There wasn’t hardly any visitor or exhibitor who wasn’t impressed by this year’s BAUMA exhibition in Munich. This goes for TT as well. The positive prevailing mood and the booming market resulted in a relaxed atmosphere which lead to increased buying interest and a lot of purchase orders.

At times the run of visitors was hardly manageable, keeping the 50 man stand crew busy all day. The consumption of 2000 litres of beer during seven exhibition days doesn’t say anything about the event’s success but is exemplary for the exceptionally high visitor frequency at the TT stand, which - with a total space of 1500 sqm was the largest stand TT ever had.

Lively interest was produced by the new GRD boring system for geothermal energy extraction, which helps reducing the drilling costs due to its innovative and compact construction.

The steerable boring systems, especially the new Grundodrill “N” series with models 15N and 25N, the sophisticated Grundoburst technology and the classic Grundomat soil displacement hammers proved to be very popular.

One of the visitors put it that way: The striking TT machine design represents competence, power and reliability – factors which are essential for successful practical applications.
GRUNDOMAT building the information super highway

While fiber optic cables to the home are designed to provide access to the latest that technology has to offer, like high speed broadband internet and hundreds of high quality, high definition television programs, the tools that are often used to install those cables are often very basic. One in particular, the pneumatic piercing tool, has been performing just these types of service installations for over 40 years. While the accuracy of the tool has improved since the early days, the concept behind it has not and today's crews are improving their efficiency, lowering the restoration costs and generating good public relations through the use of this piece of classic trenchless technology.

Verizon is one of the major telecommunication companies pushing fiber-to-the-premises (FTTP) services. The company began implementing its FTTP program in early 2002. Since then the program continues to expand and now includes projects in several states and large cities like Tampa, FL. In May of this year, Verizon announced that an initial group of more than 40,000 Tampa area households were now able to receive its product offerings through its all-digital fiber optic network. The company had already deployed over 3 million feet of fiber in the Tampa area. By the time the program is scheduled to be complete, five years from now, over 9 million feet of fiber optic cable will be installed. Installing the conduit that houses the cable is part of Stuart Greenberg’s job. As one of Arrow Construction his crews are installing conduit in various locations in Florida, helping Verizon complete its FTTP program. The piercing tool plays a major role in daily operations. Greenberg has been using piercing tools for over 15 years. Over the last five years his crews have been using them on a regular basis. For the Verizon project, they are using them daily.

Piercing tool specialist Jason Land from trenchless equipment manufacturer TT Technologies, Aurora, Ill, supplies Grundomat piercing tools and other pieces of trenchless equipment to Arrow Construction. According to Land in addition to piercing tool productivity, minimal disruption is a key benefit of the trenchless piercing tool.

According to Land, the Verizon project is giving the Arrow Construction crews the opportunity to use the piercing tools to the fullest. Arrow crews are installing conduit for both phone and internet. Greenberg explained, “For the path, which is the main line that feeds the neighborhood, we’re performing what’s called stitch boring with the piercing tool. We dig small pits on either side of the driveway. We missle from one side to the other, then the piercing tool pulls in mule tape. In certain circumstances they will complete the bore, then attach the conduit to the front of the tool and back the tool through the boring, pulling in the conduit. Depending on soil conditions boring times range from a few minutes to a half an hour.”

The tools that are used in this endeavor are the Grundomat piercing tools produced by TT Technologies, Aurora, Ill, supplied by Arrow Construction’s supplier Grundomat piercing tools and other pieces of trenchless equipment.

