DMMS

DIGITAL MONITORING & MANAGEMENT SYSTEM

PRODUCTION MANAGEMENT SYSTEM

AG TECH
TECHNICAL SOLUTIONS

TENGRILAB

MRs Underground Intelligence

PBE

WHY US?

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

DMMS SYSTEM

DMMS is the software 100% development by the Kazakhstan specialists for operative, safe and effective production management. The solution that offers an increase in personnel safety and productivity of the industrial enterprise.

> DMMS complies with the Rules of Industrial Safety for Hazardous Production Facilities, Leading Mining and Geological Exploration of the Republic of Kazakhstan
>
> (Order No. 352 of the Minister of Investment and Development of the Republic of Kazakhstan dated December 30, 2014)

COMPLIANCE WITH THE STATE PROGRAM "DIGITAL KAZAKHSTAN"

- Message from the President of the Republic of Kazakhstan on the requirement to increase the purchase of domestic software by national companies
  https://www.akorda.kz/ru/poslanie-glavy-gosudarstva-kasym-zhomarta-tokaeva-narodu-kazahstana-183048

- The possibility to finance the project from the state budget (AG Tech LLP is accredited as an R&D subject)

DMMS ADVANTAGES

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

A large number of ready-made modules,
with regular functional updates

Easy customization of system modules for
production specifications

Development and implementation of new unique modules

Compliance with strict requirements of corporate policies
in the field of security and data protection

Industrial application of advanced
innovative solutions

Technical support, warranty and
post-warranty service

Provision of training materials,
personnel training

Testing and provision of release versions
of new modules

Ensuring control and
safe production

Unified digital platform that integrates with computer-aided
manufacturing systems, ERP, MES and other software

Packaged solution for the main system with key modules and
maximum system deployment speed

No restrictions on project scaling: staffing, technology,
equipment, sensors, etc.

System compatibility with any digital technological
and equipment

Scalability with the ability to combine all business processes
into one centralized system

The system does not require the installation of additional
software at the user's workplace

DMMS COMPETENCE ARCHITECTURE

STRATEGIC PLANNING

Director's Personal Account

BIG DATA ANALYTICS LEVEL

Production Situation Center

DATA UPDATE

Enterprise Dispatching Center

DATA COLLECTION TOOLS

Sensors; Data Entry Workstation; Corporate Network

SYSTEM SCALING

The centralized control of the extensive production cycle, but also the individual approach to the composition of the technical measures of each individual production will create flexible solutions in the fields

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

1. Group of enterprises with a closed process chain

2. Group of enterprises

N. Group of enterprises

Mining

Processing

Sales and marketing

UNIFIED MAP
of all technological processes of a group of enterprises with a closed process chain
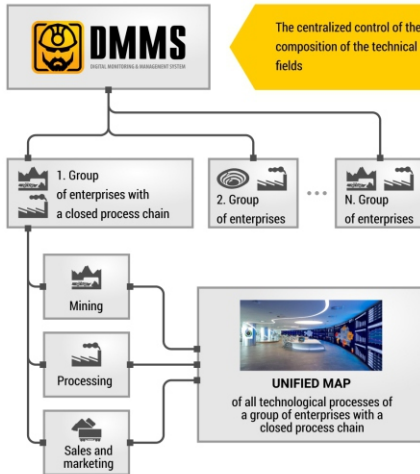
ADVANTAGES OF IMPLEMENTATION:

- Unified digital platform

- Reducing risks of personnel injuries and ensuring the control and functioning of safe production

- Integration into the company-wide system of control and management of all production cycles

- Subsequent integration of decisions with control systems and the issuance of individual JOB CARDs, with a record of the identified deviations, with further analysis and assistance in taking operational corrective measures

