



MONITECH

MINING MONITORING SYSTEMS



MATRIX

IntelliZone[®]
PROXIMITY DETECTION

PATENTED SHARPZONE™ TECHNOLOGY

Leaders in Safety and Monitoring solutions

Established in 1995, Monitech is a specialist provider of safety and monitoring solutions to the mining industry in South Africa, sub-Southern Africa and across the globe. Monitech products are designed to exceed the most stringent safety and quality standards applicable to mining operations worldwide. Monitech designs, manufactures, installs and maintains a wide range of Gas Detection, Proximity Detection, Machine Monitoring and other safety systems and equipment to the South African coal mining sector. Monitech products can be found in more than 90% of underground coal mining operations currently underway in South Africa.



Monitech's Mission

To continually improve the safety of mining personnel, from both a health, engineering and productivity perspective.

Monitech-Matrix Global Partnership

Superior service, safety, integrity and technology are the core of our business at Monitech. Monitech formed a strategic partnership with the Matrix Design Group in 2016 to deliver cutting-edge full section, leading-edge proximity detection solutions to the South African Coal mining industry. The Monitech-Matrix partnership brings new technological solutions to the African mining industry.

Matrix Intellizone®

Together with commitment and local service from Monitech, South African and African mining operators will find the Matrix systems to be the best performing and most reliable providing a low cost of ownership. The Matrix Intellizone® Proximity Detection Systems (PDS) is a state-of-the-art machine-integrated system that will automatically warn personnel if they are in close proximity or entering an unsafe working area around the mobile machinery. The system interfaces with machinery, providing the ability to slow down or stop the machine should personnel move into Warning or Shutdown Zones which are custom designed around each machine. The system is intended to enhance miners' awareness of potentially dangerous areas around working machinery and instil safe operating practices.

THE MOST ADVANCED Underground Proximity Detection System Operating Worldwide

The Matrix IntelliZone® Proximity Detection System (PDS) is a state-of-the-art machine-integrated system that will automatically warn personnel if they are in close proximity or entering an unsafe working area around the mobile machinery. The Matrix IntelliZone® proximity detection system allows users to create customized Warning, Shutdown and Operator Zones around all mobile equipment. The system interfaces with machinery, providing the ability to slow down or stop the machine should personnel move into Warning or Shutdown Zones which are custom designed around each machine. Operators are identifiable when inside the Operator Zone and the number of operators at a time can also be limited as required. The system is intended to enhance miners' awareness of potentially dangerous areas around working machinery and instil safe operating practices.

WARNING ZONE

Automatically slows down equipment speed when worker is detected. Audible beeping tone and flashing YELLOW light on Driver and Locator.

SHUTDOWN ZONE

Automatically stops equipment when Locator detected. Constant audible warning and flashing RED light on Driver and Locator. Operation resumes when locator leaves Zone.

OPERATOR ZONE

SharpZone® technology allows Operator to drive, stand or kneel in a safe position without triggering the Caution Zone warning.

