# pulseEKKO PRO®

## FOR THE GPR PROFESSIONAL

# pulseEKKO PRO

## Provides unparalleled performance, a wide range of frequencies, and flexible deployment configurations for GPR professionals


12.5 MHz


25 MHz


50 MHz


100 MHz


200 MHz

## Frequencies from 12.5 to 1000 MHz

The pulseEKKO PRO ground penetrating radar family reflects Sensors & Software's commitment to continuous cutting-edge innovation.

pulseEKKO PRO's broad range of center frequencies (12.5 to 1000 MHz) enables users to address any scale of GPR application from deep mineral exploration and glaciology to high resolution geotechnical investigations and concrete imaging.

| | Concrete, Roads, Bridges, | Mining, Quarrying | Forensics, Snow + Ice | Archaeology | Utilities, Geotechnical | Geology | Deep Geology Glaceology |
|---|---|---|---|---|---|---|---|
| 12.5 MHz | | | | | | | • |
| 25 MHz | | | | | | | • |
| 50 MHz | | | | | | • | • |
| 100 MHz | | | | | • | • | |
| 200 MHz | | | | | | • | |
| 250 MHz | | | • | • | • | | |
| 500 MHz | | | • | • | | | |
| 1000 MHz | • | • | | | | | |


250 MHz


500 MHz


1000 MHz


TR 1000



### Digital Video Logger (DVL) & Control Module

High visibility screen. Configurable software to control data collection, display images in real time and save data for post-processing.

## FEATURES

Low noise, high accuracy digital acquisition directly at receiving antenna

Wide range of regulatory compliant transmitters

Computer controlled voltage and temperature-stabilized time and amplitude

Low power consumption

# FLEXIBLE CONFIGURATIONS

Ergonomic deployment platforms. Quick release fastenings and interchangeable components enable rapid system reconfiguration. Integrated support for GPS, odometers and fiducial markers with triggering from a wide range of inputs provides accurate spatial positioning.

## Full Bistatic



Variable antenna separation and orientation to conduct transillumination and multi-offset surveys or to work in rough, poorly accessible areas.

## SmartCart



Fast surveying to cover large flat open areas.

## SmartTow



Rapid GPR profiling over smooth to moderately rough surface areas.

## One-Man



Single person operation for surveying in moderate to rough terrain.

## Multi-channel



For large area surveys or advanced survey methods such as CMP.

## Borehole



Subsurface measurements in shallow boreholes.

# ADVANCED SURVEY METHODS

## CMP



Bistatic antennas allow common mid point (CMP) surveys for subsurface velocity measurments and sismic-style trace stacking.

## WARR



Wide array reflection and refraction (WARR) surveys.

## TRANSILLUMINATION



Direct one-way transmission through an object to extract travel time, amplitude and dispersion information.

## Product specifications

### Receiver and Transmitter Transducers: 250, 500, 1000 MHz

### Dipole Antennas: 12.5, 25, 50, 100, 200 MHz

### System

Maximum System Performance:
186 dB + 10*$\log_{10}$( #stacks)  ex. 219 dB @ 2048 stacks

Environmental: IP65

Auxiliary Positioning: GPS, laser tracking

### Control Module

Time Window: 0.5 to 200,000 ns

Points per Trace: 10 to 31,000

Hardware Stacking: 1 to 32768

Software Stacking: Unlimited

Signal Enhancement: DynaQ

Hardware Temporal Sampling Increment: 5 ps

Sampling: Digital Equivalent Time Sampling (DETS)