- Unification of hardware and software

IMPLEMENTED MODULES

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

- Interactive map
- Positioning of personnel and equipment
- Safe Workplace Module
- Alarms Module
- Video surveillance
- Dispatching Module
- Monitoring of equipment operation
- Digital job card
- Downloading planning data (Micromine and Deswek)
- Loading the weekly daily plan
- Management in short intervals
- Deviations and downtime accounting

- Personal admission to job and equipment
- Events Module
- Air quality control
- Log of exceedances of gas MPC
- Production report
- Concrete stowage facility & main air handling unit control
- KPI Module
- Digital Honor Roll
- Monitoring of infrastructure status Module
- Explosive material accounting Module
- Training module
- HelpDesk

DESCRIPTION OF THE BASIC MODULES

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

- Three zoom levels
- Mine navigation system
- Object search on the map and in the system
- Layered display of information
- Map and equipment register update

- Monitoring and control of equipment and personnel movements in real time
- Construction of movement routes
- Communicating with miners by lantern
- Movement log
- Data archiving

- Displaying video from cameras
- Linking video cameras to a map
- Remote control of cameras
- Access to video archives
- Identity/Spy System

DESCRIPTION OF THE BASIC MODULES

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

AIR QUALITY CONTROL

> General gas analysis
> Air flow monitoring
> Management of airlock systems

CONCRETE STOWAGE FACILITY

> Monitoring of parameters of assemblies and units
> Red zones of parameters of main assemblies and units
> Remote control of assemblies and units

VENTILATION SYSTEMS

> Monitoring of parameters of assemblies and units
> Red zones of parameters of main assemblies and units
> Remote control of assemblies and units

DESCRIPTION OF THE BASIC MODULES

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

⚠ EVENTS

- › Automatic event generation
- › Manual event generation
- › Filtering by parameters, importance and current event status
- › Sending events to users according to their roles
- › Storing and analyzing events

⦿ ALARMS

- › Warning system:
  - Alarm control
  - Radio alert
  - Warning through lanterns
- › Mass detonation alert
- › Data archiving

DESCRIPTION OF THE BASIC MODULES

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

DIGITAL JOB CARD

- Loading the monthly and weekly/daily plan
- Shift work planning and control
- Issuance and control of work orders for employees
- Production report
- Controlling the operation of SPE at short intervals
- Assigning the equipment to the person in charge
- Monitoring current plan implementation
- Signaling of deviations from the plan (Deviation by time or direction)
- Prompt change of plan by operations by control center operator
- Recording of idle times and deviations from the plan, and further saving in the log and report generation
- Entry of intermediate results of works completed by operations
- Review the history of operational job cards changes

DESCRIPTION OF
THE BASIC MODULES

DMMS
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CONTENT CONTROL

> Planned and actual values of
> metal content in ore
> (gold, silver, etc.)

> Operational information on residual rock mass
> in the context of work places

> Chart of chamber exploration in real time
> by indicators of rock mass residues

> Planning of explosions and actual display
> of performed explosions

MOBILE APPLICATION

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM
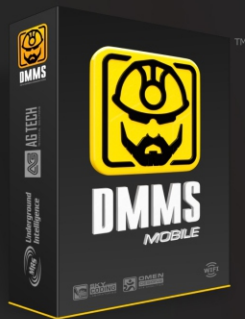
For working on protected devices in the mine environment

Registration of the breaches, risks, downtime and deviations, the fact of work, creating and changing of Job Card, filling checklists, signing via EDS and many other things - without rising to the surface

📱 MOBILE APPLICATION

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

✅ PERSONAL JOB CARD

> Creating, reviewing, receiving, signing and correcting of job cards
> Personal work schedule for each job card
> Personal admission to work and equipment

📖 INTERACTIVE MAP

> Viewing the interactive map of the mine
> Ability to work offline
> Viewing detailed information by workplaces

🚜 MONITORING OF MINING EQUIPMENT

> Collection, storage and processing of data from self-propelled equipment sensors
> Generation of reports on the work and movement of equipment

📋 CONTROL OF WORK IN SHORT INTERVALS (CYCLOGRAM OF WORK)