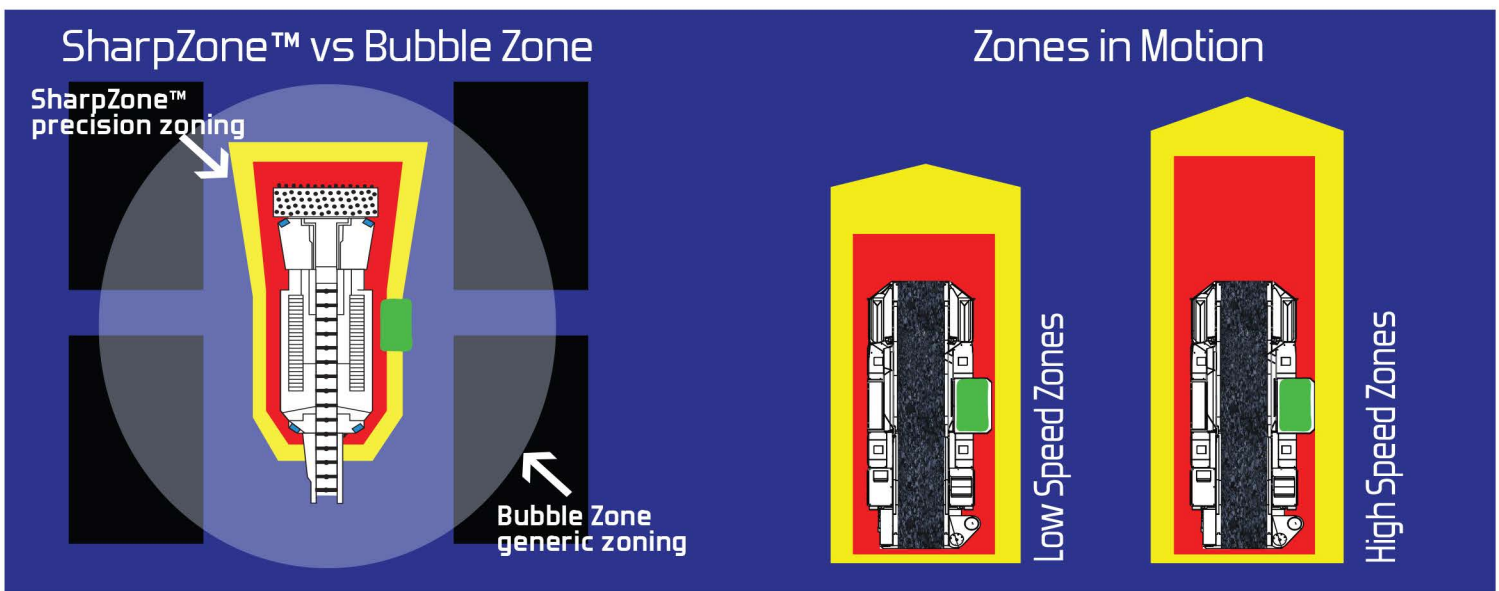


- ◆ **Proven Technology** – in local and global coal mining operations – first installed in 2009.
- ◆ **Productivity** – manufactured for harsh operating conditions, durable, compact and robust system for maximum uptime, minimizes nuisance alerts without impacting production.
- ◆ **Service & Support** – simple to operate and easy to maintain, backed by Monitech's outstanding field service technicians – **24/7/365**.
- ◆ **Precision** – create precisely shaped, customized Warning, Shutdown and Operator Zones around all mobile equipment.
- ◆ **Fails to Safe** – IntelliZone's® patented shaped zone technology detects workers in low-visibility or obscured line-of-sight locations. Zones automatically extend or contract based on mobile equipment speed.

SharpZone™ Technology for Precise Programmable Awareness Zones

Matrix's leading-edge SharpZone™ technology creates equipment-specific straight line and angled safety areas for the most effective Warning and Shutdown zones. These zones help protect miners from mobile equipment injuries and minimize nuisance warnings or shutdowns. Unlike most proximity detection systems, Matrix IntelliZone® creates machine specific straight-line and angled zones which automatically change depending on the operational status of the equipment.

- ◆ Zones can be dynamically changed based on a variety of analog, digital or CANBUS inputs to user requirements:
 - ◆ Speed
 - ◆ Direction
 - ◆ Articulation
 - ◆ Pivot
 - ◆ Steering
 - ◆ Locator Association
- ◆ IntelliZone® operates using low frequency electromagnetics.
 - ◆ Advanced software algorithms provide the (X,Y) location of personnel around the machine.



