

**The Global Leader in
Ground Penetrating Radar
(GPR) Solutions**



Solutions & Application Areas

Civil & Structural Engineering
Environmental & Geotechnical
Roadways & Transportation Infrastructure
Exploration & Mining
Military & Police
Education & Research
Archaeology & Cultural Heritage



“ At MALÅ we believe results speak louder than words. Our unwavering commitment to solving real world problems is backed by more than 75 years of experience developing subsurface investigation solutions. Today, we can proudly say that we are the premier and most innovative provider of GPR technologies in the world with clients in over 100 countries.

It is MALÅ’s passion for innovation, hi-quality solutions and top-notch after sales services that has put us where we are today, but it could only be done with the support of you, our clients from around the globe. So thank you for your interest in MALÅ solutions and for sharing our passion of going beyond the present.

In the next few pages you will see a selection of our latest solutions, developed with your needs in mind. ”

At your service
Niclas Ingemarsson
Chief Executive Officer



Company Introduction

The solution for subsurface investigations

MALÅ Geoscience is a Swedish company with a history that began in the 1930's as a part of the Swedish Geological Survey (SGU). In the small community of Malå, SGU launched an ambitious research program to develop survey equipment for mineral exploration. MALÅ Geoscience is named after this community and has during more than 75 years developed various geophysical and technical instruments, including field computers, gamma detectors, various borehole tools, and has pioneered with unique inventions like the well-known Slingram (horizontal loop EM) and RAMAC borehole radar systems. Today, MALÅ Geoscience is a private company and the market leader in the design and manufacture of Ground Penetrating Radar (GPR) systems, offering innovative solutions for subsurface investigations.

With over 75-years of professional experience, MALÅ knows how to build reliable field equipment and has developed a versatile range of high quality, durable and easy to use instruments that offer solutions across a broad range of subsurface investigation applications.

MALÅ has a GPR solution for all applications. From non-destructive testing (NDT) and concrete imaging, to utility detection, mapping and general geophysical investigations, on surface as well as in boreholes.

We pride ourselves on our customer care and support services delivered centrally and locally, through our offices, service centers and worldwide network of experienced sales partners.

R&D and Innovation

MALÅ focuses on innovation and has delivered a numbers of "firsts", such as Borehole GPR, all-digital GPR, flexible Rough Terrain Antennas, parallel synchronized GPR controllers, and the first fully integrated 3D GPR Array with the MALÅ MIRA System. With a combined 250 years of R&D experience our team knows that value of working closely with clients and partners. This way, MALÅ is able to deliver powerful, practical, and yet easy-to-use solutions at affordable prices. Coupled with a commitment to provide support and high-quality service, we work hard for your business.

“ I have been a customer of MALA Geoscience since I first started my career as an Assistant Professor of Near Surface Geophysics in 1999. Over the last ten years, I have consistently received outstanding products and service. I have found MALA Geoscience remarkably generous in their customer support, repeatedly providing me and my graduate students with affordable solutions to further my scientific research using the ground penetrating radar technique. This superb customer support has had very significant positive, long-term impact on my academic pursuits ”

Prof. Lee Slater
Near Surface Geophysics - Rutgers University, Newark, NJ, USA

MALÅ Imaging Radar Array (MIRA)

The most powerful 3D subsurface investigating solution available; GPR productivity on steroids!

The MALÅ Imaging Radar Array (MIRA) system is a complete and world unique 3D system, covering all steps in the target locating process, from field survey to end-results. It is the only available system of its kind that seamlessly integrates 3D GPR acquisition, QA/QC, 3D processing, positioning, interpretation and export&reporting.

MALÅ MIRA is a highly cost efficient and comprehensive hardware and software solution that removes much of the ambiguity involved in GPR data interpretation.

The MIRA system, based on the revolutionary ProEx core technology, is the latest in a long tradition of innovative GPR solutions from MALÅ Geoscience. The MALÅ MIRA solution represents a significant advancement in second generation GPR Array technology.

