

## The Adventure of Earth

Exploration & Geosurvey Division

### DMT GmbH

- **Mining Services**  
Operational safety and profitability,  
all from a single source
- **Industry Systems**  
Understanding machinery, optimizing  
operations and increasing profitability
- **Building Safety**  
Safety for personnel,  
plants and products
- **Civil Engineering**  
Matchless technology and cost  
efficiency in consulting and planning
- **Exploration & Geosurvey**  
Reliability in planning,  
construction and operation

#### The Adventure of Earth

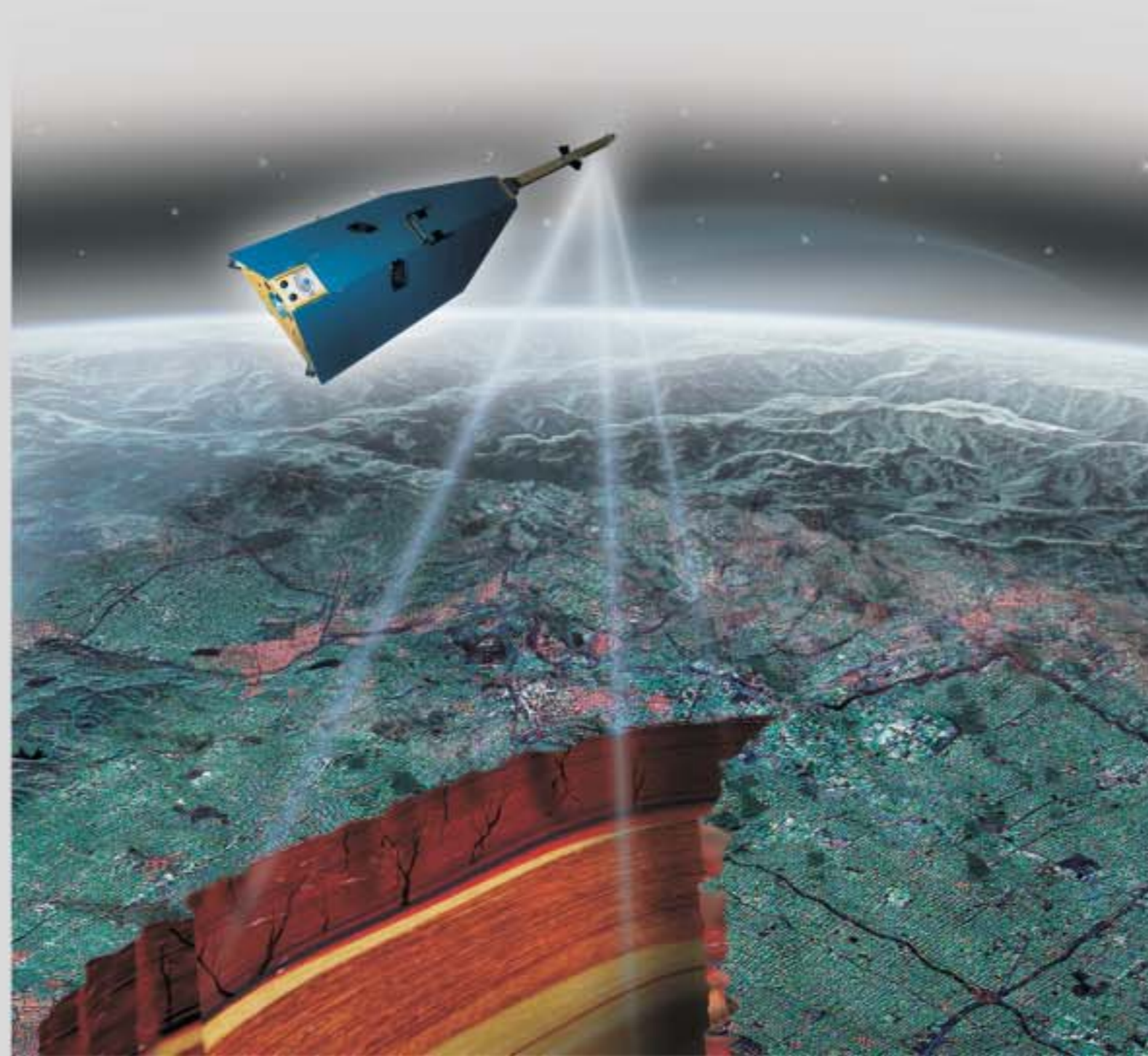
##### DMT GmbH

Exploration & Geosurvey  
Division

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DIN EN ISO  
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certified

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## The fascination never ends, ...



**Dr. Eiko Räckers**  
Director, DMT Exploration &  
Geosurvey Division

... setting out again and again on the Adventure of Earth, delving into the depths and carrying out complex geological investigations for our customers around the globe. Applying fine-tuned skills and sensitive instruments, we explore the composition of subsurface formations and locate mineral resources deep underground. And our enthusiasm for our work runs just as deep, for it is the continuation of a centuries-old tradition of exploration. But one thing has changed radically: we work with the methods and means of cutting-edge technology. With satellite-supported surveying. With geological and geophysical exploration. With intelligent precision instruments, often custom engineered to a customer's specific needs. And this formidable technological arsenal is backed up by our most valuable asset: an interdisciplinary team of geologists, physicists, mathematicians and business professionals, electrical engineers and surveying experts, mechatronics engineers and geophysicists. This interlinking of various skills not only gives us enormous flexibility, it guarantees you the substantiated results you need for your planning.

Our customers and markets know no boundaries. We locate Siberian ores and Colombian coal, and fossil fuels throughout Europe. We explore and monitor all varieties of surface and underground engineering projects. Our surveying technicians were involved in constructing the Eurotunnel, to name just one example. And our geophysical subsoil investigations of planned transport routes continue to clear the way for traffic projects, for better mobility and infrastructure.