Verizon is the major telecommunication company that is pushing fiber-to-the-premises (FTTP) services. The company began implementing its FTTP program in early 2002. Since then the program continues to expand and now includes projects in several states and large cities like Tampa, FL. In May of this year, Verizon announced that an initial group of more than 40,000 Tampa area households were now able to receive its product offerings through its all-digital fiber optic network. The company had already deployed over 3 million feet of fiber in the Tampa area. By the time the program is scheduled to be complete, five years from now, over 9 million feet of fiber optic cable will be installed. Installing the conduit that houses the cable is part of Stuart Greenberg’s job. As one of Arrow Construction his crews are installing conduit in various locations in Florida, helping Verizon complete its FTTP program. The piercing tool plays a major role in daily operations. Greenberg has been using piercing tools for over 15 years. Over the last five years his crews have been using them on a regular basis. For the Verizon project, they are using them daily.

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Undercrosing the Trans Pennine Pipeline with Grundoram

This 52 km section of Trans Pennine pipeline is one of four new sections of high pressure pipeline to be installed on behalf of National Grid. This is all part of a programme to transport gas from the Norwegian owned Ormen-Lange North Sea Gas Field to the new Gas Import Terminal at Easington, North of the Humber in Humberside, England.

The project comprises 52 km of 1200 mm steel pipeline with extensions to the existing AGIs at Asby and Ganstead. The pipeline crosses beneath 23 roads, 2 railway lines and a number of main rivers including the River Hull and the Market Weighton Canal.

The route of the pipeline goes through a range of varying ground conditions from a 12 km chalk section (South of Beverley) to sand/gravel and peat to name just a few. During the later stages of this project Murphy Pipelines called upon the services of TT UK Ltd to request the use of their 'world renowned' GRUNDORAM pipe-ramming equipment.

Renowned for its unmatched ‘powerful’ impact performance and reliability for ‘Trenchless’ steel pipe installations, the GRUNDORAM Goliath was deployed to undertake several of the under road and canal crossings on this pipeline route where the ground conditions were unsustainable for using conventional Auger Bore techniques.

The GRUNDORAM Goliath which is pneumatically driven, was attached to the end of each steel pipe section length, lined and levelled within the extended trench excavation before being rammed into position under the crossing. Supported by the track caterpillar side-booms the GRUNDORAM Goliath easily rammed home the steel pipe sections.

All the pipe-ram crossings, ranging from 35 – 50 m were successfully achieved with average ramming speed times of 30m per/hour, excluding set-up and welding times.

Contractor: National Grid, UK
Client: Murphy Pipelines, UK
Project: Trans Pennine gas pipeline from Ormen-Lange in Norway to the gas import terminal in Easington, UK
New pipe: Steel Ø 1200 mm
Installation lengths: 35 - 50 m
Machine: GRUNDORAM Goliath
Details: Several of the under road and canal crossings on this pipeline route where the ground conditions were unsustainable for using conventional Auger Bore techniques were done using the GRUNDORAM Goliath.

Commenting on the GRUNDORAM installations, Shane Jestin (Construction Manager for Murphy Pipelines) said, “The GRUNDORAM pipe-ramming machine certainly has earned a place in their specialist equipment toolbox for future trenchless pipeline projects.”

Road & Bridge Branch of China Rail-way 6th Bureau, a customer of TT’s Chinese Partner McAllen (Tianjin) International Ltd., is ramming pipes with a diameter of 377 mm and a wall thickness of 12 mm with the Grundoram Koloss underneath other above crossing railway tracks in order to build a tunnel roof for the new railway connection.

The project has been thoroughly prepared with the full support of McAllen, whose engineers have been present at the job site 24 hours a day. As 40 trains cross the construction site the Beijing Railway Bureau. Therefore he has announced that 8 similar tunnels will be built in the very near future by means of this technology. Beginning March 2007, another ramming job (total ramming length was 2066 m with 377 mm diameter and 10 mm wall thickness steel pipes with the Grundoram Koloss and PCC 35) has been finished at the Zhe Chun road underground railway station in Beijing.

Once again TT technology proved to be the right choice to get the job done.

Beijing gets ready for the 2008-Beijing-Summer-Olympics: The pipe roof being built underneath the railway embankment.