> Current plan implementation monitoring
> Alarms for deviations from the plan (time and direction)
> Prompt change of the operations plan by the Control Center operator
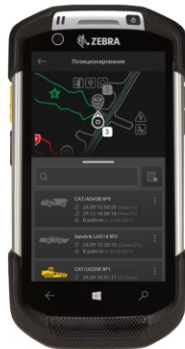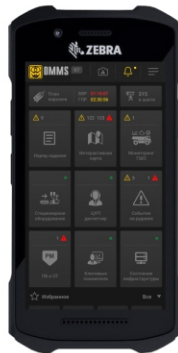
📱 MOBILE APPLICATION

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

CONTROL CENTER DISPATCHER

> State of mining operations, personnel and mining equipment monitoring
> Visualizing critical points and problems that require attention

⚠ EVENTS AT THE MINE

> Event notifications and rapid response tools
> Which events the worker will see and which events the master will see can be easily configured by the system administrator

OCCUPATIONAL SAFETY

> Recording of incidents and violations occurring at workplaces in the mine
> Monitoring the elimination of identified violations at workplaces
> Making decisions about the prohibition and resumption of work on the basis of promptly received data
> Bound equipment
> Medical Examination
> Control of admissions to operations, self-propelled equipment, licenses, briefings and trainings
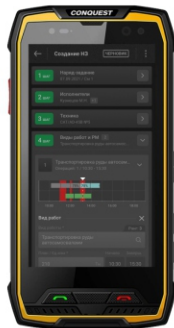
📱 MOBILE APPLICATION

DMMS
DIGITAL MONITORING & MANAGEMENT SYSTEM

STATIONARY EQUIPMENT

> Conveyors, crushers, lifting mine equipment, etc.

KEY INDICATORS

> KPI by section: mine, sites, personnel, and mining equipment
> Digital Honor Roll

INFRASTRUCTURE STATUS

> Status of positioning readers, alarm controllers, telephone and wi-fi point status

ELECTRONIC DIGITAL SIGNATURE

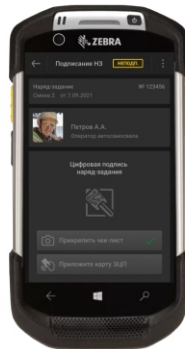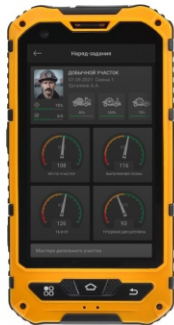> Authorization in the mobile application and signing job cards via EDS

RATIONALIZATION PROPOSALS

TRAINING SYSTEM

HELPDESK

DUMP TRUCK DRIVER TABLET

SOCIAL DISTANCE CONTROL FOR INDUSTRIAL ENTERPRISES

SOCIAL DISTANCE CONTROL
FOR INDUSTRIAL ENTERPRISES

DMMS COVID-19 PREVENTION SYSTEM

We offer the implementation of the system to
monitor and control the social distance of
personnel, with the function of managing
anti-epidemiological measures within
industrial enterprises.

The system allows you to reduce the risk of
infectious diseases and avoid mass infection
of personnel at industrial sites of any size.

FUNCTIONALITY

Monitoring the distance between workers in a radius of up to 10 m and an accuracy of 0.3 m

The feedback from the base stations makes it possible to transmit functional Vibration and light signals

System access control and function management via NFC

Extensive integration with most information systems for enterprises (ERP, 1C, BI, etc.)

One base station provides radio signal coverage up to a radius of 2 km

Detection of cases of sudden changes in the position of personnel (falls, device removal, etc.)