In short: when you need to know what's going on underground, DMT Exploration & Geosurvey is there for you.

## DMT - a safe prospect

Measuring, testing, planning and developing – these DMT core competencies form the basis of our comprehensive service packages in mining, infrastructure and civil engineering, mechanical engineering and in all aspects of technical safety. With this concentrated know-how and over 150 years experience, we are a systems service provider for comprehensive solutions – and a sought-after partner in more than 70 countries worldwide.

To meet the exacting demands of our customers, we adhere to a corporate philosophy that applies to all five business divisions united within DMT: “a safe prospect.” The responsibilities of our dedicated professionals include keeping people safe in their workplace as well as guaranteeing that structural elements, buildings and investments are safe, sound and solid. With DMT as your partner, you can be sure your project will be completed on time and on target. A solid future!



# Looking into the heart of the earth

## A never-ending adventure

The world is flat. At least people lived in this faith that for centuries, until Galileo Galilei showed the earth from a new perspective. His discoveries triggered a research impulse to find out exactly what lies deep beneath the surface of the earth.

Since then the earth's surface has been extensively surveyed and researchers have penetrated miles into its interior. And companies like DMT have made a significant contribution to these successes. For over 150 years we have been exploring the ground below us. Today, DMT is a leading international service provider in mining, in geotechnical exploration for specialised underground engineering projects as well as in the search for oil and gas deposits.

The Exploration & Geosurvey Division looks back on a long tradition. One of the initiators of modern geophysics, Ludger Mintrop, was an employee of our company at the beginning of the last century. His development of refraction seismology, now a recognised technique in the exploration for mineral resources, was a milestone in the progress of geophysics. DMT has continued in this direction, developing high-resolution exploration methods including the CMP refraction technique and surface-air sound seismology. And thanks to our dedication to progress, we continue to achieve results that testify to the efficiency of our organisation.



