

Exporting knowledge on a global scale

Mining technology in know-how transfer

Knowledge is mining's greatest asset: whether it's Eurotunnel or the London Eye, Jeddah Airport or the Gotthard Base Tunnel, the Megalithic Temples of Malta, offshore crane ships in the Gulf of Mexico or the CERN particle accelerator – where technology is achieving great things you will also find safety and precision based on knowledge gleaned from the mining industry.



The Gyromat 5000: a surveying instrument for mine roadways delivering precision in tunnel engineering.

FOTO: DMT, ESSEN

In exploration and 3D measuring and testing, in civil engineering and infrastructure, in plant construction and process engineering – know-how from the coal mining industry is in action all over the world and is writing its own global success story. Being able to drive mine roadways also means having the skill to survey and design tunnel projects, knowing how to move loads weighing millions of tonnes also means understanding rope safety and having experience in exploring the coal seams of the Ruhr basin also means being able to prospect for oil and gas, ores and minerals, water and rare earths anywhere in the world. Anyone who can take 3D scans of the underground world in real time using technology developed for Mars exploration and then produce these as virtual reality displays can do the same thing at any place on Earth where special know-how is required to further investigate and explore our planet.

The Essen-based DMT, which was part of the RAG group of companies, Germany's largest coal mining corporation, until 2007, is now successfully and effectively applying mining-based expertise all over the world. Now affiliated to TÜV Nord AG, DMT has been actively involved in the coal and

steel industries since the eighteenth century and is now represented in every continent with some 30 offices in Germany and around the world. DMT has already undertaken commissions in more than 150 countries worldwide and every year the company carries out around 10,000 projects in the fields of exploration, engineering, consulting and geotechnics. An impressive success story based on technological know-how from the Ruhr coalfield.

Measurement precision for multimillion-dollar projects

When tunnels are being driven through rock or bored under the sea even the smallest deviation can cost millions and put lives at risk. This kind of operation calls for measurement precision of the highest order. And even here the ingenuity of the mining technology industry, as has always been represented by RAG through its mining and technology operations and highly focused research and development department, is still bearing fruit. Just one example of this is the development of highly specialised measuring instruments. The DMT 'Gyromat 5000' precision-surveying gyroscope, which is the most accurate instrument of its kind in the

world, uses a fully-automatic gyroscopic surveying system to determine true north. Originally developed for surveying mine roadways this high-precision, explosion-proof device has a measurement accuracy that corresponds to a deviation in arc of no more than 1.2 centimetres over a distance of one kilometre.

As the recognised technology leader in this field the Gyromat is now used around the world in all kinds of tunnelling projects outside the mining industry and has contributed to a number of spectacular international successes. These include the Eurotunnel between France and Britain, which is the world's longest subsea connection, the Gotthard Base Tunnel that runs through the Gotthard Massif some 2,500 metres beneath the Swiss Alps, which is the world's longest rail tunnel, a number of civil engineering projects in the Himalayas, at the Brenner Pass and in Hong Kong, various operations for the world's most powerful particle accelerator at CERN in Geneva, sewer tunnels in the USA, hydro power stations in Lesotho and Iceland and a long list of subway projects around the world. A monopoly on knowledge that has its origins in the Ruhr mining industry.



The Bochum Rope Testing Centre (DMT Laboratory for Non-destructive and Destructive Testing) works to enhance safety around the world. The London Eye (right) and Wembley Stadium (above) also rely on Bochum's testing expertise.

FOTO: DMT, ESSEN

Safety for mega-ropes

Ropes and cables that are used to hold up roofs, bridges and floating cranes, for example, play a crucial role and lives depend on them not failing. The Bochum Rope Testing Centre (DMT Laboratory for Non-destructive and Destructive Testing) tests and analyses ropes to the limit and in so doing provides a worldwide safety service for installations in which ropes and cables are critical elements. Originally developed for the mining industry, where winding ropes had to raise and lower loads weighing millions of tonnes and safely transport men up and down the shaft, this know-how is now being used all around the world to protect major engineering structures that rely on haulage ropes, traction cables and tensile cables. The Millennium Wheel, or London Eye, which at 135 metres in height is the tallest Ferris wheel in Europe, and the tent-like roof construction of the Hajj terminal at Jeddah Airport, whose total area of 40.5 hectares makes it the largest roofed structure in the world, have both been tested by engineers from Bochum.

As has been the Brooklyn Bridge in New York, one of the oldest suspension bridges in the United States and in its time the longest of its kind in the world, as well as being the very first to use suspension cables made of steel. And the spectacular roof of the 90,000-capacity Wembley Stadium in London, which can be fully opened or closed within one hour, is also on the DMT reference list. The stadium roof is supported by a 135 metre-high arch that is visible for miles around. The arch towers over the stadium and its 315-metre span makes it the longest unsupported roof structure in the world.

DMT is also involved in subsea projects and has been testing the multimillion-dollar Big Hydra ropes that are used in the Gulf of Mexico to connect offshore crane ships to the ocean floor for pipe laying in water some two kilometres in depth.

Technology from Mars used on Earth

Who surveyed the Megalithic Temples of Malta? Who used those sites to create the virtual world of the hypogeum? Who is now surveying ships, bridges, voids and cavities in places where satellites cannot go? 3D technologies from DMT, whose most recent origins lie in the Mars mission, are delivering success all over the world: working in technological partnership with the German Aerospace Centre DMT has developed 'DMT Pilot 3D', a high-

performance, satellite-independent inspection and 3D surveying system and 3-in-1 tool for precise positioning, navigation and 3D documentation. This all spells a quantum leap in surveying precision. Earth's surface or ocean floor, underground tunnels or the planet Mars: those who know their way around the dark depths of the earth are not put off by the vast expanses of the universe or the global challenges that have to be met and resolved by engineering skill.

Processes developed by the mining industry are proving useful just about everywhere and this will

certainly be true as we face the future. Mining engineers can be proud of their accomplishments, their talents and their culture. And of their legacy too: for even in the years after 2018, when the last German coal mine closes, their story will not be forgotten but will be updated continuously in future knowledge, always new and always better. The force of the German coal industry that shaped a whole world of ideas will continue to have an impact as its stock of knowledge is forever passed on in all kinds of ways, creating innovation wherever it goes – in every corner of the world.