Monitoring vital signs Pulse and body temperature. Maintaining a "Personal MED-CARD"

Personnel body temperature monitoring

Data from the base stations are sent to the server for further analysis by other DMMS modules

THE PRINCIPLE OF OPERATION
OF THE SOCIAL DISTANCE
CONTROL SYSTEM
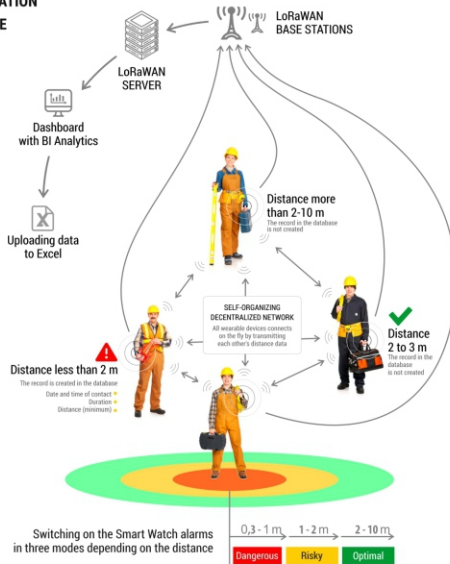
SMART WATCH INDICATION

Vibration	Light	Event Description
{□}	D ▢ ❶ S ▢ ❷ T ▣ ❸	**Optimal distance for contact** The other bracelet is within a radius of 2 to 3 m Maintain the current distance
{□}	D ▢ ❶ S ▣ ❷ T ▣ ❸	**Average risk of infection** The other bracelet is within a radius of 1 to 2 meters The distance should be increased
{□}	D ▣ ❶ S ▢ ❷ T ▣ ❸	**High risk of infection** The other bracelet is within a radius of 1 m The distance should be increased immediately
{□}	D ▢ ❶ S ▣ ❷ T ▢ ❸	**No connection to the base station** Means that the employee will not be able to receive messages
{□}	D ▣ ❶ S ▢ ❷ T ▣ ❸	**Dispatcher call** Means that the employee connect with the dispatcher
{□}	D ▣ ❶ S ▣ ❷ T ▣ ❸	**Alarm signal** Means that the employee must follow the approved evacuation protocol
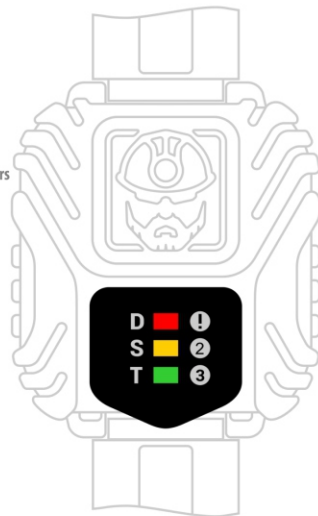
D ❶
S ❷
T ❸

EXPECTED RESULT

| 1 | There is a possibility of integral assessment of employee activity (a sharp decrease in activity during the day from the statistical average may indicate the state of health of the person) |

| 2 | Continuous monitoring of the employee's body temperature during the day is possible, achieved by activating the built-in temperature sensor (optional on request) |

| 3 | Timely isolation of sick people and their contacts will help to avoid mass infection of workers at the production site |

STATUS MONITORING AND
EXACT POSITIONING OF PERSONNEL

STATUS MONITORING AND
EXACT POSITIONING OF PERSONNEL

DMMS SMART POSITION

We offer the introduction of a system of monitoring and exact positioning of personnel, with the function of controlling anti-epidemiological measures on industrial enterprises.

The system allows to monitor the movement of personnel, equipment and inventory in real time on industrial sites of any size.

FUNCTIONALITY

Online monitoring of the personnel, equipment and inventory movement on the territory of the enterprise

Close contact monitoring of the sick person with other workers (0.5-3 meters)

Access control and management system functions via NFC

Tools for data analysis, performance evaluation and operational management decisions

Detection of cases of sudden changes in the position of personnel in space

Wide integration capabilities with most information systems for enterprises (ERP, 1C, BI, etc.)

