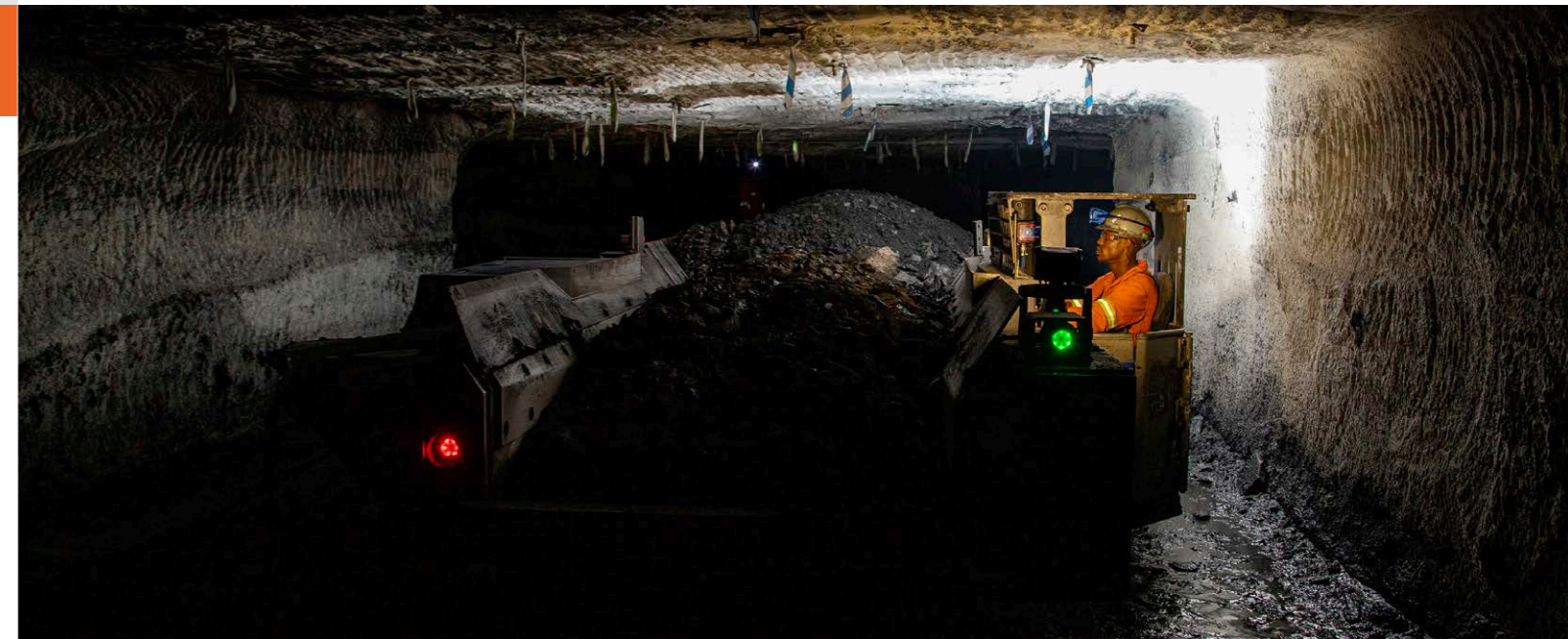
- Individual facility mine-map
- Easy view navigation with layers and tabs
- Ability to monitor at system level or zoom in to individual people and equipment
  - High resolution tracking including direction of travel.
  - Personnel tracking
  - Asset tracking
- Critical safety data reports
- Productivity trends
- HazardAvert system operating status and maintenance
- Mining equipment operating status and maintenance

## MONITOR

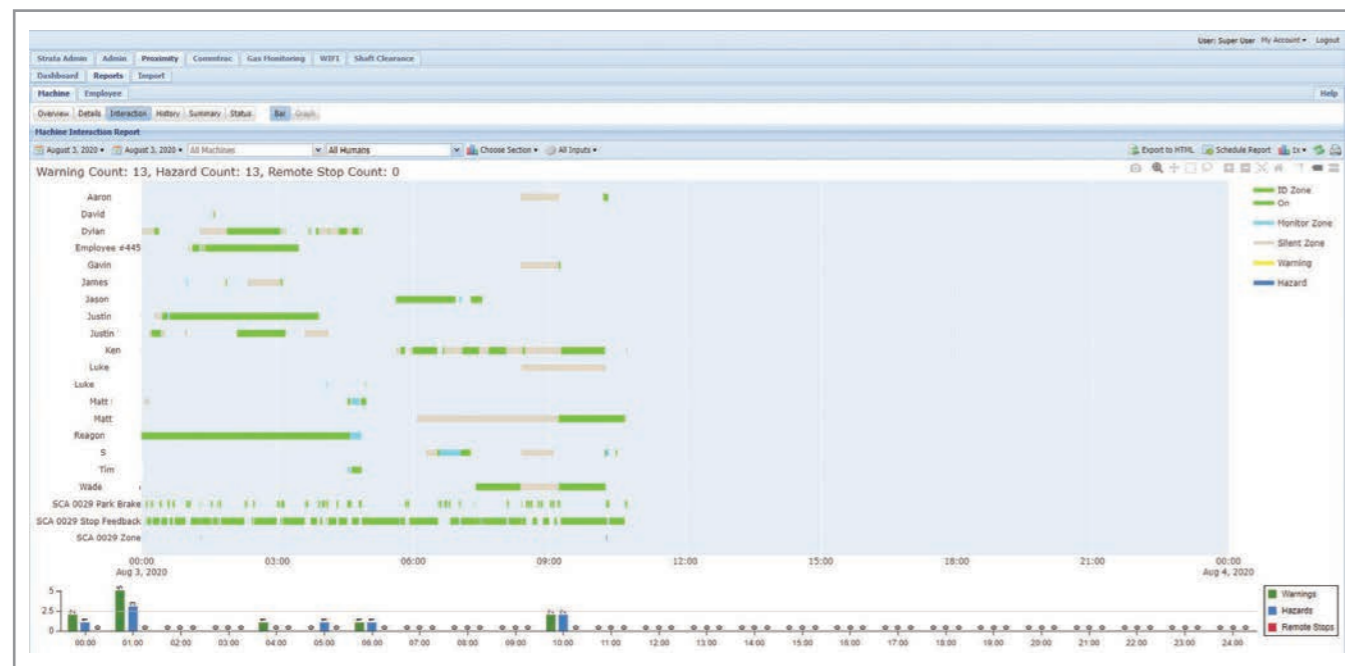
- Working & safety practices of personnel
- Worker and machinery interaction
- Warning and/or Hazard zone breaches and duration of breach
- Emergency, Hazard Zone stops
- Duration of inactivity