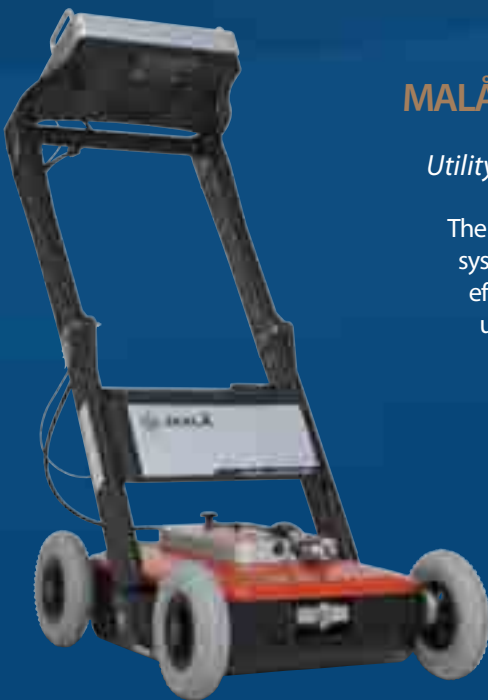


MALÅ Easy Locator System

Utility locating made easy for any material, metallic or non-metallic!

The MALÅ Easy Locator is the industry-standard Ground Penetrating Radar (GPR) system for utility location professionals worldwide. The Easy Locator delivers cost-effective, entry-level GPR, redefining the way that everyday location of utilities and unknown buried objects is performed.

The semi-automated Easy Locator systems include an easy user interface where the operator needs to provide only minimal input to begin collecting data. Portability is unmatched in both weight and ease of disassembly for transport between projects. Its design, ease-of-use and accuracy make the MALÅ Easy Locator an essential tool for every utility location professional.





MALÅ CX System

The #1 GPR System for concrete inspections in the World!

MALÅ CX Systems allow you to scan concrete structures simply and safely. It is an '3D-in-the-box' data acquisition, display and analysis system, developed with maximum productivity in mind. There is no need to transfer data to another workstation to process or interpret data. As a fully integrated, compact and extremely user-friendly system, the MALÅ CX delivers cost-effective GPR measurements of the highest quality.

MALÅ ProEx System

The most versatile GPR System in the market!

The MALÅ ProEx system contains the latest core technology developed by MALÅ Geoscience. It is a modular and lightweight, full-range Ground Penetrating Radar (GPR) system designed to meet the needs of the advanced professional user. The modular design of the MALÅ ProEx system makes it the optimal GPR platform for the advanced and multi-disciplinary user. ProEx is designed with multi-channel surveys in mind and, with its market unique parallel processing core, the survey speed and field efficiency is the same regardless of number of data channels used. The MALÅ ProEx is fully compatible with all antennas currently manufactured by MALÅ Geoscience, offering configurations between 25 MHz to 2.3 GHz, with an option of nearly an endless number of simultaneously recording channels. Such diversity makes the ProEx system ideally suited for clients with the widest range of application areas.



MALÅ X3M System

The most compact GPR system available!

The X3M system contains of an integrated radar control unit, fitted directly on a shielded antenna and powered externally. The built-in electronic design makes it low weight and a very compact system, easy to transport, assemble and operate.

The convenience of this flexible and modular design means that a MALÅ X3M based GPR system can be quickly and easily configured for use across a wide range of mid-range applications, simply by changing the antenna. This flexible approach offers you an affordable choice to system configuration. The system has been available on the market since the early 2000's and because of its flexibility, robust design and outstanding quality it is one of MALÅ Geoscience most popular systems.

Civil & Structural Engineering

GPR is an essential locating tool for the detection and mapping of non-metallic and non-conductive utilities.

In Europe, while performing new installations, 90,000 incidences of third party damage to gas pipelines are reported each year...

Prior to the use of GPR, utilities constructed of plastic, terracotta, concrete, non-toneable fiber, asphalt composite and other materials were generally considered non-locatable. This stemmed from the fact that the generally accepted method of non-intrusive detection incorporated the use of electromagnetic devices which cannot locate non-metallic / non-conductive underground objects.