The Ormen-Lange gas field in the North Sea.
Grundoram used for Liquefied Natural Gas project in Nigeria

Daewoo Engineering & Construction Co of London recently took delivery of a GRUNDORAM Goliath which was destined for their contract in Nigeria. Daewoo are the main contractor to the Nigeria Agip Oil Company on the Nigeria Liquefied National Gas Pipeline Project which runs from Ogboinbri to Obaif Obrika, a distance of some 216 kilometres to the North of the Rivers State.

In April 2006 two under road crossings were carried out with Grundoram Goliath for the Nigeria LNG pipeline. Contractor Daewoo plans to use the Grundoram Goliath for 100 crossings altogether.

In April 2006 one of TT UKs Customer Support Engineers went to site to oversee the commissioning of the GRUNDORAM Goliath over a two week period during which time 2 under road crossings were carried out, along with maintenance training for Daewoo's site technicians.

There are approximately 100 road crossings throughout this project where it is planned to use the GRUNDORAM Goliath. The road crossings vary in length from 10 Metres to 40 metres. On average a 15 Metre road crossing was taking in the region of 4 hours to complete. This did not include the waiting time.

Project: Nigeria Liquefied Natural Gas Pipeline Project
Client: Nigeria Agip Oil Company Ltd
Contractor: Daewoo Engineering & Construction Co Ltd
Place of project: Mbiama, Rivers State, Nigeria
Pipe: Steel Ø 760 mm. 15.88mm wall thickness
Installation lengths: from 10 to 40 metres
Equipment: GRUNDORAM Goliath
Soil conditions: Clay with some sand content
Details: In April 2006 two under road crossings were carried out with Grundoram Goliath for the Nigeria LNG pipeline. Contractor Daewoo plans to use the Grundoram Goliath for 100 crossings altogether.

In December 2006, a 1800 mm steel pipe with 25 mm wall thickness was installed beneath a motorway at a 4 m depth and over a length of 46 m for TSK M.l.m in Prague, assisted by a Grundoram Taurus pipe rammer providing a thrust energy of 18.000 kN. The dynamic forces using this size of machine is not an everyday task and requires careful planning. The service pipe is for use as a protection pipe for a draining pipe. The contract for this project was awarded to TT’s Czechoslovakian partner, Interglobal DUO S.r.o. and the construction company Eks poł. S.r.o.

The steel pipes, each with single lengths of 3 m were already prepared in the factory to form lengths of 6 m each, and on site welded together forming one pipeline with an overall length of 24 m. Due to the side slope of the motorway the starting pit was excavated at a depth of about 2.5 m and a length of 30 m. A power cable, crossing adjacent to the bore path, had to be re-installed beforehand. A concrete foundation and steel beams were applied as guiding and slide rails for the rammer. The complete pipe length of 24 m was laid out without any problems, due to the ideal jobsite surroundings.

After alignment work and fixation of the ram cone at 2 welding points to the pipe, aided by a crane, the ram and the ram cone were lifted into position, tensioned and connected to 4 compressors. The rammer lies on a starting cradle with a lifting cushion, which allows for a precise machine alignment together with the pipe length. Due to the first stroke impulse the ram cone and the rammer lighten together and there is therefore no need for any re-tensioning.

The propulsion in the ground consisting of clay and pebbles was carried out with a speed of 4 - 6 m per hour, to everyone’s satisfaction. The soil removal process, after completion of the bore, was carried out manually.

Preparation for the ramming process. The steel pipe length is lying on the concrete foundation with steel beams acting as guiding rails.

The 1800 mm steel pipe after the ramming process and soil removal.
Record-breaking gas pipeline landfall in New Zealand

At 1,850m overall, the twin landfalls are believed to be the world’s longest. The Pohokura landfall traverses a 33 metre cliff and an offshore reef – actually pyroclastic flows from Mt Taranaki, the spectacular volcano that dominates the local landscape (and is scheduled to erupt again in roughly a century)

The Pohokura gas field is located in the Taranaki Basin, near the western tip of New Zealand’s North Island. The field’s reserves are estimated at 900 billion cubic feet of gas and 50 million barrels of condensate. Initially Pohokura is expected to deliver three million barrels of condensate each year, about a quarter of New Zealand’s total gas production. It’s also expected to deliver three million barrels of condensate each year.

