

# Cat<sup>®</sup> Detect Personnel

Cat Longwall Systems



## Cat® MineStar™ System

*Cat MineStar System is the industry's broadest suite of integrated mine operations and mobile equipment management technologies configurable to suit your operation's needs.*

*Detect, a capability set within Cat MineStar System, provides equipment operators with enhanced awareness of the environment around their equipment, resulting in increased safety and greater operator confidence.*

*Personnel enables enhanced safety during the operation of Cat longwall systems. Protecting the most valuable asset on a site, the operator, Personnel reduces the potential for operator injury through seamless integration into critical machine control functions. It adds to overall Cat longwall system value through maximum machine utilization and continual safe operation of the system.*



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**Keeping operators safe and out of harm's way is a top priority for you and Caterpillar. Controlling potentially hazardous working conditions such as automatically moving shields helps you achieve this goal. Personnel protects operators from these hazards to allow continuous, safe operation of Cat Longwall Systems.**

**Personnel represents a quantum leap in safety for Cat Longwall Systems. Common safety procedures, such as lock-out, tag-out, in conjunction with the detection technologies in Personnel, provide multiple, redundant layers of safety for your miners. Personnel does not replace manual lock-out of roof supports. It adds another means of keeping workers safe underground by automatically ceasing movement of shields on both sides of the detected, tagged employee.**

# Redundant Safety Systems

Optimizing Your Operator's Safety





A longwall equipped with Personnel detects the presence of the person and if the tag is appropriately programmed – their employee ID, location and/or role – and reports this directly to the local controller, which then responds in real time, preventing motion while the person is present. Since operator roles are configurable within the system, the roof supports can be programmed to respond differently based on operator role. For example: it may be desired for a roof support to advance as scheduled for maintenance personnel to troubleshoot problems, while it also may be desired for the roof support to stop when a visitor is detected.

Radio Frequency Identification (RFID) technology utilizes a reader to send electromagnetic signals that generate a marker field. A transponder tag, worn by workers, receives the signal and sends data back to the reader. The reader interprets the data and passes it on to the Programmable Mining Control for roof supports (PMC-R), which initiates the appropriate response.

If several tags are detected in the same field and the system is programmed to differentiate responses by the role of the tag wearer (operator, maintenance crew, visitor etc.), the “safest” control response is selected.

Readers located at the surface give a visual indication to personnel entering the mine whether their tags have sufficient power and are set up correctly. Gate readers located at the ends of the longwall give a visual indication to personnel entering the longwall whether their tags are functioning correctly and the miner is registered.

# Features and Benefits

Value for Your Entire Operation



Personnel provides operators with peace of mind while working around Cat Longwall Systems. The system also allows management the flexibility to optimize the system for their specific needs.

- Reliable detection provides a high level of safety for longwall personnel
- Tracks location of each individual in the operating longwall area
- Visualization using advanced Cat software
- Readers and tags are intrinsically safe
- Each tag has a unique identifier and is software-configured, allowing adaptation to mine specific regulations
- Direct connection to local controller for real-time response
- Control response programmable dependent on person's role
- Unique dual-frequency system and special antenna setup to enhance reception in steel-laden environments
- Flexible mounting of the reader on the roof support lessens installation time compared to third party systems
- Overlap of marker fields ensures tags are still detected in the event of reader or system failure
- Reader preconfigured for easy installation
- Constant communication between readers and tags ensure detection of tag failure