Monitoring of vital signs by pulse and body temperature. Maintaining a "Personal Medical Record"

Personnel body temperature control

IMPLEMENTATION ARCHITECTURE

Base Stations (BS)
Located along the perimeter and,
if necessary, inside the perimeter
of the site at a distance of 25-30 m

GLONASS/GPS
The positioning system is used
in open areas

Radio Tag
Within sight of at least four base stations,
transmits coordinates with an accuracy of
10-50 cm

Server Hardware
Data from the base stations are sent to
the server for further analysis with other
DMMS modules

EXPECTED RESULT

1 Base stations of 500 units can provide coverage of an industrial site up to 120,000 sqm = approximately 15 soccer fields

2 On an open surface positioning is provided by integration with the GLONASS/GPS module. Accuracy in RTK mode up to 1 m, in standard mode up to 10 m

3 There is a possibility of integral evaluation of the employee's activity (a sharp decrease in activity during the day from the statistical average may indicate a person's state of health)

4 It is possible to continuously monitor the employee's body temperature during the day, the result is achieved by activation of the built-in temperature sensor (optional on request)

ANTI-FATIGUE SYSTEM

THE SYSTEM FOR MAINTAINING DRIVER PERFORMANCE

DMMS ANTI-FATIGUE SYSTEM

Driver fatigue control system is designed
to ensure the safety of traffic and
work with heavy equipment, through operational
monitoring, control and maintenance of driver
performance. It functions in conjunction with
Smart-Watch.

SYSTEM FEATURES

Condition monitoring,
fatigue tracking

Vehicle geolocation

Transmitting data to the
dispatcher

Initiation of
light signals

Initiation of
audible alarm

Operational detection of
alcohol vapors at the operator

OPERATING ALGORITHM

STAGE 1	STAGE 2	STAGE 3
Data collection	Data analysis	Decision Making

OPERATION MECHANISM

The system recognizes the position
of the vehicle and transmits the position
of the vehicle to the dispatcher,
using the GPS/GLONASS navigation systems

The system analyzes the manner
in which equipment controls

The system has the ability to interfere
in the operation of equipment

The system activates the operator
If drowsiness is suspected

The system analyzes the condition
of the equipment operator

The system transmits operational information
about the state of the operator and
the position of the equipment to the dispatching console
through existing communication channels

GPRS

WiFi

The dispatcher has the ability to promptly intervene
in the operation of the equipment in case of
a critical operator's condition and prevent accident

TECHNICAL SPECIFICATIONS

> The system provides continuous monitoring of the driver-operator performance of large-tonnage equipment (dump trucks, excavators, etc.), as well as passenger vehicles

> The system is designed as a Smart-Watch

> Monitoring of fatigue is provided by parameters of human galvanic skin response (GSR)

> Data exchange can be performed via uplink-downlink channel via wireless networks Wi-Fi, LTE or IIoT LoRaWAN
(at customer's request)

> Signal output in case of driver vigilance violation

> The system provides automatic saving of log files and their storage for up to 3 months

INVENTORY MANAGEMENT

INVENTORY MANAGEMENT
AT THE PRODUCTION ENTERPRISE

> Automation of receipt operations, sales, write-offs, movement of inventories

> Centralized storage of information about warehouses, suppliers, responsible persons, inventory in the appropriate directories of the System

> Providing operational and reliable information about the availability of inventory in warehouses

> Maintaining information about stocks in the System with details at the level of: nomenclature numbers, quantities, responsible persons, departments, storage locations in the warehouse

> Ensuring the inventory of inventories (actual availability, identified illiquidity) and data analysis

> Integration with related systems

> Offline operation of the system on workplaces without Wi-Fi

VEHICLE MANAGEMENT

VEHICLE
MANAGEMENT

VEHICLE MANAGEMENT

Vehicle Management — DMMS module, which has a wide range of functions for monitoring and controlling the vehicle infrastructure of production enterprises

Basic Functionality

- Fuel and equipment operation control
- Positioning
- Digital job card
- Personnel status monitoring
- Events and reports generation

SENSORS FOR EQUIPMENT MONITORING

Positioning

Anti-Fatigue

Strain gauge

RPM detection and engine runtime monitoring

Fuel level monitoring

Tire pressure monitoring

FUEL AND EQUIPMENT OPERATION CONTROL

- Collection, storage and processing of indicators from self-propelled equipment sensors (positioning, engine, scales, load cells, fuel sensor, etc.)