GPR became main-stream for utility detection and mapping when MALÅ Geoscience introduced the MALÅ Easy Locator in the early 2000's. The Easy Locator revolutionized the use of radar, introducing GPR at a price point half that of other systems available at the time. The user-interface broke every barrier in terms of ease of use in the field and became the GPR standard and selected tool by locating professionals.

Taking locating to the next level, MALÅ Geoscience is pleased to introduce the MALÅ X3M System as the standard alternative to the Easy Locator for mapping and gridding. It's the most popular system on the market today for use by

“MALÅ's CX systems are easy to use, affordable, and allow for multiple frequency antennas and electromagnetic sensors. MALÅ's technical support and hardware repairs are unparalleled in this highly technical and competitive industry!”

Gary Nutwell
Metro Concrete Scanning Corporation, Annapolis, MD, USA

Subsurface Utility Engineering firms for extensive mapping of industrial and commercial areas. With its rough, flexible and modular design, the system offers an easy to use and cost-effective solution for locating and mapping professionals worldwide.

For more advanced and larger scale projects, MALÅ Geoscience offers the high-end MALÅ ProEx and MALÅ MIRA Systems to complete the solutions offered to the civil & structural engineering professionals. With the comprehensive system hardware and user-friendly software our customers will save both actual operation time and man-time which makes these MALÅ ProEx and MIRA solutions a reliable and cost-effective alternative.

Applications include:

- Void location
- Environmental remediation
- Utility positioning & mapping
- Utility detection
- Damage prevention





Non Destructive Testing (NDT) professionals routinely use GPR for various applications, including concrete testing. Prior to the use of high frequency (above 1 GHz) GPR transducers, x-ray methods were the primary tool for imaging structural embedment in concrete.

GPR is today replacing the x-ray method in many instances as the preferred approach for a number of reasons. The x-ray method is expensive, time consuming, poses major health risks during operation and suffers limitations on which surfaces can be imaged. For example, slabs on grade or other surfaces where both sides cannot be accessed may not be scanned with x-ray. GPR on the other hand requires less training, poses no health risks from emissions, and can be used on any surface.

MALÅ Geoscience is pleased to introduce the MALÅ CX System, a tough, compact and high quality GPR system for the NDT operator. Results are obtained, in real time, directly in the field. The MALÅ CX is not only cutting costs related to reduce man-time but is also today widely accepted as cost saving technique in the quality assurance process.

GPR as an imaging tool allows the operator to gather the following information:

- **Rebar and post tension cable location and depth**
- **Slab thickness**
- **Location of non-metallic and metallic conduits and other embedded non-structural features such as fiber networks, in-floor heating elements and plumbing**
- **Detection of voids and variations in the concrete matrix**

After 11 September 2001, soon after the World Trade Center in New York collapsed, MALÅ Geoscience took an active part in the huge and necessary work to examine the ground under the site in order to create a complete picture of the subterranean damage.

There are different MALÅ GPR solutions available for condition assessment covering various environments and project scales. MALÅ Geoscience can offer not only the mentioned MALÅ CX System. Also the MALÅ ProEx and MALÅ MIRA Systems are defined as suitable solutions for various projects within this industry.

Applications include:

- **Inspection of reinforced concrete structures**
- **Measure bridge deck thickness**
- **Void detection and location**
- **Structure inspection**
- **Bridge deck condition assessment**
- **Condition assessment**
- **Determining concrete cover depth on new structures**



Environmental & Geotechnical

Assessing sites for hidden environmental hazards such as underground storage tanks, buried drums, landfills, trenches, abandoned pits and waste lagoons is routine in the environmental assessment industry. During the past two decades, GPR has become an integral part of subsurface environmental investigations, applied to large contaminated industrial sites as well as at the local street corner petrol station with leaking underground storage tanks. GPR's ability to rapidly scan large areas and detect buried debris and objects as well as disturbed soil saves tremendous amount of project funds by allowing environmental scientists and engineers to focus their attention to where it matters.