# System Integration

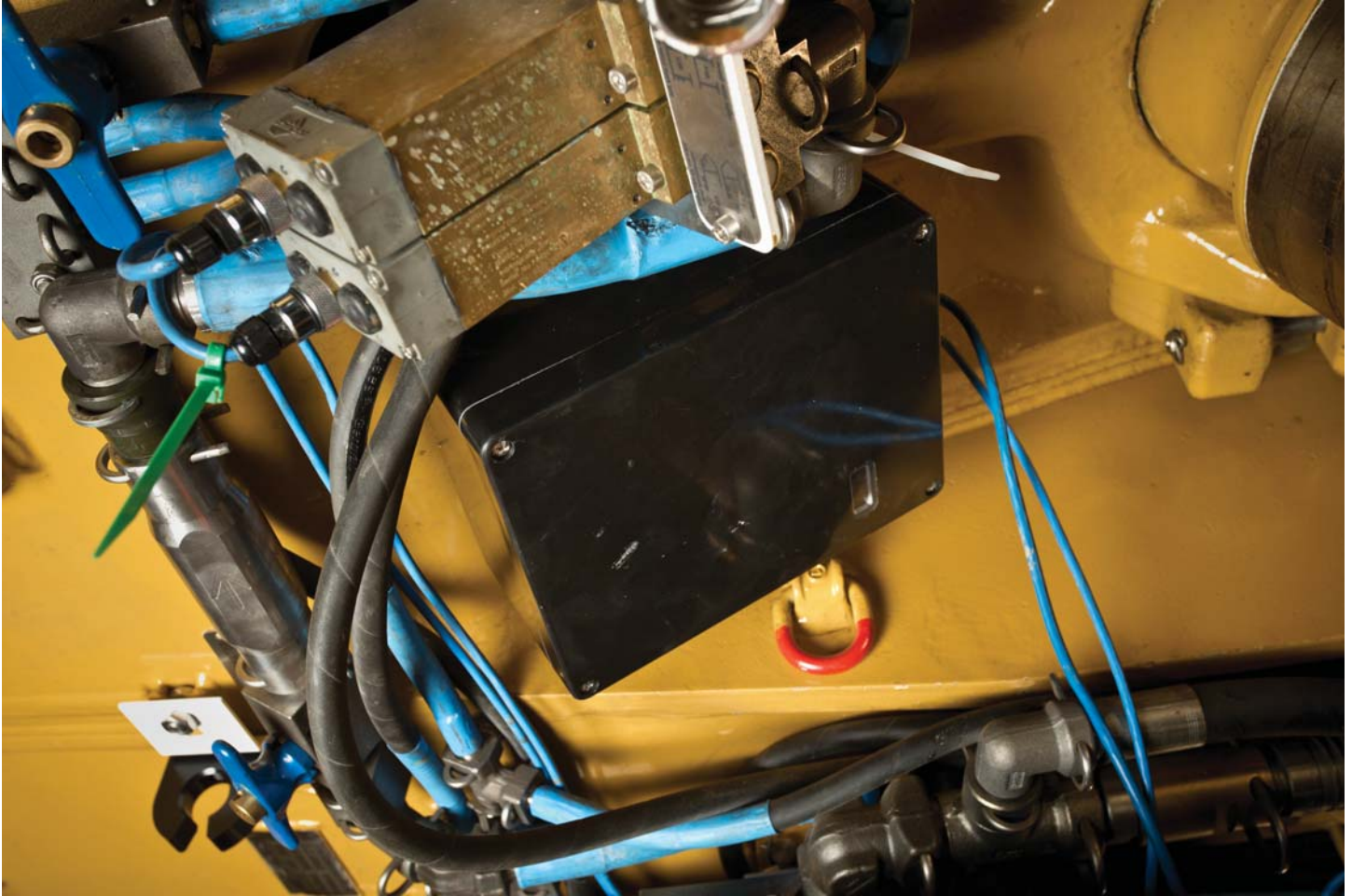
## Complete System Integration Improves Control

Each roof support in the longwall is equipped with its own reader, which is connected directly to the local roof support controller, enabling real-time response. Other systems on the market send signals to a control center and/or gate-end computer for processing, creating the potential for latency issues. Personnel has local control, multiple redundancies of detection and communication – and no single point of failure. Any problem with a reader or a roof support control is immediately detected by the neighboring controls. Operators are automatically recognized by the system as they pass through gate readers at the entry points of the longwall. While on the longwall, their position is constantly monitored. In the unlikely event of a tag failure, the system will recognize the absence of the operator and alarm the head gate, reducing your overall risks and enhancing safety at your operations.



# System Components

Rugged Hardware to Keep Your People Safe



## Readers

One reader is mounted on each roof support and connected directly to the local Cat PMC-R roof support controller. Installation is relatively easy and existing PMC-R control systems can be upgraded. The reader software is pre-installed and the marker field is adjusted by varying the field strength. Once this has been done, the reader detects the exact position of any tag in its marker field. Marker fields are set to overlap allowing tags to still be detected in the unlikely event of a reader failure.

