



METS 2.1

Underground Coal Miner & Equipment Tracking Network



- **Text Communication**
- **Tracking**
- **CO Monitoring**
- **Pre- & Post-Accident
Rated**

The Matrix METS 2.1 System is a wireless communications, electronic tracking and CO monitoring system designed for use in coal mines.

METS 2.1 scalable design works effectively in small or large operations with simple, flexible deployment options that are ideal for coal mining.

METS 2.1, the most widely used tracking system in U.S. underground coal mines, is designed specifically for survivability and reliable post-accident use.

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METS Miner & Equipment Tracking System

METS 2.1 is a tracking, communications and atmospheric monitoring system (AMS) designed specifically for survivability and post-accident use in underground coal mines.

This system is an extremely valuable safety, productivity and efficiency tool for your mining operations. METS 2.1 is scalable to accommodate small or large operations and flexible to keep up with the ever-changing plans of soft rock operations like coal.

- Fully complies with 2006 Miner Act requirements
- Wired mesh redundant infrastructure designed for reliable post-accident operation
- Flexible spacing - continuous (500') to 3000'
- Cost-effective to purchase and maintain
- No fiber or XP boxes in smaller mines
- Reader/node placement not limited to line-of-sight with other nodes
- Receives CO monitoring data from Matrix IS wireless atmospheric monitoring sensors
- Mine emergency and custom reporting
- Local distributors or Matrix-direct for sales and service
- WV, PA and MSHA Part 23 Approved (MSHA # 23-A080013-0)

**METS 2.1
is the most
widely used
tracking system
in US
underground
coal mines!**





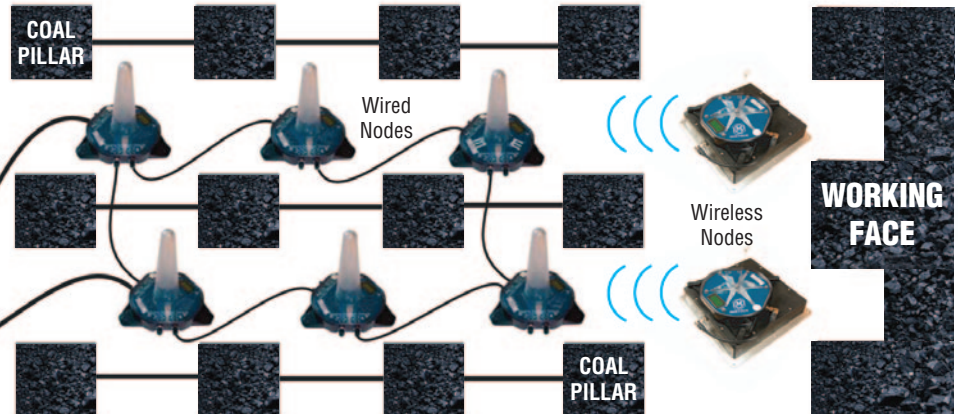
Workstation with Mine Map and Data Display



SERVER

HUB

Simplified Layout Diagram (not to scale)



Matrix Intrinsically Safe (IS) tracking tags, communications devices and CO sensors communicate with IS infrastructure nodes connected via coaxial cable or through wireless transmission. Hubs connected to the IS infrastructure provide fiber or copper ethernet switch connectivity to an above-ground server that stores and communicates data from/to the devices.

Workstations communicate with the server to display location status of tracking tags, data from devices like CO sensors, and communication with METS 2WC-T text pagers.

Miner & Equipment Tracking

T1000 Tracking Tag

Known to miners as “the puck,” the Matrix T1000 tracking tag utilizes RFID technology to send an identifying signal to receiving nodes. The personnel tag can be securely adhered to the miner’s helmet or temporarily attached using the elastic headband option. For equipment, the asset tag is securely bolted into place.



