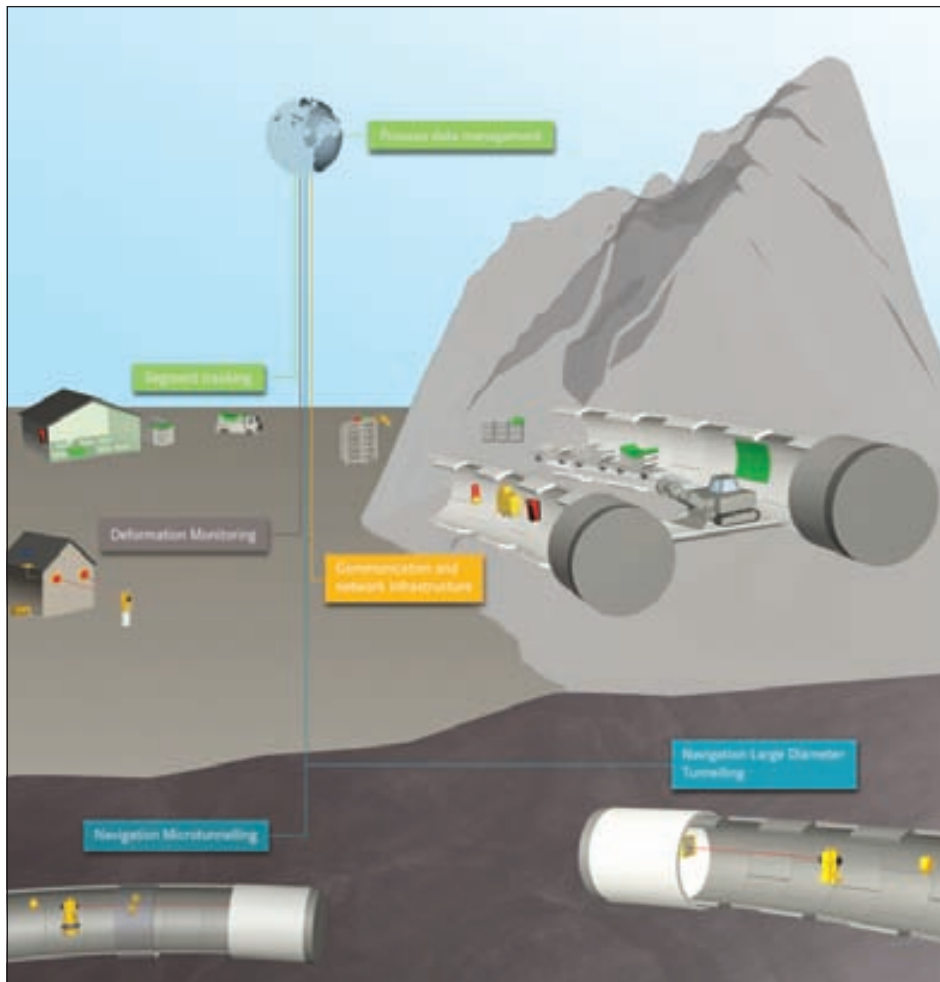


# Guidance and beyond - 20 years of VMT

**Twenty years ago VMT was a TBM guidance system supplier. Now it wants to take charge of data across the whole project site. Managing director and founder Manfred Messing tells Kristina Smith why.**



**Above: Manfred Messing, Managing Director and co-founder of VMT**  
**Left: VMT's scope of supply**



manufacture and installation of segments, from the navigation system, the TBM and other instrumentation, and a network to carry all that data around underground.

"The big challenge facing the industry is to have the comprehensive data and information flow that you already get in other industries like aerospace, automotive and other production plants," says Messing. VMT wants to take that challenge on.

There are several companies on a similar quest, most of them specialist instrumentation and monitoring firms. Why should a TBM guidance firm take on this challenge?

"Because we consider us a data manager," says Messing, only half joking. "We are certainly able to manage data, all kinds of data. We have the software abilities and vast experience and we have worked on over 1,000 projects in the last 20 years all over the tunnelling world, with different clients and systems.