Operating at 12V and less than 250 mA, the intrinsically safe reader demands little of the power supplied at the face.

The robust housing allows easy mechanical integration into the roof supports along with a special antenna configuration for flexible positioning and safe and easy access.



## Tags

Each miner or visitor wears an intrinsically safe battery-powered tag. This compact unit can be mounted on a helmet or worn on clothing or a belt. The tags are active and can store up to 2 KB of data. Comprised of a chip, antenna and enclosed battery, the tag is about the size of a deck of cards.

The tag has low power consumption and a guaranteed one-year battery life. Under typical use, most batteries will have a two-year life span. Battery status information routinely transmitted by each tag is captured by the visualization software, allowing mine staff to be warned when their tag needs replacing.

Each tag is delivered as a “blank slate” with only its unique identifier. In this “factory” state the tag will have the highest safety configuration. Only when the tag is programmed with specific personnel parameters (subject to local regulations) will the longwall system react differently. The first time a new tag enters the longwall the PMC-R will ask for the name and the role to be assigned to the tag. Information can be assigned to the tag or it may be left blank to simply recognize the presence of a person.

The system interacts directly with the longwall controller. For mines that establish a company wide set-up standard this enables the use of tags across mine sites utilizing Cat PMC-R control systems and Personnel. For example: a mine manager can carry one tag across multiple sites, if all are properly equipped, and can expect the same level of safety at each site.

The Cat Personnel tag uses two frequencies: low and high. Low frequency is used for standard RFID identification as described above. High frequency is used for detailed communication back to the reader, including providing data on battery status and marker field number.



# Information Reporting and Notification

## Keeping Your Managers Up to Date

### Visualization

The locations of personnel detected by the system can be displayed in the surface mine control center and/or gate end using advanced Cat visualization software. Tags and relating data can be shared via various communication interfaces within a mine's local area network (LAN) to be integrated into third party or mine specific visualization systems to allow for a comprehensive, site wide tagging solution.

The software allows data to be replayed along with reporting capabilities that can be used for continuous improvement towards safety.

If a maintenance need arises, the system provides information to the person at the underground control center or surface control room that will aid in locating the nearest specialist that can fix a technical issue such as a hydraulic or electrical problem.



### Support

For more than 25 years, Caterpillar has been providing electronic and electrical components and systems for the mining industry – real world technology solutions that enhance the value of Cat products, making customers more productive and profitable. Your Cat dealer is ready to assist you with matching technology systems to the application and obtaining responsible, knowledgeable support. From sales and implementation to support and service, count on your Cat dealer to provide all of your technology product needs.

# Cat Detect Personnel Specifications

Reader	
Dimensions	200 × 250 × 120 mm 7.9 × 9.8 × 4.7 in
Weight	5.5 kg 12.1 lb
Input Voltage (DC)	9.5V – 13.2V (typical 12V)
Power Consumption	<= 250 mA
Connectors	OS4 and OS8 (O-ring sealed)
Operating Temperature	–20° C to +70° C –4° F to +158° F
Frequency	
Low-Frequency	125 kHz
High-Frequency	2.4 GHz
Sealing	IP 67
Type of Certification	Intrinsically safe
Approvals	ATEX, MSHA, IECEx
Features	Direct serial communication to roof support control unit

Tag	
Dimensions	80 × 60 × 40 mm 3.1 × 2.3 × 1.6 in
Weight	200 g 7 oz
Input Voltage (DC)	3.6V (± 15%)
Estimated Battery Lifetime	2 years under typical underground use
Operating Temperature	–20° C to +40° C –4° F to +104° F
Frequency	
Low-Frequency	125 kHz
LF-Range	Up to 6 m Up to 19.7 ft
High-Frequency	2.4 GHz
HF-Range	Up to 50 m Up to 164 ft
Sealing	IP67
Type of Certification	Intrinsically safe
Approvals	ATEX, MSHA, IECEx
Features	Different mounting versions available (belt, helmet, or safety vest)

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at [www.mining.cat.com/miningtechnology](http://www.mining.cat.com/miningtechnology)

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