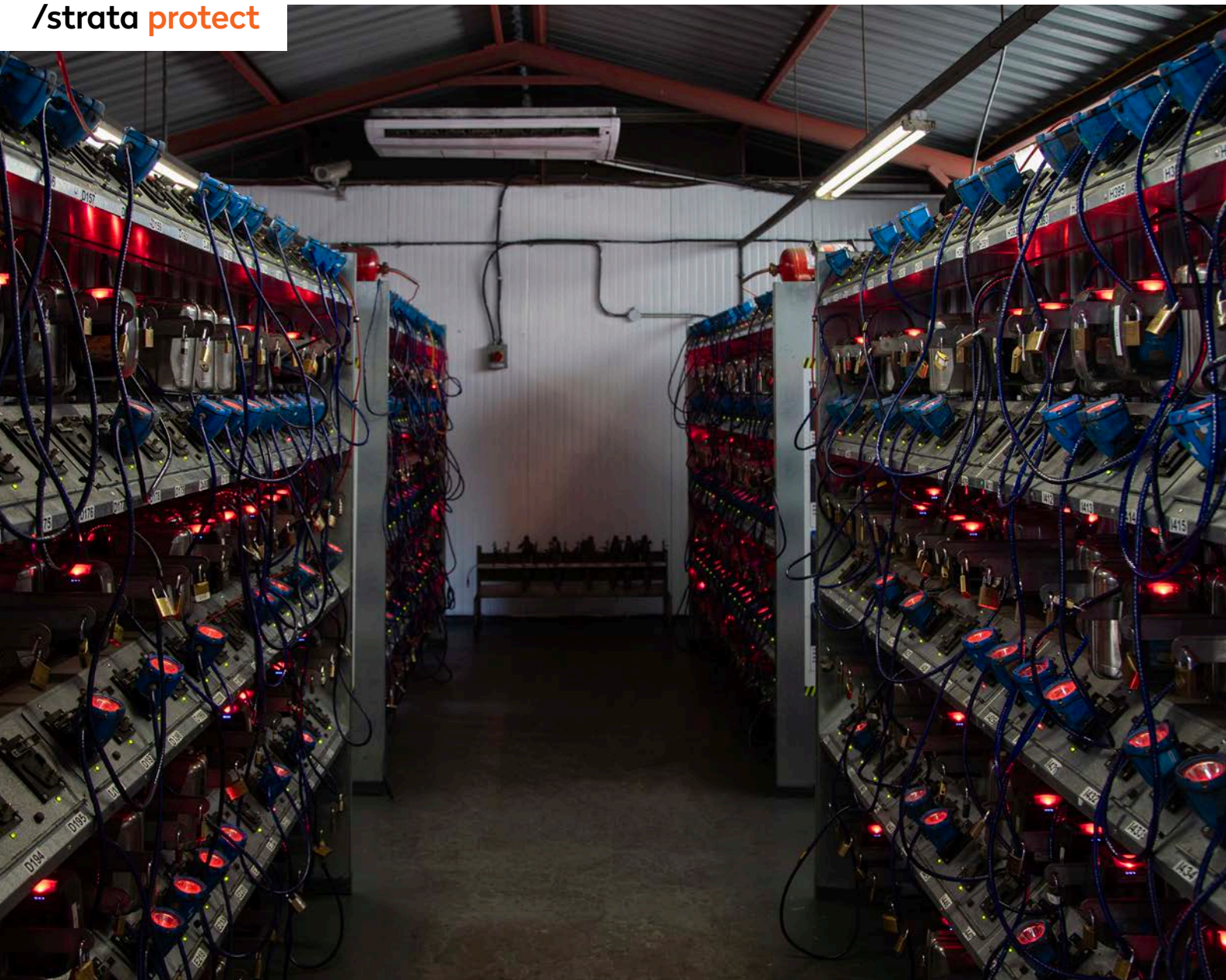
## REPORTING

- Safety Reports
  - Worker and machinery operator safety practices
  - Zone breaches – frequency and duration
- Productivity reports
  - Machinery tracking
  - Travel time
  - Stop time
  - Interactivity time



**HAZARDAVERT® SEES WHAT PEOPLE CAN'T, AND REACTS WHEN PEOPLE DON'T.**





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