"If you think about it, with our expertise we are able to help even the most experienced construction companies who are building the tunnels. All that experience has been integrated into what we have developed."

## The hand of Herrenknecht

Messing was 35 when he set up VMT on a 50/50 basis with Herrenknecht. Later, Herrenknecht became the major shareholder, now holding 52%. "That means if the going gets tough, Martin Herrenknecht has the final say," says Messing. But then he laughs. "You know, I've an entrepreneurial core, I'm generally not good at doing what I'm told!"

Messing started his career as an apprentice surveyor and worked on a number of tunnelling projects in the 1980s. His first encounter with a TBM came on the Storebelt Tunnel in Denmark in 1990 where he was working for MT Group as head of surveying on

**BACK IN 1994**, Manfred Messing was on site in London, on the Jubilee Line Extension, putting VMT's brand new TBM guidance system to the test. It was a memorable project for VMT managing director Messing. And it isn't just the taste of English beer which he remembers with satisfaction.

"It was a real struggle," he says. "We had developed the system and it was working in the office, but then we had to use it under real conditions, on site. We had to work so hard, with every muscle in our body, but we never

gave up and we did it! That was the start of everything."

Messing is in a jovial mood for our interview to mark VMT's 20 years in the business. He has a lot to celebrate. Over the past two decades VMT has grown to employ more than 200 people with subsidiaries in China, Australia, Russia and the US and a turnover in 2013 of around Euro 29M.

VMT's business is no longer exclusively devoted to TBM guidance systems; it now has systems which can take information from the

the Sprogö site.

"That project was certainly significant for me and still helps me today," says Messing. "In the end you find out that many of the problems we have today are the same as the ones we had 23 years ago."

After the successful Jubilee Line project, which was delivered in co-operation with TACS, VMT started to grow – in employees, in the number of products and services it offered and in turnover. By 2001 VMT's turnover was Euros 2.7m and it was employing 20 people. Five years later there were 65 staff and a turnover of Euros 9.9m.

Offices have opened in response to demand from the market, in "tunnelling hot spots", says Messing. Its Chinese subsidiary, for example, was opened in 2006 following on from VMT's first project in China on the Beijing Metro in 2001. To date it has sold 450 units there.

"China is an important market for us," says Messing. "China will continue to grow, but we will have to see whether VMT continues to grow there. We will have to fight with more competitors - and we always have to be one step ahead."

Another hot spot was Australia, where a VMT office opened in 2008 and supplied 21 guidance systems to the Brisbane Airport Link for TBMs, road headers and rock bolters. One year later a Russian office opened and in 2011, a US one. The next VMT subsidiary will be in Doha, the next 'hot-spot' in tunnelling.

It is not only VMT which has changed since

1994. TBM guidance systems – and the way they are procured - are different too, says Messing. "The components are so much more reliable now," he says. "When I began everything was in the early development stage."

Two decades ago, contractors were the ones buying them. For the past 10 years, it is the



**Above: 2010 - First microtunnelling curve drive in the US successfully completed with a radius of 414m and precisely guided by a VMT navigation system.**

**Below: Screenshot of a navigation system for a tunnel boring machine**

TBM manufacturers who procure them, says Messing.

That has to be good news for VMT. Its mother company Herrenknecht sells more TBMs than any other manufacturer. "Herrenknecht is the market leader and VMT is the market leader," says Messing. Only a handful of Herrenknecht machines, sold to French contractors, are built with their own in-house guidance systems.

As for the competition in the navigation systems market – ZED, Enzan, PPS and TAC – Messing is complementary: they all offer reliable solutions now, he says. Japanese contractors tend to want Japanese guidance systems, and Western contractors choose Western ones. Japanese navigation systems do more than Western ones, because Japanese TBMs don't come equipped with in-built intelligence whereas Western TBMs come with their own PLCs (programmable logic control).

Where Messing is prepared to boast about VMT is on the subject of customer service. Martin Herrenknecht gave him his best ever piece of advice, he claims, it's all about the service. "I don't always agree with Martin, but on this I definitely agree," says Messing. "You can have the best system in the world, but if you don't have the service, forget about it."