The project’s landfall was installed using HDD by Australian HDD specialists AJ Lucas.

Two boreholes were drilled to the target point, 609mm (24") and 914mm (36") respectively, 355mm and 609mm steel liners were thrust into the boreholes from land using Lucas’ dedicated “Taurus” pipe rammer from Tracto-Technik sister company TT Asia Pacific in Brisbane.

One of the key challenges was traversing the different geological layers through the cliff section into the underlying bedrock, which is a fractured siltstone, locally known as “papa”. This is topped with a 1-5m layer of gravels, cobbles and rounded volcanic boulders of varying sizes. Finally, there’s a metre of sand and gravel at the exit point.

To cross the surface layers of pyroclastic boulders and cobbles, two casings were hammered approximately 130m using the Grundoram Taurus that has the capability to deliver up to 2,000 tonnes of dynamic loading, the hammer is one of the world’s largest and second most powerful, the only one more powerful being the TT “Apollo” with 4,000 tonnes of thrust. There were some initial concerns as to whether the hammer would in fact be able to do the job as the casing diameter and lengths were off the manufacturer’s chart.

To minimise the distance the casings had to be installed the entry angle of the casings and the drilling rig was increased to 20 degrees below the horizontal. This had flow on effects for the break over arrangement. The two overburden casings were, 690mm OD and 990mm OD. Both sizes were rolled and welded from 25mm thick plate.

Once the casings were placed and socketed in the Papa rock, the first 311mm diameter pilot hole was drilled, then reamed to 660mm. Once completed and the hole conditioned, a 355mm OD liner was forward-thrust into the hole to the exit. The second hole was drilled in the same way, but with a 609mm OD liner in a 914mm diameter hole. Once the liners were installed, also by forward thrusting, the clad stainless steel flow line was pushed in from the shore side.

Due to space constraints the stringing and fabrication of the product pipeline was not able to be in the same alignment as the boreholes.

Contractor:
AJ Lucas, Sydney, Australia

Place of project:
Pohokura gas field, Taranaki Basin, New Zealand

New pipe:
Steel, casings: Ø 690 and 990 mm
Gas pipe PE: Ø 355 and 609 mm

Equipment:
AJ Lucas 500T HDD rig
Grundoram Taurus

Details:
The project’s landfall was installed using HDD for the gas pipes and pipe ramming for the overburden casings. The soil conditions were extremely difficult with the surface layers consisting of gravels, cobbles and rounded volcanic boulders and the bedrock being fractured siltstone (so called “papa stone”).

One of the key challenges was traversing the different geological layers through the cliff section into the underlying bedrock, which is a fractured siltstone, locally known as “papa”. This is topped with a 1-5m layer of gravels, cobbles and rounded volcanic boulders of varying sizes. Finally, there’s a metre of sand and gravel at the exit point.

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Combined with the entry angle, the break over towers were up to 17 meters in height in order to maintain a radius of curvature large enough that the pipe did not exceed its minimum yield point. The entire break over structure resembled a giant roller coaster when it was completed, and drew many comments from nearby onlookers.

The site setup was probably one of the most demanding Lucas has had to complete in terms of safety and environmental compliance. The site operated 24 hours per day, seven days a week, presenting several challenges. High winds, freezing temperatures and horizontal rain were a constant companion. Crew conditions and morale were monitored constantly to ensure safety as well as production was maintained in these difficult conditions.