MALÅ X3M systems or, in case of more complicated applications, the MALÅ ProEx, are the systems of choice for most companies dealing with environmental and geotechnical applications. The highly popular MALÅ X3M, with its compact, yet flexible, solutions, offers the essential range of antennas for almost all related applications, while the MALÅ ProEx's unlimited choice of antennas is the ideal multi discipline GPR solution.

Applications include:

- Hazardous waste site assessment
- Underground Storage Drums location
- Landfills delineation
- Site assessment
- Underground Storage Tank (UST) location
- Mapping of groundwater resources

“MALÅ Geoscience undoubtedly remains our sole GPR provider and we highly recommend any of their products to potential buyers”

Keith T. Garry
So-Deep US, P.C, Michigan, USA





Roadways & Transportation Infrastructure

In the United States there are roughly 590,000 bridges at an average age of 45 years. Recent estimates claim that \$5 billion USD will be spent annually to repair or replace portions of the, in total, 2.8 billion square feet of bridge decks.

From years of experience with road and infrastructure investigations, MALÅ Geoscience is well prepared to offer a cost-effective GPR solution for the aging infrastructure problems that many of the cities worldwide are facing.

Condition assessment of roadways and related infrastructure is an ever growing application area for GPR. Bridge decks, parking decks, and other structures may be scanned to nondestructively evaluate the amount of deterioration of these structures. Areas of degraded or compromised concrete from corroded rebar and delimitation are detectable with GPR as are areas of low propagation velocity, due to the higher dielectric properties from infiltrated water and chlorides.

Introducing the MALÅ RoadCart system, that provides a breakthrough in affordable GPR infrastructure technology for evaluating pavement, base and sub-base thicknesses. It is an extremely portable, user-friendly and cost-effective ground coupled platform that provides unmatched performance.

The platform of the MALÅ RoadCart system is built on the MALÅ ProEx control unit, which allows the user to utilize and simultaneously collect data from multiple antennas with varying frequencies at highway speeds. The typical setup for the RoadCart system is a two-antenna configuration that includes a 2.3 GHz antenna for pavement evaluations and an 800 MHz antenna for relatively deeper base and sub-base evaluations. However, the MALÅ RoadCart can accommodate frequencies as low as 250 MHz to allow the user to use the system for deeper geotechnical investigations.

As many of the projects involve surveying of larger areas, MALÅ Geoscience is pleased to introduce also the cutting edge GPR array system, the MALÅ MIRA (MALÅ Imaging Radar Array) System. The MALÅ MIRA System has proven to match the need for many institutions and organizations worldwide in their intense work to secure areas close to collapsing by their aging infrastructure.

Applications include:

- **Asphalt evaluations and thickness measurements**
- **Utility detection and delineation**
- **Base and sub-base thickness measurements**
- **Geotechnical investigations**
- **Void detection**
- **Bridge deck evaluations**

“ We have owned and operated MALÅ equipment since 2001, starting with the DOS based CU-I and continuing up through multi-channel ProEx. With each generation of equipment, MALÅ continues to improve on an already outstanding GPR platform. The durability of their equipment and their superior customer service has been a great asset to the continued growth of our company ”

Michael J. Wightman
President – GeoView, Inc. – St. Petersburg, FL USA



Exploration & Mining

Geologists and geophysicists rely on ground penetrating radar (GPR) to rapidly gather high resolution subsurface information. Compared to other geophysical methods and with respect to resolution, few if any comes close in terms of ground coverage per time instance.

The integrated GPS support simplifies geological mapping and prospecting in the remotest of areas. Antennas ranging from the deep penetrating, low frequency, MALÅ RTA antennas up to the high resolution HF-MALÅ will satisfy all thinkable variations of application areas.