Pulse Repetition Frequency (PRF): up to 100 kHz

Data Quality Assurance: Active temperature and supply voltage compensation

Power Consumption: 100 mA @ 12V

Temperature Range: -50 to +50 C

### Transmitter

Emission Regulation-Complant Transmitters: FCC, ETSI (EU) and Industry Canada

Power Consumption: 150 mA @ 12V

Temperature Range: -50 to +50 C

### Receiver

Receiver Sensitivity: 1.5 μV lsb

Data Recording: 16 bit

Power Consumption: 100 mA @ 12V

Temperature Range: -50 to +50 C

### Resitive Dipole Antenna Center Frequency

|  | Size | Weight | Elements |
|---|---|---|---|
| 12.5 MHz | 736 × 14 × 5 cm (290 × 5.5 × 2 in) | 7.2 kg (15.9 lbs) | 5 |
| 25 MHz | 368 × 14 × 5 cm (145 × 5.5 × 2 in) | 3.6 kg (7.9 lbs) | 3 |
| 50 MHz | 184 × 14 × 5 cm (72 × 5.5 × 2 in) | 1.8 kg (4 lbs) | 1 |
| 100 MHz | 92 × 14 × 5 cm (36 × 5.5 × 2 in) | 1.2 kg (2.6 lbs) | 1 |
| 200 MHz | 46 × 14 × 5 cm (18 × 5.5 × 2 in) | 0.8 kg (1.8 lbs) | 1 |

### Resistive Dipole Transducer Center Frequency

|  | Size | Weight | Elements |
|---|---|---|---|
| 250 MHz | 38 × 38 × 20 cm (14.5 × 14.5 × 8 in) | 3.0 kg (6.6 lbs) | 1 |
| 500 MHz | 23 × 23 × 17 cm (9 × 9 × 6.5 in) | 1.2 kg (2.6 lbs) | 1 |
| 1000 MHz  bistatic | 15 × 15 × 12 cm (6 × 6 × 5 in) | 0.6 kg (1.3 lbs) | 1 |
| 1000 MHz Tx-Rx Combined | 19 × 13 × 15 cm (7.5 × 5 × 6 in) | 1.0 kg (2.2 lbs) | 1 |

### Regulatory Specifications
Complies with regulatory agency requirements for ultra-wide-band equipment: FCC (Federal Communications Commission), Industry Canada and European Community (ETSI) standards.
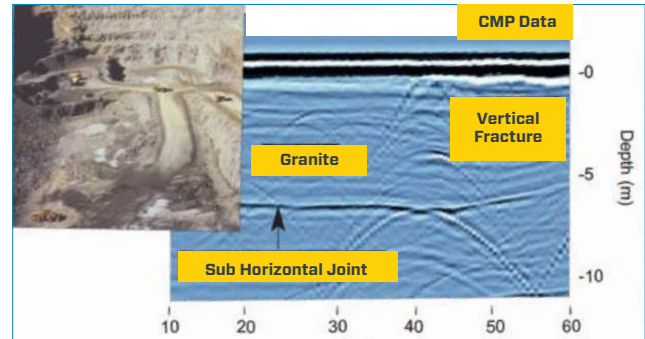
**pulseEKKO PRO applications include investigations for:**
**Mining & Quarrying, Geotechnical & Environmental, Forensics & Archaeology, Glaciology & Ice Sheets, and Structure Assessment**
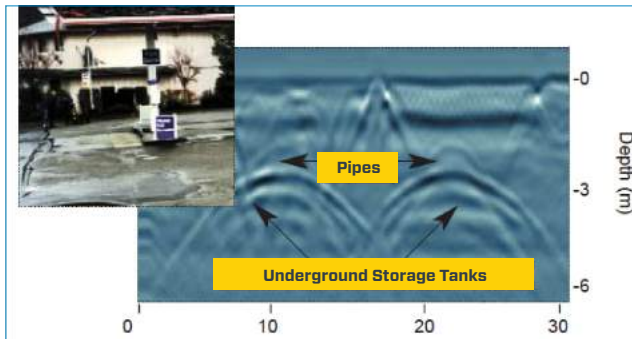
## GEOLOGICAL STRATIGRAPHY
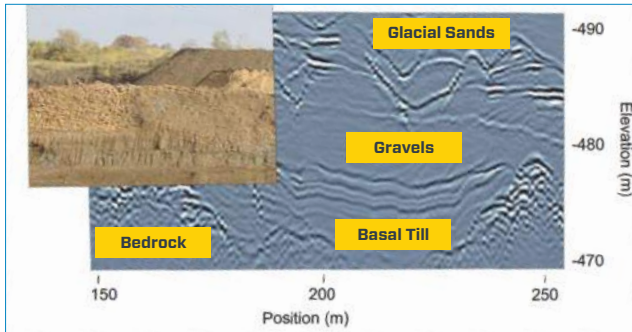


Ground Penetrating Radar (GPR) is used to detect the depth and profile of the bedrock surface.