Cultural awareness at the project blessing: the typical Maori greeting.
Pipe Cracking in Greenland

Successful renewal of a sewer pipe under residential home for old people

An Ø 250 mm concrete pipe was partly worn and leaky and partly blocked up/crumpled up in Nuuk (Godthåb), this pipe should be replaced with an Ø 250 mm pre-isolated PE-pipe. At sections of the main line 2 strength are brought together to one line. This line (24 metres), which was laying under the residential home for the elderly people, could not be renewed in a traditional way.

According to initial plans the pipe should have been cleaned and kept, but contractor Otto S. Nielsen from GR-entreprenøren was not happy with this solution, he had heard about pipe cracking and he contacted Gunnar Guldbrand A/S in Denmark, specialist in the future sewer pipe renewal with cracking. Gunnar Guldbrand believed, that it would be possible to crack the pipe under the building and upsize the diameter to an Ø 315 mm PE-pipe the whole way to the stopping well and in that way he avoided digging up the way in, which reduced the inconvenience for the old people and their personnel.

The cracking job went absolutely according to plan and was completed in 5 – 6 hours. However when the concrete pipe was initially exposed ready for the cracking to commence, it was found that in places the pipe was full of stones and debris and it would never have been possible just to clean the pipe out to achieve the optimum pipe carrying capacity. Therefore it was necessary to upsize the pipe capacity to 325mm PE-pipe diameter.

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Contractor:
Otto S. Nielsen/Denmark
Place of project:
Nuuk / Greenland
Old pipe:
Concrete Ø 250 mm
New pipe:
PE Ø 315 mm
Installation lengths:
36 metres
Machine:
GRUNDOCRACK
Details:
The pipeline to be renewed was partly collapsed and leaky, the bore path was crossed by a sewer pipe. Cracking the old pipe and renewing it took only 6 hours altogether.

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US Contractor J. Fletcher Creamer Takes on Sludge Line at Las Virgenes

Ductile Iron Pipe Bursting

The Las Virgenes Municipal Water District (LVMWD), Calabasas, CA, provides potable water and wastewater treatment services to residents of Agoura Hills, Calabasas, Hidden Hills, Westlake Village, and surrounding areas of Los Angeles County. The facility is considered to be a model for wastewater treatment and environmental stewardship.

Recently an 200 mm ductile iron force sludge main deteriorated beyond the point of operation. LVMWD Facilities Manager David Lippman needed to find an effective, efficient and environmentally friendly pipeline replacement method. Lippman said, „The loss of this sludge line really put a strain on our operations. We needed to replace the line in a short amount of time, but, because of its location, we wanted a method that minimized social and environmental disruption.”

After reviewing method recommendations, Lippman chose static pipe bursting. J. Fletcher Creamer California Operations, Sylmar, CA was contracted and trenchless equipment manufacturer TT Technologies, Aurora, IL was contacted for technical support.

The LVMWD was formed in 1958. Today, in addition to potable water, the district also offers wastewater and water recycling services. Recycled water from the district’s Tapia wastewater facility is used to irrigate golf courses, school grounds, highway medians and other areas. A percentage of biosolids (waste removed from the wastewater) is transferred to the Rancho Las Virgenes Composting Facility four miles away. At Rancho, the biosolids go through a composting facility four miles away.

Two state-of-the-art fuel cells at Rancho take the methane gas by-product and use it to create energy to run the facility. This fuel cell arrangement is one of only five similar plants in the world. The district and its facilities have been recognized nationally for quality operations.

For all its advancements, the LVMWD still faces the same infrastructure problems. Treatment facilities around the country are facing. The recent replacement of a section of force main between the Tapia plant and the Rancho facility highlights the issue.

In October of 2002, a 13 m section of the ductile iron main was replaced. In December, the pipe failed again. The 200 mm pipe was taken offline and the 150 mm main was used instead. Lippman began putting together a plan to correct the problem. After reviewing several methods, static pipe bursting was chosen and J. Fletcher Creamer and Son was contracted.