Procuring guidance systems on lowest cost is a false economy, he says. "With a navigation system you need to have a solid, robust supplier that can give you quick reaction in emergencies. There are 200 of us because our customers require service. If you are a five-man bunch, you cannot look after all your projects when you have 100 projects running at the same time."

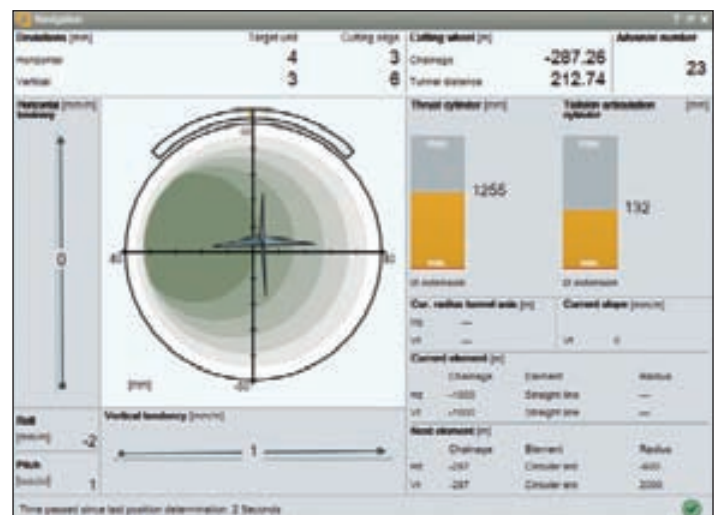
A TBM which is sitting idle while the guidance system is fixed or – worse – one that has headed off the design tunnel axis is an expensive problem, says Messing.

Though ZED is a competitor, it is also fully owned by VMT which bought the small English firm in 2002. "But they have retained their independence," says Messing.

"They are the originals. They introduced



The fundamental principle of navigation systems is based on the use of a laser theodolite and a laser target on the machine. The photo-sensory target unit is mounted in the shield or on the machine frame of the TBM and its position is accurately determined upon installation. A laser theodolite that is fixed to the tunnel wall continuously controls the position of the target unit and determines the position to the tunnel axis during the entire tunnelling process. The measurement direction is displayed and the horizontal and vertical deviation from the shield axis is derived by a visible laser beam. The hardware delivers reliable results and withstands strong vibrations, even in hard rock.



## INTERVIEW

High production rates in mechanized tunnelling including segmental lining and a high quality of the structure rely on efficient segment manufacturing and logistics. The VMT Segment Documentation System SDS significantly assists in maintaining the quality and logistics management. It is used to track, control, and document the production, storage, and usage of each segment including the materials used. SDS fits each segment with a barcode or RFID label and verifies the information that is read manually or automatically against an individually configured database. If required, all production and usage parameters for each segment are available at any time. Using interfaces, data exchange with supplier and customer systems as well as site information systems may be performed.



guidance systems for TBMs. I really admire what they did for the industry."

In the future, says Messing, ZED will concentrate more on electronic engineering, something it has already started to do, while still working with its existing customers.

### Why diversify?

VMT doesn't just supply guidance systems for TBMs, soft and hard ground. Today it supplies them for micro-tunnelling, pipe-jacking, roadheaders and bolters. And it is currently developing a system for excavators, to be released soon.

Messing doesn't see any systematic changes in TBM guidance technology on the horizon. "The structure is still the same as it used to



**Above: Integrated Risk and Information System IRIS powered by ITC: a process data management system designed for managing complex infrastructure projects by providing an integrated solution for risk assessment and information management**

be," he says. "I would like to put more electronic parts in, RFID, radio sensors, wireless LANS but this does not fit with the tunnelling process. In the end it is the tunnelling process that is limiting our ideas."

The last few years have seen VMT launch a raft of new products aimed to organize the huge quantity of data being generated on tunnelling projects: Tunnel and Underground Navigation and Information System (TUNIS); Segment Documentation System (SDS) and Deformation Measuring Systems; Integrated Risk and Information System (IRIS) and High Adaptability Data and Emergency System (HADES).