## MINING & QUARRYING



GPR has been adopted by underground mines for safety and resource development. GPR detects changes in rock type and senses major structures such as fractures, faults and joints.

## GEOTECHNICAL & ENVIRONMENTAL



GPR applications in this area include imaging geological stratigraphy, mapping depth to bedrock, sinkhole detection, locating underground storage tanks (USTs), route selection for roads, railways and pipelines. Drainage systems on golf courses and farms can also be located.

## FORENSICS & ARCHAEOLOGY
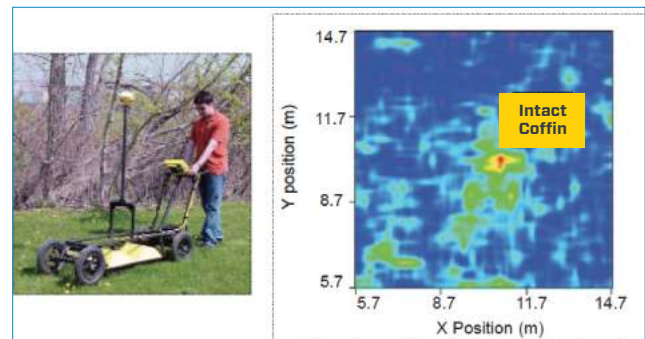


Law enforcement personnel regularly use GPR to uncover buried caches of drugs, money, weapons, as well as locate clandestine graves. GPR is used by professional archaeologists worldwide to image underground artifacts, tombs and the foundations of ancient structures.

## GLACIOLOGY, ICE & SNOW
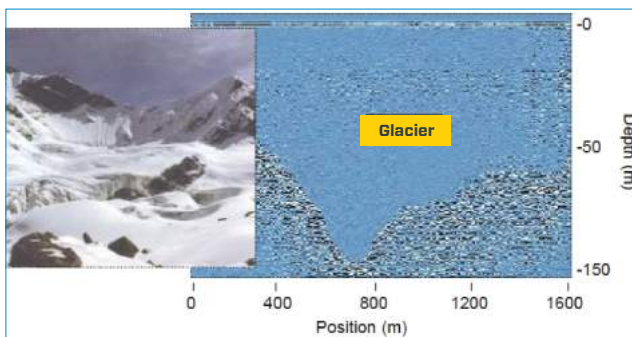


Applications for GPR include ice thickness for winter road safety, snow depth, location of avalanche victims, glaciological and polar ice-cap research.
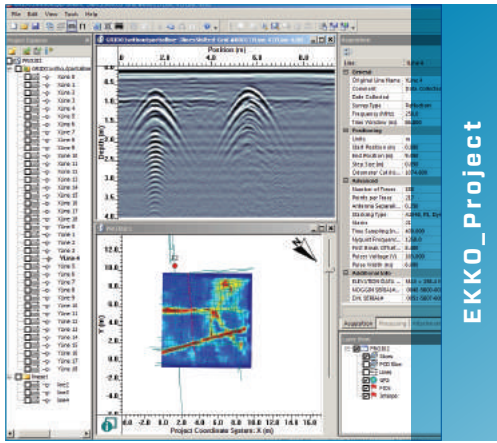
## STRUCTURE ASSESSMENT
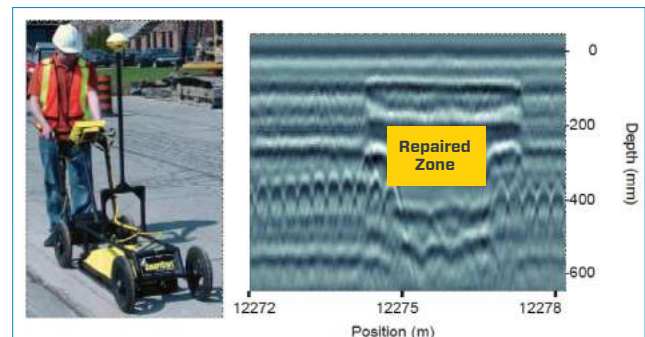