J. Fletcher Creamer and Son has a distinguished history as a multiface contractor. Over the last 75 years, the company developed into one of the most respected contractors in the United States. With offices throughout the country, J. Fletcher Creamer has developed a reputation for dependability, progressiveness and innovation.

Both California based J. Fletcher Creamer and Son Area Manager George Mallakis and Lippman agreed that trenchless pipe bursting was a good option for this project.

Approximately 213 m of the main was designated to be replaced and up sized with 250 mm HDPE SDR 9 pipe. The run was divided into two 106 m sections with an exit pit dug in the middle. Launch pits were dug on each side of the run.

The crew began by placing the Grundo burst 800G bursting unit in the exit pit and inserting the locking bursting rods through the first run to the launch pit. A flexible guide rod attached to the front of the first rod was used to help ensure the smooth installation of Quicklock rods. Once at the launch pit, the J. Fletcher Creamer crew removed the guide rod and attached the bladed cutting wheels, bursting head, expander and new 250 mm HDPE. The entire configuration was then pulled back through the host pipe by the hydraulic bursting unit.

The 200 mm ductile was effectively split and the new HDPE was installed without incident. After a day of heavy rains, the bursting unit was repositioned 180 degrees in the exit pit and prep began for the second run. The procedure was repeated and the second section of main was successfully replaced. Crews then set to work reconnecting the new pipe with the existing pipe and restoring the exit and launch pits. Once completed, the entire system was pressure tested before being put back into service.

Mallakis was pleased with the static bursting results. He said, “This was a project that needed to be done quickly. It had to be done in a way that didn’t impact traffic and open cutting wasn’t competitive. The static method allowed us to meet the requirements of the job.”

Lippman said, “By using the static system they only needed to open up three sections, a pit on each end and one in the middle. That had a very minimal impact on traffic. If we had used traditional open cut methods, we would have had to close a lane. The static method worked very well in this situation.”

Client: Las Virgenes Municipal Water District, (LVMWD), C.A.
Contractor: J. Fletcher Creamer, J Sylmar C.A.
Place of project: Tapia, C.A.
Old pipe: Ductile iron Ø 200 mm
New pipe: HDPE Ø 250 mm
Machine: GRUNDOBURST 800G
Details: Due to corrosion a 200 mm ductile iron force sludge main failed to operate. 700 m of the pipeline were replaced with an HDPE pipe 250 mm using the static pipe bursting method.

Text and photos provided by TT Technologies, Aurora/USA.
Pipe bursting protects Castle Neuhaus

The company Roers GmbH from Münster was commissioned with the project, they have been using a Grundoburst Type 400 G.

The bore path was divided into mains partitions of 63, 68, 48, 32 and 28 m, while the machine pits were excavated in sections at the corner and connecting points. The old path comprised 7 mains; together they were 30.5, 34.7, 33.6, 35.6, 39.3, 38.7, and 18.2 m long. The first 4 mains were combined to form two bursting routes while driving through the central manholes. A size 400 water line also had to be crossed within the area of a traverse heading, with a space of only 15 cm in-between.

The Grundoburst 400 G was applied for the job. After rig installation, pushing forward the QuickLock rods through the old line commenced immediately. The smooth working course was slightly thwarted by the unfavourable conditions for laying out the long pipes; butt-welded in preparation and linked to the rods lying in the old pipe, along with the bursting head and a reamer OD 329, they were waiting to be pulled in.

The pipe bursting method was out of the question. There were too many problems, like inconvenience for the heavy traffic in the bore path area and the necessity to protect the trees and old pavements. The rather narrow roads, 4.50 m wide at best, made the whole project increasingly difficult. Therefore, the Paderborn municipal sewerage authority decided to employ trenchless renewal using the pipe bursting method.

The level of the water is his responsibility. Stronger influx can also encourage circulation of the water and help to suppress seaweed growth, a common problem of stagnant waters, particularly in the summer months. Consequently, the vitrified clay pipe lying 1.65 m deep is going to be replaced by a larger PP-HM pipe ND 200, manufactured by Schöngen.