- Guaranteed two-year battery – no daily recharge required.
- Rugged high-strength polycarbonate
- Compatible with all versions of METS
- Innovative attachment methods
- MSHA & US FCC approved
- Low profile and weight for minimal intrusion on normal miner routines or equipment operation

SPECIFICATIONS

- Base Tx Frequency: 433.92 MHz
- Tx Range: 200-600 ft
- MSHA Certification: 23-A060003-0
- FCC Certification: USKMDG-T1000
- Enclosure Material: Clear Polycarbonate
- Overall Diameter: 2.2 in
- Height: 0.72 in





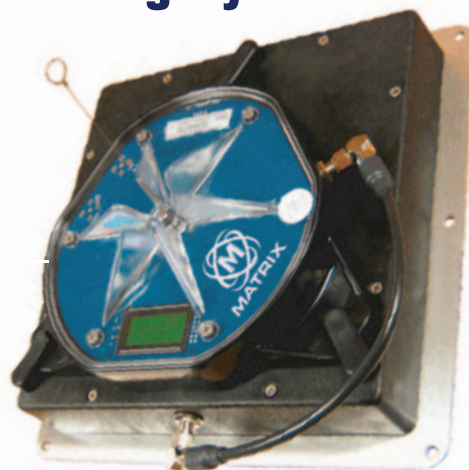
METS Miner & Equipment Tracking System

Section Tracking and Communications

Wireless Node

Wireless, battery-powered nodes relay tracking tag, text messaging, CO sensor and other data to/from METS wired nodes to provide simple, easy-to-advance tracking and communications.

- Inexpensive, lightweight, compact and portable
- Easily interchangeable battery packs
- True wireless unit (no outside connections)
- Intrinsically Safe (IS) design
- LCD screen with text-based status information
- Receives transmissions from CO sensor, TextPager and Tracking Tags
- Easily configured and moved on Matrix tracking map display



SPECIFICATIONS

- Battery Life: Approx. 35 - 75 days
- Range: Approx. 300' between readers (depending on seam height and conditions)
- Node Dimensions: 2" x 8.5" x 8.5"
- Battery Pack Dimensions: 1.9" x 10" x 10"
- Weight: 12 lbs
- Communication Frequency: 433 MHz band
- Power Source: 12 - 15 D cell alkaline batteries

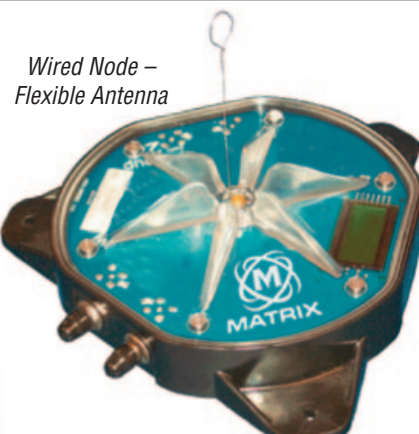
Wired Node

Receives transmissions from tags, text pagers and CO sensors and relays information to the server.



Wired Node – Fixed Antenna

- Low cost, easy to repair
- Connected with MSHA approved IS Coaxial Cable
- Multiple antenna ports allow redundancy and coverage of multiple areas
- Power and data supplied through coaxial cable
- Underground cabling can be configured in a mesh topology for redundancy and maximum survivability
- Fixed or flexible antenna
- Intrinsically Safe (IS) design
- Reader/node placement not limited to line-of-sight with other nodes