# At first glance

## Photogrammetry and remote sensing



From high in the sky, our precisely aimed technological instruments scrutinise the earth. That's why you can depend on us for exact, down-to-earth data on raw-materials deposits and their properties. But we also record long-term developments on the earth's surface: when houses in mining areas begin to sink, trees die as a result of falling groundwater levels or residual waste is suspected, we supply decisive findings using hyperspectral analyses and radar interferometry. This gives you the chance to counter negative developments quickly and effectively.

We give you all the support you need to reach the right decisions. Such as whether and where further exploration is worthwhile in a specific area. Our specialists evaluate aerial photographs, integrate the results of preliminary geological reconnaissance, and draft digital topographic site models from the acquired data. This provides you with a clear initial view of the subsurface, as a basis for planning your next step.

Decades of experience have made us a sought-after partner among companies in the raw-materials industry worldwide. The European Union, the World Bank, governments and investors rely on our expertise. Because DMT offers the perfect combination of mining know-how and advanced exploration technology – from planning to documentation and model-making.

### **D M T      S P E C I A L**

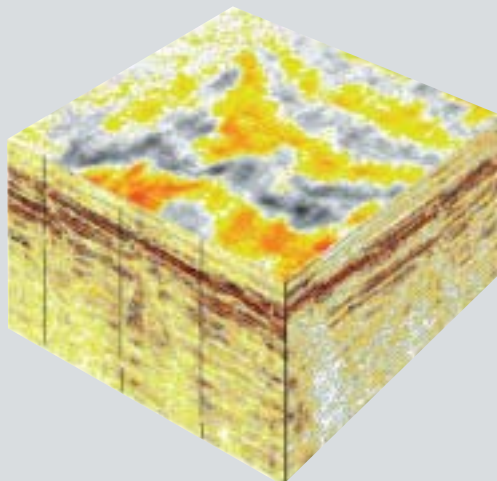


We digitise detailed information on geographic conditions in your raw-materials concession – a source of key data for planning further exploration.



# Mineral resources located with precision

## Exploration in depth



As soon as the first raw data have been documented, DMT's experts dig deeper. Their goal: to create an exact model of the deposit and reveal its economic viability. Information you can count on as a basis for your calculations.

Each exploration project is unique. Factors such as type of landscape, duration and the required accuracy of data determine which instruments and methods are used. These include vibroseismology, which is regarded as the most advanced method of exploration at depth. It has the advantage of being environmentally friendly as well as efficient. Vibration vehicles weighing several tonnes generate defined vibrations and the travel times, reflections and refractions of these vibrations reveal accurate details on what lies hidden beneath the surface. This enables us to look many miles down into the earth. We also apply other seismic technologies such as airguns, explosives and weight dropping.

Armed with these surveys, we develop detailed 3D images of the subsurface – even under the most complex tectonic conditions – depicting deposits of oil and gas, coal, ore and salt. That means your drilling sites are precisely located before costly work begins. In addition, our 4D exploration affords insight into long-term changes in the deposit subsequent to starting production.