The free gradient line is in some need of repair, because in-growing roots, cracks and collapses have taken their toll in the course of time. Vast masses of water seep away whilst the amount of water flowing in is hardly sufficient, the janitor Mr. Mertens says. As the janitor of the castle, watching the level of the water is his responsibility. Stronger influx can also encourage circulation of the water and help to suppress seaweed growth, a common problem of stagnant waters, particularly in the summer months. Consequently, the vitrified clay pipe lying 1.65 m deep is going to be replaced by a larger PP-HM pipe ND 200, manufactured by Schöngen.

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Castle Neuhaus near the city of Paderborn in western Germany built in the 14th century, served as an additional residence for the prince bishop Clemens August of Bavaria in the late Middle Ages. In 1864, the community bought the castle. Besides a museum and a small banquet hall for special occasions, it also accommodates the secondary school with 700 pupils.

Seems like the master builders had chosen Venice as their model when they decided to use oak piles for the foundation. The bearing capacity of these piles must never be put in jeopardy; therefore the wood had to be protected from, in this case, “life threatening” oxygen. To provide water, the moat is connected to the river Pader by means of a pipe line ND 175 made of vitrified clay. The path runs diagonally through Neuhaus in a length of 239 m and crosses the heavily frequented area of water seep away whilst the amount of water is going to be replaced by a larger PP-HM pipe ND 200, produced by Schöngen.

The free gradient line is in some need of repair, because in-growing roots, cracks and collapses have taken their toll in the course of time. Vast masses of water seep away whilst the amount of water flowing in is hardly sufficient; the janitor Mr. Mertens says. As the janitor of the castle, watching the level of the water is his responsibility. Stronger influx can also encourage circulation of the water and help to suppress seaweed growth, a common problem of stagnant waters, particularly in the summer months. Consequently, the vitrified clay pipe lying 1.65 m deep is going to be replaced by a larger PP-HM pipe ND 200, produced by Schöngen.

The open trench method was out of the question. There were too many problems, like inconvenience for the heavy traffic in the bore path area and the necessity to protect the trees and old pavements. The rather narrow roads, 4.50 m wide at best, made the whole project increasingly difficult. Therefore, the Paderborn municipal sewerage authority decided to employ trenchless renewal using the pipe bursting method.

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Castle Neuhaus near the city of Paderborn in western Germany built in the 14th century, served as an additional residence for the prince bishop Clemens August of Bavaria in the late Middle Ages. In 1864, the community bought the castle. Besides a museum and a small banquet hall for special occasions, it also accommodates the secondary school with 700 pupils.

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First task for strongest TT bursting rig 2500 G in Russia

The Russian construction company MUP Wodokanal from Klin had the task of renewing an open slope sewage pipe, trenchlessly at a depth of 1,50 to 7,80 m using the static pipe bursting method. The steel-concrete pipes ND 560, damaged by corrosiveness and breakages etc. was to be replaced by a new and larger sized PE-pipe (diameter 630 mm) over a total length of 340 m.

The special challenge in this case was to destroy the steel armour of the steel-concrete pipe already in the ground. A further challenge was provided by the fact that neither the asphalt, nor the green areas or footpaths above the pipeline were to be affected in any way.

To achieve these targets, Mr. S. Borissov, Director at MUP Wodokanal and his engineers chose the Grundoburst 2500 G from TRACTO-TECHNIK as the most suitable and safest equipment.

The Grundoburst 2500G bursting rig has a pulling force of 2500 kN (250 ft.). This powerful machine allows for pipes from 300 to 1000 mm diameter to be replaced with the static pipe bursting method.

First of all, preparation work had to be carried out at the jobsite. Among other tasks the starting pit had to be produced and equipped in order to install the Grundoburst 2500G with an extension frame, as well as preparation of the target pit, where the PE-pipes were to be pulled in.