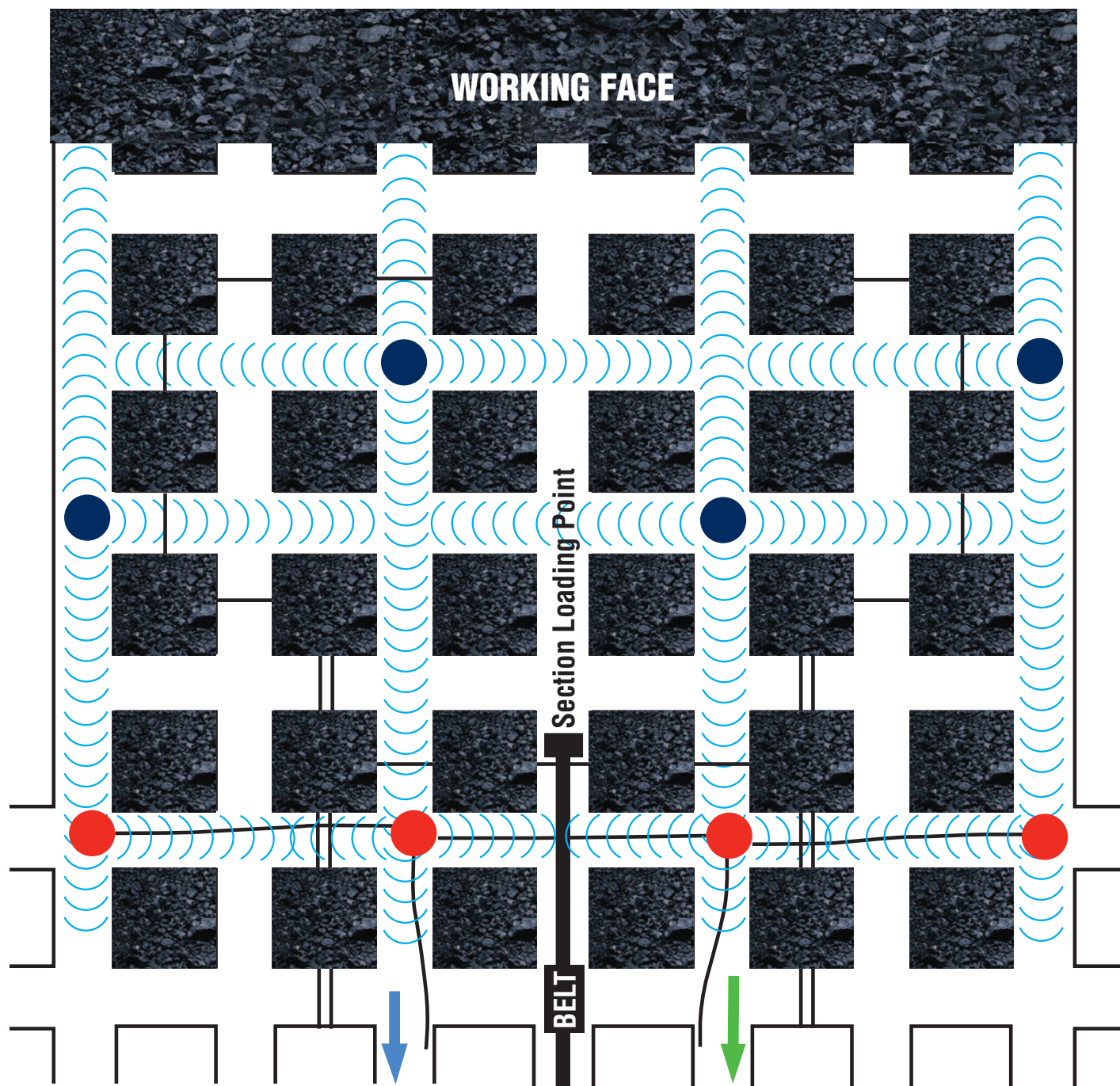






Wired Node – Flexible Antenna

SPECIFICATIONS

- Range: Approx. 300' between readers
- Node Dimensions: 2" x 8.5" x 8.5"
- Weight: 12 lbs
- Comm. Frequency: 433 MHz band
- Power Source: Hard wired - coaxial

Simplified Diagram for Tracking & Communications



LEGEND	
	Wired METS Node
	Wireless METS Node
	Primary Escapeway
	Secondary Escapeway



METS Miner & Equipment Tracking System

CO
Monitoring

Wireless Atmospheric Monitoring System (WAMS) S1000 CO Sensor

Designed to deliver pre- and post-accident CO sensing using advanced Matrix technology, which minimizes calibration labor and radio interference. Each WAMS S1000 includes a sensor unit for gas detection and base unit for unique identification.