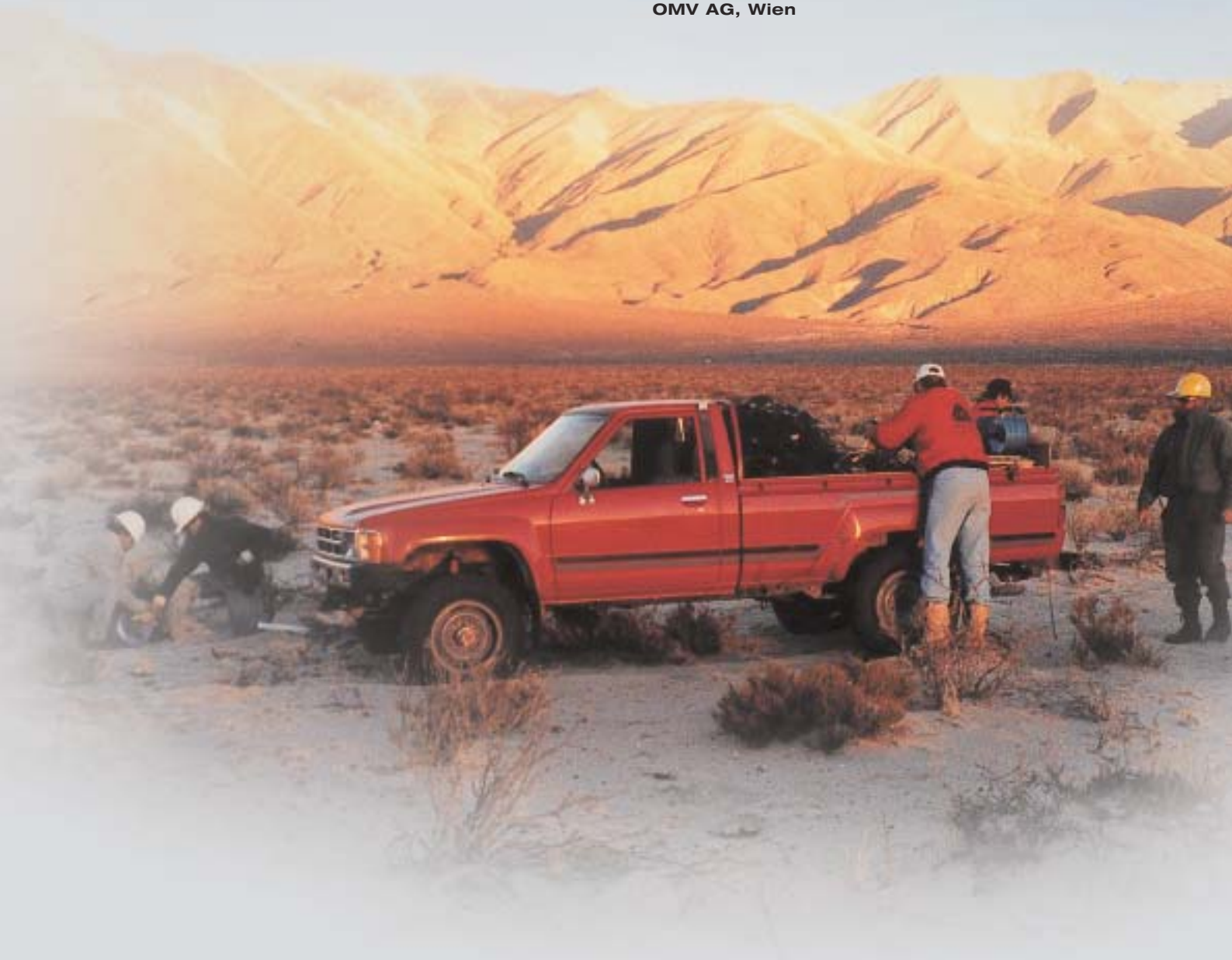
### D M T      S P E C I A L



Operation of our vibration vehicles is cost-effective, efficient and environmentally friendly. Deposits are illustrated in 3D and 4D – before and during production.

“Even in difficult terrain, the DMT teams conduct their surveys efficiently and with care for the environment. We are certainly looking forward to continue working together.”

**Dr. Erwin Herndler,  
Seismic Acquisition,  
OMV AG, Wien**





# Exploration in detail

## Deposits probed from all sides

Step by step to success: DMT's experts employ geophysical and geological research methods to determine the size of near-surface deposits, calculate the volume of their reserves and the proportion that can be mined.

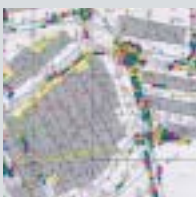
In detailed surveying, we rely first and foremost on high-resolution geophysics technology. High-frequency vibrators are among the instruments used to accurately analyse the underground structures. Following this process, any faults, zones of weakness and geological interfaces are mapped. Accurately placed boreholes are drilled as the next step. Our intelligent borehole probes then record further data, from which we determine geotechnical parameters.