- Control over the performance of the driver's work order and production program

- Equipment status and separate units monitoring

- Generation of reports on the work and movement of equipment

PAYDABEKOV Rinat Kibraevich

Driver
Production Line №1
All orders 6 / 7   75%
Поздравляем со сдачей проекта и вручением премиальных возногражденией

Chevralet Niva 4x4 №16

ON OFF   En route
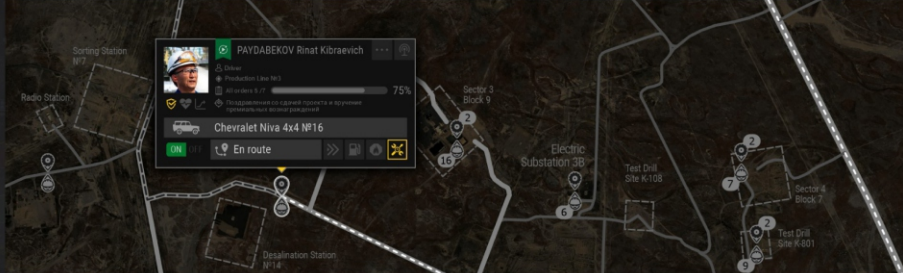
POSITIONING

- 24/7 positioning and monitoring of all types of vehicles via IIoT infrastructure

- E-Log of the movement of equipment and personnel

- Construction of traffic routes

- Reports as infographics

- Data archiving

Sorting Station
№7

Radio Station

Sector 3
Block 9

Electric
Substation 3B

Test Drill
Site K-108

Sector 4
Block 7

Test Drill
Site K-601

Desalination Station
№14

DIGITAL JOB CARD

- Planning, coordination and control of work performed by type of work, operations and work places

- Printed and electronic job cards

- Equipment fixing on the job order

- Maintaining permits to perform jobs

- Generation of reports

- Generating summary reports

PROXIMITY ALERT SYSTEM

The Proximity Alert System (PAS), which operates over a variety of distances is designed to improve workplace safety by incorporating the latest technology detection of equipment, personnel and vehicles. The Dangerous Proximity Detection System and Collision Avoidance System has been designed to prevent injuries and potential fatalities due the operation of heavy equipment near workers, other hazardous equipment or obstacles on the jobsite.

The PBE Dangerous Proximity Alert System is the first system which combines surface and subsurface technologies for a complete solution that works over a variety of ranges distances with optimal accuracy.

The PAS System can be used in a wide variety of situations during operation on the surface and subsurface, improves operator situational awareness to make the workplace safer and increase productivity.

Unique features of the Proximity Alert System:

- Detecting collisions and dangerous proximity of two vehicles
- Detection of collisions and dangerous proximity of vehicle and person
- Detection of collisions and dangerous proximity of vehicle and stationary equipment
- Personnel detection alert system
- Geozone barriers can be set for hazardous areas
- Audible and visual warning
- Real time video surveillance
- Multiple object detection
- Simultaneous use of multiple technologies for maximum reliability and safety
- Flexible user interface options
- Highly customizable reporting capabilities

The PAS system provides the ability to configure in detail reports generated, which not only improves workplace safety through point-to-point alerts, but also, through data management and reporting, increase driver culture and increase productivity.

Proximity Alert System (PAS) is a collision avoidance system for personnel and equipment. It provides a reliable channel to alert objects of proximity and its direction.