- WARNING ZONE
- SHUTDOWN ZONE
- OPERATOR ZONE

Primary Components

IntelliZone®
PROXIMITY DETECTION



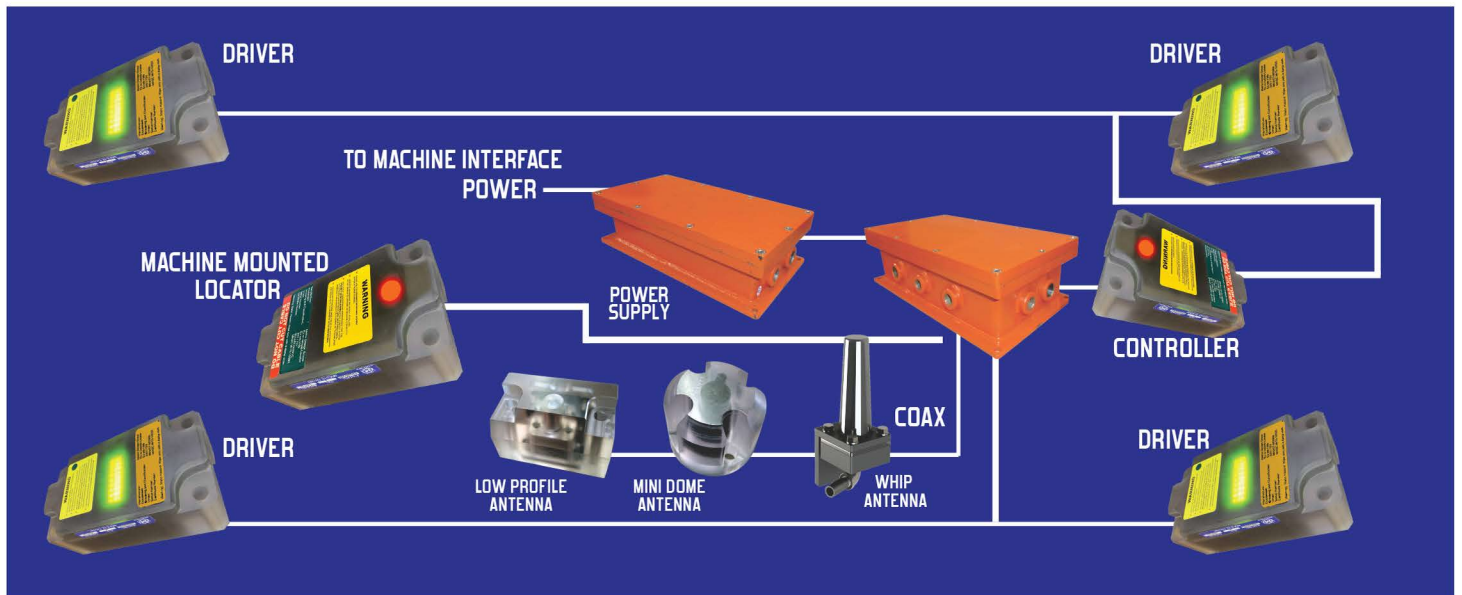
Cap Lamp Locator (CLL)

- ◆ The Matrix IntelliZone® CLL is a wearable Ex ia Approved Cap Lamp with integrated Locator Unit.
- ◆ The CLL has an OLED Screen that can report system alarms (Audible and Visual, errors and general diagnostics to the user).
- ◆ Advanced software algorithms provide the (X,Y) location of personnel around the machine.
- ◆ Zoning can be designed according to end-user requirements and machine input.

Drivers



- ◆ The Matrix IntelliZone® uses four Mine-Duty, Polycarbon Drivers mounted on the corners of the machine mainframe. Drivers are mounted in heavy duty steel pockets, integrated into the machine profile.
- ◆ Drivers allow for coordinate (X,Y) location of Locators (Personnel).
- ◆ Drivers feature highly visible LED's that alert personnel in the event of a Zone breach.
- ◆ Drivers are fully encapsulated IP68 vibration resistant units.



Machine Mounted Locator (MML)



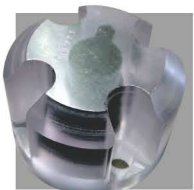
- ◆ The MML checks signal strength of the Drivers and Antennas.
- ◆ Provides Fail to Safe functionality.
- ◆ Used to adjust Zones on articulated machines.

Controller & Software Key



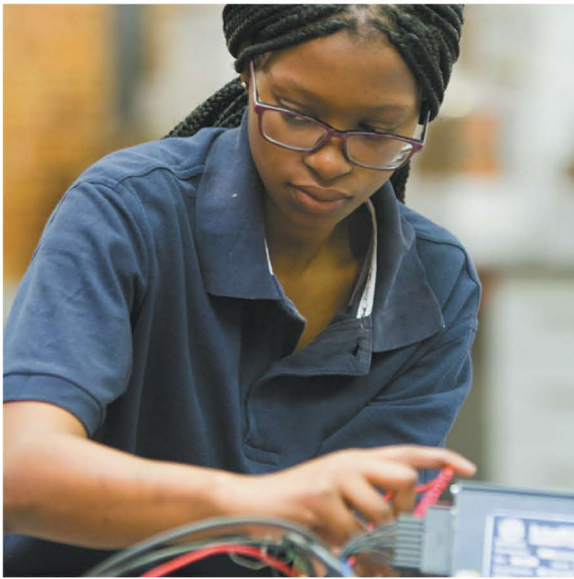
- ◆ The Controller and the Software Key control the System.
- ◆ The Controller has two Interface connectors (I/O, CAN and Ethernet) and two Antenna Ports.
- ◆ Multi-coloured LED's show the various System states.
- ◆ Controller is fitted into a flameproof enclosure.

Antenna



- ◆ Two required per Installation - mounted on the Machine.
- ◆ These provide communication between the Controller and the CLLs.
- ◆ Various types available - Whip, Low Profile, Dome and Mini Dome.





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ID: 9105045361

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