It could be seen as a risk, to diversify into so many other products. But these new ideas have come in response to the market, says Messing. "Customers who work with us in partnership come to us with their ideas," he says. "If the customer just considers you as a supplier, that doesn't happen."

VMT needed to diversify to continue growing. "TBM guidance is our core market, but growth potential here is limited, says Messing. "In order to remain as a good supplier, we have to look at other products."

2009 saw two new VMT systems making appearances on significant projects. TUNIS made its debut on the AVE Barcelona Trinidad project. And SDS helped record the manufacture, movement and final position of over 70,000 tunnelling segments on the Adler-Ski Resort project in Sochi, Russia.

There is no latest version of SDS, says Messing, as it is always developing in response to demand from job sites for more modules and abilities. Current projects include the Bosphorus Crossing in Istanbul, Waterview in Auckland, New Zealand and Koralm in Austria and will be used in Doha and Sydney.

VMT's industrial measurement division started in 1996; its first project was the measurement of a TBM's shield at the Sotralentz company in Drulingen France. It is from this part of the business that the laser tracker, used for measuring segments moulds and the segments themselves has emerged.

There is a lot of discussion about whether such accurate measurement of segments is



**Left: High Adaptability Data and Emergency System HADES: an integrated coms system for large construction sites or facilities**

required but Messing sees demand coming thanks to clients who are starting to demand it on their jobs. "In today's world, everything is quality controlled. You cannot just build a tunnel like you did 50 years ago." The laser tracker was at work on the Lee Tunnel in London, is at the Koralm project and will be on the Doha Metro.

Laser measurement has also taken VMT into other sectors. "This part of the business originated in the need to make geometrical control measurements for segment mould," says Messing. "Since this job would not have been enough to provide a full service and know-how we had to look for other fields; we had to venture into automotive, aerospace, robotics. The market share is not enormous but provides about 10 to 15 per cent of our entire turnover."

IRIS was first deployed on a large scale in 2011 on Downtown Line Phase 2 in Singapore. "The aim of IRIS is to optimise the tunnelling construction process," says Messing. "Because we have so many data sources, people are simply flooded. Without organising the data, it is difficult to make decisions. With an intelligent engineering model behind it, we can make decisions about risk more reliably."

HADES is one of VMT's latest inventions, and is still under development, says Messing. HADES uses a fibre-optic data line to create a network for all types of information from



**Above: It's all about the right people**

telecommunications to video surveillance, WLAN to sensors.

"It is an open data infrastructure to enable the data to flow from the TBM and all over the job site, and in between job sites," explains Messing. "If IRIS is the brain, HADES is the body. You can't have a brain without a body."

#### **Tomorrow's leaders**

The biggest challenge facing VMT now is how to consolidate after its years of growth. "We need to build a strong management team," says Messing. "We need to look for the next generation of leaders and managers. We need

young people, mobile people.

"We are no longer a start-up company. It is all about organisation, while keeping contact with our customers."

The economic situation in Germany means that VMT's staff is made up of engineers from around the world. Around 70% of people at its head office in Bruchsal, are not from the local area. Most are from the east of Germany or from outside Germany. This is a really positive thing, says Messing, helping to create a truly cosmopolitan team that can work anywhere in the world. "Like any manager, I don't praise my people enough," says Messing. "But they are the company. Everything is possible when you have the right people."

The culture at VMT is open and communicative, says Messing: it's easy to talk to each other. His people are motivated by success as much as money. "When they make a breakthrough and it's accurate, that's a highlight," he says, "or when we get a letter from a customer telling us that we have done a good job."

Looking ahead 20 years, Messing does not expect to be at the head of VMT. "I will still be working, but hopefully I will be able to choose my work and my projects."

In the immediate future, Messing and his team are preparing for a very important event: a big party to celebrate VMT's 20 year anniversary. Now that should be a good one!



# 5 mm

The length of the head of the common wasp „Vespula Vulgaris" and the typical accuracy achieved throughout the project by **VMT's SLS Guidance Systems.**



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