Through analysis and evaluation of the drill cores, we fill in any remaining gaps in our assessment. This puts our specialists in a position to draw substantiated conclusions on the quality of the underground mineral resources.

The results are fed into a giant data pool, which contains all the relevant information for making a more detailed 3D model of the deposit. With this precise image, you are equipped with a reliable basis for planning mining activities. This includes, for example, knowledge of how the mineral resources are spatially distributed underground and what the potential production volume is. We also help you determine the optimum type of exploitation. Whether underground or surface mining: our experts can tell you which method and type of operation is the best.



## DMT SPECIAL



High-resolution geophysics gives you highest-possible planning reliability for exploiting deposits. We determine the spatial distribution and quality of mineral resources.

# Built on solid ground

## Avoiding construction site problems



Will the building site meet your expectations? Just ask DMT's experienced professionals. In advance of major civil engineering projects, DMT locates cavities, obstacles or impenetrable rock – potential problems during the construction work. Carrying out such investigations is essential to achieving smooth construction operations or optimum route planning. For building construction as well, a DMT geophysical site analysis lays the foundation: Is the site capable of bearing the load? Where does the ground need to be reinforced? By applying a combination of various non-destructive and environmentally friendly techniques, the DMT experts give you solid information.

This know-how is invaluable – not just for construction projects, but also in locating suitable sites for geothermal power stations and windparks or in detecting residual waste. Thanks to the outstanding results we achieve with non-destructive methods and trial drillings, these techniques are in especially strong demand. In addition to seismic methods, we apply various potential methods such as electromagnetics, magnetics, geoelectrics, gravimetry and ground radar. These techniques, supplemented by tunnel surveying and other engineering survey methods, give construction managers and planners the certainty they need.

You too can profit from our experience. We will apply an intelligent combination of methods to give your project a solid foundation.

## D M T   S P E C I A L



Patented, innovative methods for reliably assessing construction sites – before you start building, let us determine the nature of the subsurface with our environmentally friendly methods. So you can build on solid ground.



“DMT applies combined non-destructive techniques for us using the latest methods, not only economically but also in the best interests of the environment. And they do that all over the world. Our association with DMT goes back a long way, and we appreciate the expert teams as reliable partners.”

**Dr. Kim Jungyul, C.E.O.,  
SOAM Consultant Co., Ltd.,  
Daejeon, Republic of Korea**

# Guaranteed stability

## Geomonitoring keeps you informed of changes



Exploitation of raw materials may have begun, but that does not mean our work is finished. Far from it. Our specialists continue to accompany your project with great care. Because beneath the surface, the earth is in constant motion; wherever underground production takes place, the soil shifts.

Applying geomonitoring, we determine whether and how deposits shift and change. This information lets you react without delay to each new situation. And it is essential for planning the subsequent utilisation of an exhausted deposit, e.g. for underground storage. Our current monitoring responsibilities include helping prevent caving-in and subsidence in a large area of a former Ruhr Region mining district. DMT is also called in for large civil-engineering projects – such as the football stadium "Auf Schalke" in Gelsenkirchen, Germany. Throughout the construction phase of this extraordinary stadium, DMT engineers were charged with measuring and recording even the slightest levels of ground subsidence.

Our know-how is just as much in demand for monitoring structures. When a bridge foundation subsides, when wind and water burden a dam, when heat affects vast roofs or when explosions shake buildings – then even the smallest of changes must be reliably recorded and expertly evaluated. Our proprietary measuring instruments guarantee comprehensive monitoring of your construction project. The measurement data are sent directly to you by data transfer, e-mail or SMS. In other words, you are kept constantly informed on the conditions at your site.

## **D M T      S P E C I A L**



Remote monitoring via radar satellite, DGPS long-term surveying or online surveillance – whatever your monitoring needs, DMT is your partner.