- Intrinsically Safe (IS) design allows system to be energized when the fan is down, allowing examiners to enter the mine
- Battery powered for easy placement and advancement with section moves
- Performance-tested to comply with MSHA 30 CFR 75.351 and APOL 2207
- Specifically designed for resistance to RFI even in close proximity to two-way radios
- The first and only stationary CO sensor compliant with the performance-testing standards set forth by MSHA
- Wireless data transmission with no MSHA blasting clearance requirement
- CH4, airflow and oxygen sensors are in development



SPECIFICATIONS

- MSHA IS Approval No. 18-A090002
- MSHA 30 CFR 75.351 & APOL 2207 compliant
- Display: Four-digit screen with membrane keypad
- Battery Life: 6+ months on three inexpensive D-Cell alkaline batteries
- Dimensions: 11"H x 5.25"W x 3.5"D
- Weight: 2.25 lbs
- Temperature Rating: 30°F to 120°F
- Range: 300' to 500' in five-foot coal seam
- Solid-state circuits, no trimpots



The only post-accident,
performance-tested,
and NRTL-Listed
stationary CO system
on the market today





Text Pager

The METS Text Pager transmits and receives text messages from other text pagers or any METS workstation. It also has the ability to receive AMS, belt and reader status information.



SPECIFICATIONS

- Battery Life: 30 - 45 days
- Range: Approx. 500' in 5 - 6 ft coal
- Display: 2" Multicolor (128 x 64 pixels)
- Weight: 11 oz.
- Batteries: 4 AA alkaline
- Audible Alert: Loud tone
- Visual Alert: Dual ultra-bright LEDs

- MSHA IS approval No. 23-A090007-0
- Compact, rugged, mine duty case fulfills MSHA's communications requirements on sections and escapeways (Miner Act 2006)
- IS design using alkaline batteries – no daily recharge required
- Full QWERTY keyboard for easy use
- Cost-effective compared to traditional radios
- Can communicate "1-to-1" or "1-to-many"
- Audible and visual alerting
- Text and graphics can be displayed
- Uses existing METS infrastructure
- Functions as a tracking tag





Matrix is the safety and productivity technology leader for underground mining products and services in the United States. Matrix specializes in cost-effective systems for communications and tracking, atmospheric monitoring, belt control, and proximity detection.

Matrix's products and services include the following:



METS 2.1 Communications, Tracking & Mine-Wide AMS

METS 2.1 is the most widely used tracking system in the United States' underground coal mining industry. This proven system includes two-year battery life tracking tags, full-keyboard text communicators, wireless Intrinsically Safe (IS) CO sensors and comprehensive miner-friendly software. METS 2.1 is IS and post-accident rated for communications, tracking and atmospheric monitoring.



Atmospheric Monitoring

Matrix S1000 wireless Intrinsically Safe (IS) CO sensor, integrated with METS 2.1 is the only fixed-location, wireless CO sensor to be MSHA approved (IS), listed by a Nationally Recognized Testing Laboratory (NRTL) and part of a comprehensive AMS package. Recently, Matrix has added CH4 and Airflow sensors to its AMS platform.



Proximity Detection

The Matrix IntelliZone® proximity detection system uses MSHA-approved Intrinsically Safe (IS) devices to precisely track individuals within close proximity to mobile mining machinery. The system creates dynamic, programmable awareness zones which slow or stop the equipment if a worker gets too close.



Camera & Lighting Systems

The Matrix **UVision™** dual-spectrum system combines bright LED and safe UV lighting. UVision is 50% brighter and the UV makes reflective material POP. It's safety everyone can see!

The Matrix **MineOwl™** Camera & Light System delivers superior in-cab video quality in low-light environments. MineOwl delivers the best combination of durability, high-resolution and low-light performance available in an XP camera system.

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