Both the MALÅ ProEx and X3M solutions offer suitable solutions for geological or mining applications. The flexibility in the MALÅ GPR Systems allows antennas to be pulled by hand or towed in various configurations behind ATV's, vehicles, snowmobiles, or whatever other means is necessary to traverse the desired terrain. GPR is frequently used to obtain the following geological information:

- **Deep bedrock profiling**
- **Groundwater resources**
- **River & lake bottom profiling**
- **Fractures characterisation**
- **Sedimentological studies**
- **Soil & aggregate mapping**
- **Bathymetry studies**
- **Polar research**
- **Karst mapping**

A \$150,000 borehole GPR survey was able to add more than \$14.2 million in value in the mine's resource base!

The need of knowledge of subsurface conditions are vital to make the right decisions concerning underground constructions, hydrogeological models and volume estimations.

When constructing a mine shaft, drift or gallery, borehole GPR is being used as an investigation tool at the very front, collecting valuable information on fractures, fissures and fault planes which may oppose a threat to safety. Horizontal drill holes are used to collect GPR reflection and tomography data, prior to the tunneling work. Borehole GPR is in many cases the only way forward when making reliable estimates on how to continue the construction safely.

MALÅ Geoscience manufactures the only commercially available GPR solution that efficiently can perform borehole GPR surveys deeper than 30 meters. The MALÅ Borehole Systems have been used successfully to depths in excess of 2500 meters.

Applications include:

- **Depth to bedrock**
- **Sand and gravel mapping**
- **Placer mapping**
- **Groundwater exploration**
- **Stratigraphic mapping**
- **Mine Safety**
- **Hazardous fracture zone detection**



Military & Police

There are currently 86 national forces having MALÅ equipment in use at a regular basis.

The GPR technology has proven to be a valuable method for various applications for military and police departments all over the world. MALÅ GPR solutions reduce time for searching a site and its non evasive qualities prevents unnecessary excavation. GPR technology is oftenly used in combination with other methods but MALÅ GPR solutions provide capabilities that other methods can't.

MALÅ GPR Systems are frequently used by military and police when securing areas from unwanted objects, structures or materials. Regardless if the task is to investigate crime scenes, searching for buried ammunition, finding secret rooms in cellars or tunnels, the MALÅ GPR offers a robust, reliable and cost-effective solution.

Applications include:

- **Finding and mapping metallic and non-metallic mines and unexploded bombs**
- **Finding secret rooms, cellars, internal boxes and 'stashes'**
- **Finding underground warehouses, bomb-shelters.**
- **Wall investigations - finding secret transmitters, receivers, microphones and internal boxes.**
- **Forensics investigations**





Education & Research

Multi-disciplinary MALÅ GPR Solutions are widely appreciated by the research and educational community.

Many Universities and research organizations have come to use MALÅ GPR Systems as a tool in their every day work to analyze and create an understanding for various problems in various fields. GPR is regarded as a widely versatile technology and can successfully be applied to a very wide area of interest.

One area in which GPR is a frequently used method is for measuring the thickness of snow and ice and to study the structure of glaciers. Mapping ice contacts, depth to the basal till layer, hidden crevasses, and other information may be obtained from GPR data. Glaciologists and researchers in the Polar Regions use the unshielded low frequency MALÅ RTA antennas, ranging from 30 to 100 MHz, for deep studies up to several hundred meters. MALÅ ProEx solutions have been widely appreciated for the ability to customize the length of the time window, maximizing the depth range of investigation.

Winter season ice roads are an essential part of the scandinavian road network and essential for transportation in northern regions to support mining and petroleum operations. In some areas ice roads are also used intensively the car- test

“ We really like the neat and compact system and how it works exceptionally well in the field even under the most adverse conditions. The real benefit is the ease and speed with which we can change antennas and thereby switch investigation frequency and medium since our research is performed on a range of features such as glacier ice, snow and lake ice ”

Prof. Peter Jansson
Department of Physical Geography and Quaternary Geology, Stockholm University

industry. Surveys of the ice thickness with the MALÅ X3M, MALÅ ProEx, and/or MALÅ CX Systems are often conducted by towing or affixing antennas ranging in frequency from 250 MHz to 2.3 GHz depending on the ice profile.