GPR is widely used to assess the interior of concrete and pavement for asset management and maintenance planning.

# EKKO_Project

## Data analysis Software
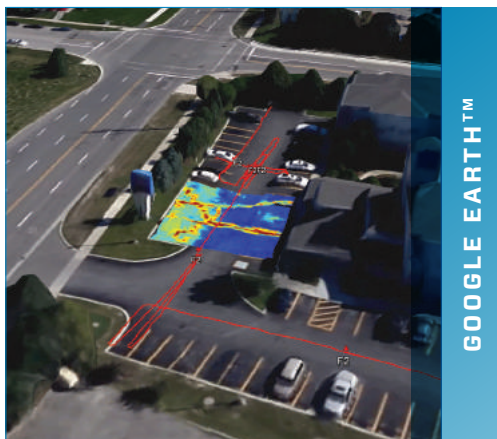


**EKKO_Project**

### EKKO_Project:

**PC software for GPR data management, data integration and basic GPR data display:**

- Includes all GPR data and ancillary files such as GPS, topography, photos, videos, and field notes
- The MapView window automatically shows a map of the project
- Display GPR lines and save them to graphic image files such as .jpg, .bmp and .png.
- Display depth slices generated by processing GPR grid data. Slice up and down in depth through the data volume to reveal targets. Works with multiple grids simultaneously

### Reporting  used to extract useful information from the GPR data:

- The Summary Report allows the user to select data images and photographs, add text and output to a PDF report
- Other reports extract field interpretations added to the data and outputs them in formats such as spreadsheet (.csv), Google Earth (.kmz), GIS and CAD (.dxf)



**GOOGLE EARTH™**
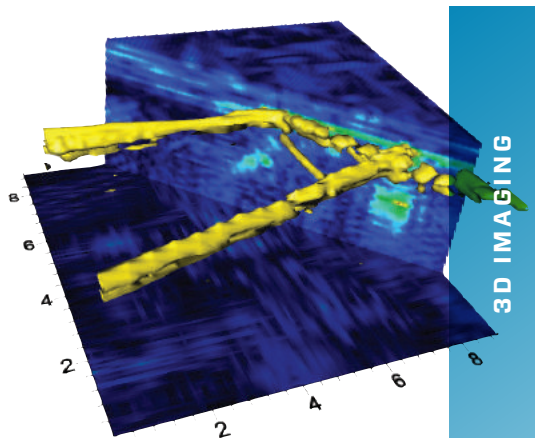
### Additional modules - EKKO_Project can be enhanced with:

1) **LineView** module for modifying and displaying GPR lines
2) **SliceView** module for modifying and displaying depth slices from GPR grid data
3) **Interpretation** module for adding interpretations in post-processing. Specialized reporting modules that use interpretations added to the data are also available:
   - i. **Bridge Deck Condition Report** module extracts rebar interpretations and generates ASTM-standard maps of bridge deck deterioration
   - ii. **Pavement Structure Report** module extracts subsurface layer interpretations such as bottom of asphalt and generates thickness charts, tables and statistics
4) **Processing module** for advanced data processes such as filtering and migration



**3D IMAGING**

### 3D Visualization:

SliceView exports GPR grid data to a 3-dimensional output.
Use a 3D visualization application to:

- View and rotate data as a 3D cube.
- Modify the opacity to make weaker signals invisible and 'melt out' stronger targets in the volume.
- Slice through the cube in any direction.

**Subsurface imaging solutions**