PAS PURPOSE

System Advantages

> Warning of the direction of proximity of vehicles, personnel, obstacles and other moving or stationary objects

> Operation in underground mines, quarries, warehouses and other hazardous areas

> Audio and visual alarms with the possibility of connecting additional external notification source (strobe/siren)

> Registration of all events in the main unit with the ability to detailed reporting

> Software for equipment configuration does not requires special skills

> Wi-Fi and 3G modules for remote monitoring and configuration

PAS OVERVIEW

> Combination of several technologies (GPS/RFID/EM-sensors/Radar) to provide trouble-free operation and exact positioning of objects

> Customizable proximity ranges (Dangerous, Medium and Far)

> Customizable audio and visual warnings

> Internal diagnostic, performance monitoring and reporting systems

> Geo-referencing capability

> 4 outputs and 4 inputs providing additional control and interaction with the vehicle (vehicle brake control)

> Recognition of the proximity object: personnel, large vehicles, cars, obstacles, etc.

> Generation of reports for daily review and complete data collection for external analysis

> Power from vehicle ignition or auxiliary power supply.

Heavy vehicle   Personnel   Light vehicle   Obstacle

PAS TECHNOLOGY OVERVIEW

> Reliability and security of the PAS system is ensured by a combination of 4 technologies for full-range protection and redundancy.

> GPS/RFID/EM sensors/Radar technologies have limitations, but the use of combination of technologies provides high accuracy in determining range and approximation direction.

> PAS uses the most precise of combined technologies, depending on vehicle type, application or requirements

> The priority for each technology can be determined

	Technology	Range	Accuracy	Note
1	**RFID**	60 m (200 ft.)	Coverage	Accuracy is limited
2	**Radar**	100 m (300 ft.)	30 cm (1 ft.)	Requires a line of sight
3	**Electromagnetic**	10 m (30 ft.)	30 cm (1 ft.)	No line of sight required
4	**GPS**	Not limited	2,5 m (8,2 ft.)	Surface work

Speaker for audio alerts
Object location
Menu and the Distance to the nearest object Display
Optical Sensor
Calibration, Diagnostics and Number of objects Display
Menu Controls

Speaker for audio alerts
Object Positioning
Menu and the Distance to the nearest object Display
Light Sensor
Calibration, Diagnostics and Number of objects Display
Beacon light for visual alarms
Menu Controls

Proximity Alert System-Z

- > Used in light vehicles

- > Powered from the motor vehicle mains
  (or other external source)

- > Application of RFID/Radar/RFID/EM-sensor technology
  (2 sensors in base configuration,
  with the ability to increase up to 4)
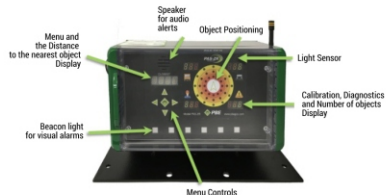
Proximity Alert System – ZR (PAS-ZR)

- > Used in large machines

- > Vandal-resistant enclosure for heavy-duty
  applications

- > Powered from the motor vehicle mains
  (or other external source)

- > Application RFID/Radar/RFID/EM-sensor technology
  (4 sensors in base configuration)
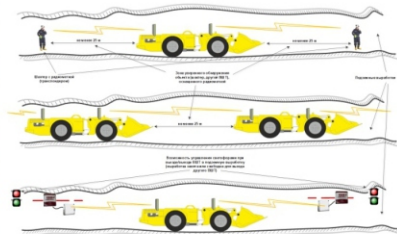
COLLISION AVOIDANCE SYSTEM

> Ability to prevent dangerous approaching of personnel and equipment

> Ability to identify the type of approaching object (large equipment, small equipment, people)

> Ability to determine the distance of approaching

> Ability to determine the direction of approach

> Ability to determine the number of objects in the vicinity

> Automatic braking system activates at critical approaching

Thank You for Your Attention!

AG TECH
TECHNICAL SOLUTIONS

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