MALÅ Geoscience is well known for its borehole antennas and these are also used in various research projects. The MALÅ Borehole system is one of a kind and offers various measurements modes in order to reach maximum value of a GPR project. For instance, combining crosshole tomography with surface reflection profiling offers a powerful tool for exploring fractures and voids in a hard rock environment.

Applications include:

- GPR signal characteristics
- Near Surface Geophysics
- Hydrogeophysics
- Geology
- Environmental
- Engineering
- Archaeology





Archaeology & Cultural Heritage

Archaeologists worldwide apply the GPR method on projects to obtain non-invasive subsurface information from the Pyramids of Egypt to the rain forests of South America and everywhere in-between. GPR provides archaeologist's with a tool to image otherwise completely indistinguishable features from the surface.

Buried trenches, burials, objects of interest, ancient foundations, and many other anthropogenic features in the subsurface are often initially discovered with GPR. Having preliminary information is essential for the archaeologist to focus their efforts and minimizes the need for blind or random test pits. MALÅ X3M and ProEx systems from MALÅ Geoscience offer ideal platforms for the archaeologist in projects covering small to medium areas.

MALÅ Object Mapper is ideally suited for picking targets of interest and immediately creating "dig sheets" or grid maps to scale. In the box 2.5D time slicing with the MALÅ Monitor XV11 provides the project scientists with near real time images with detail not always achievable with standard 2D profiles.

However, for larger areas and where there is a need of very detailed subsurface information, it is most efficient to use a full-range 3D GPR Array system, such as the MALÅ MIRA System.

The system and its array technique uses a number of transmitter and receivers simultaneously to measure several parallel profiles in one sweep and by doing so, the survey becomes detailed, accurate and extremely cost-effective.

Applications Include:

- **Archaeological Site Assessment**
- **Buried goods, clandestine grave location**
- **Cultural Resource Management**
- **Location of hidden weapons or evidence**
- **Site monitoring**
- **Location of ancient buildings, foundations and related vestiges**
- **Excavation planning**
- **Cemetery mapping**

“ I consider the MALÅ Imaging Radar Array (MIRA) as the currently most advanced and complete multichannel GPR system on the market, best adapted for efficient, large-scale GPR prospection.

Our test measurements have resulted in data of outstanding quality and unprecedented resolution, opening entirely new possibilities for high definition archaeological prospection.”

Immo Trinks, PhD
Cantab, Sweden

GPR Technology in brief

The Ground Penetrating Radar (GPR) technology uses electromagnetic (EM) waves transmitted from an antenna (Tx) which reflects on layers and objects in the ground. These reflections are received with an antenna (Rx) and create a picture of the subsurface. As the transmitting and receiving antenna is moved along the surface, recordings are collected and displayed side by side. The result looks like a cross section also known as radar profile.

GPR can be used in a variety of media including rock, soil, ice, fresh water, concrete, pavements and structures and it can detect objects, voids, cracks and changes in the material.

The resolution and investigation depth is depending on the antenna frequency used; most often ranging from 20 MHz to 2.3 GHz. High frequency antennas don't penetrate as far as deep frequency, but they do provide better resolution.

MALÅ Geoscience offers comprehensive training programs at the Corporate Headquarters in Malå, Sweden or at any of our regional offices located in USA, China, Australia and Malaysia.



Contact Details

MALÅ Geoscience has more than 60 distributors worldwide and users in 114 countries.

To discuss your requirements in more detail or to locate a local representative, please contact MALÅ Geoscience Corporate Headquarters, offices or visit our website at www.malags.com

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Contact us today for
further information!



MALÅ Geoscience is the Global Leader in Ground Penetrating Radar (GPR) with users in 113 countries and more than 60 distributors.

With offices in Sweden, USA, China, Malaysia and Australia, and service centers in 3 continents, the company offers an outstanding level of service to customers and business partners worldwide.