“The DMT SUMMIT system is easy to operate, flexible in use and accurate in providing investigation results. And DMT's after-sales service is excellent.”

**Dr. Rüdiger Giese,  
Head of the underground seismic group,  
GeoforschungsZentrum Potsdam, Germany**



# State-of-the-art equipment

## Geomeasuring systems for diverse tasks

Customers worldwide put their trust in DMT quality. Because for some 150 years the industry has been profiting from our expertise in exploration and developing measuring instruments. As both inventors and users of technology, we are dedicated to producing equipment that is uncompromisingly accurate, practical and robust.

Our cableless Borehole Shuttle is just one example: it is engineered to survey both deviated and horizontal boreholes. And DMT's unique, high-precision surveying gyroscope GYROMAT was instrumental in advancing the Eurotunnel between Dover and Calais – accurate to the centimetre.

The transportable, versatile DMT CoreScan Colour not only sets new standards in digital drill-core interpretation, this compact scanner can be used anywhere.

And our seismic data acquisition systems, such as the modular SUMMIT system with its variable layout options, are unparalleled for flexibility and ease of use. Whatever your objective, you can count on DMT precision equipment in investigating and surveying the subsurface.

In tool engineering too, DMT is an industry leader: we develop prototypes, engineer equipment for series production and adapt systems already on the market to handle specific applications. And if you are faced with an engineering challenge beyond the capacity of existing instruments, our development teams will work with you to find an ideal solution.



## **D M T      S P E C I A L**



Know-how from A to Z: as developers and users, we understand how field measuring instruments should be made – small, light and indestructible.

# A life full of energy

## Looking to the future



People have rediscovered the benefits of urban living. Metropolitan areas around the globe offer more quality of life than ever. More and more urban planners are returning rivers to their natural courses and relocating traffic and transport routes underground to create space for green areas and gardens. Former industrial areas are being converted into technology parks and city centres are being linked up by high-speed transport networks. DMT is involved in forward-looking infrastructure projects in Germany and around the world. In projects aimed at creating attractive living environments for future generations, our geophysical site investigations make it possible to build safely and economically.

Ensuring a sustainable supply of environmentally friendly energy for the future is a huge challenge facing society. That is why the development of geothermal energy and the exploitation of gas hydrate occurrences throughout the world play an increasingly important role. In fact, experts estimate that the energy reserves of gas hydrates, an ice-like crystalline mixture of methane and water, are considerably larger than those of fossil fuels. As chances of finding deposits are especially good in sub-oceanic sediments and in permafrost regions, their exploration is a considerable engineering challenge. DMT is dedicated to locating and extracting these energy sources of the future.

But we are also looking at ways to make better use of available resources, such as CH<sub>4</sub> occurrences in deep coal deposits or disused mines. Here, as part of geological exploration and feasibility studies, we help select locations for small power stations that use methane for generating energy.

Final disposal of CO<sub>2</sub> is another one of the global challenges our experts are researching. Among the options they are examining is to deposit the gas in disused mines. Our efforts to find ways of reducing greenhouse gases in the atmosphere and our exploration of alternative energy sources share a common goal: to come up with permanent solutions that make sound sense, economically and ecologically – and to safeguard quality of life on our planet.



# Exploration & Geosurvey Division

## An integral part of DMT

- ? Everything from a single source: construction of measuring equipment, data acquisition and interpretation
- ? Reliability that only a major corporation can provide
- ? Flexibility backed up by ample capital and strong human resources
- ? Innovation with tradition – over a hundred years of know-how
- ? Customers profit from interdisciplinary specialist knowledge
- ? Global presence – always on the spot

### Specialist offices

- ? Specialist office for vibration measurement (approved in accordance with the German laws on Emission Protection (BImSchG))
- ? Specialist office for laser equipment as well as DKD (German Calibration Service) calibration office