Work began by pushing in the bursting rods with an attached guiding sleeve through the damaged old pipe from the starting pit to the target pit. This work took about 3 hours to accomplish. During this process the bursting rod – just as with smaller units – is no longer inserted manually. Due to the single rod weight of 325 kg a lifting device is necessary. MUP Wodokanal used an available lifting crane, model Ivanowez.

The Quick-Lock rods reduced the thrust times immensely. The rods, made from a fully metal material form a tight connection. The rods are simply clicked into place and do not need to be screwed together. There are no threadings, which can be susceptible to any wear and tear. The components are corrosively protected and undergo a special heat treatment.

In the next step inside the target pit the guiding cone is exchanged for a roller blade and an expander, which is then connected to the PE-connection piece and the PE-pipe itself. The roller blade is then pulled through the old pipe, therefore cutting the old pipe open and pushing the steel-concrete fragments into the surrounding soil. The pipe is pulled into the ground simultaneously.

The unit was only running at half power, the pressure indicator showed 100 – 115 bar, compared to the 250 bar, which are possible. The pulling in process of the new pipes over the first length of 140 m took approx. 3.5 hours, over the second length of 200 m approx. 5 hours.

Engineers from Mechgrundostroy in Moscow, a pipe bursting specialists from TT Germany and engineers from MUP Wodokanal were involved in the project. The operators from MUP Wodokanal were given extensive training on this bursting rig.

The Russian composer Pyotr Ilyich Tchaikovsky (1840 – 1893) spent the last seventeen months of his life in Klin. For the last seventeen months of his life he settled in this house in the outskirts of Klin. In this quiet corner he found ideal conditions for his work. He completed the scores of "olenska" and the world famous "The Nutcracker", wrote 18 piano pieces, 72 compositions, "The Night" vocal quartet, romantic compositions No 23 to the poem of D. Riazin, Third piano concerto which was his last composition. The manuscript is dated "October, 1893. Klin."
Client: Karl Fürholzer GmbH, Austria
Equipment: GRUNDOBURST 1250 G
Old pipe: Concrete ND 300 mm
New pipe: HD-PE ND 400 mm
Installation length: 200 metres in single lengths of 60 resp. 70 metres
Upsizing time: 4 working days
Upsize differential: 30%

Details: The steel-coated old concrete sewer ran along a 2-lane motorway extremely close to a parallel slope wall. The manholes along the pipeline had to be renewed, too.

The condition of many existing old water and sewage pipes is crying out for sanitation and renewals, but at the same time it is necessary to retain the diameter, or even increase the diameter of the pipes.

During a renewal process in Austria the static pipe bursting method proved itself very well and numerous referenced jobsites were carried out successfully.

The sequence for pipe renewal measures is very simple: a patented bursting rod is pushed into the old pipe, which is intended to be burst open, from a hydraulically operated rig. Upon arrival inside the target pit or manhole the bursting tool with relevant expander is attached to the new pipe and the bursting rods. Almost all old pipe materials can be burst and pulled in. During the static installation the expander body provides further bursting of the old pipes, as well as the displacement of any fragments into the surrounding soil. Nominal size expansions up to two dimensions are generally possible.

The bursting technology is mainly used for the renewal of pressure pipes (gas and drinking water). However, the system has also proved successful for the installation of sewer pipes.

In October 2006 a new milestone was set for the application of the bursting technology in sewers in Amstetten/Northern Austria by the company Baumeister Karl Fürholzer GmbH from Arbing. For the very first time in Austria the GRUNDOBURST 1250 with 125 tons pulling force from the manufacturer TRACTO-TECHNIK was used. The machine technique is available with either 20, 40, 80, 125 or 250 t pulling force.

To prepare the pipe bursting job it was necessary to produce starting and target pits. For optimal use available manhole areas were used and the installation lengths in each case were between 60 and 80 meters.

In total a pipe length of 200 m was renewed in 4 working days, including all by jobs, using the pipe bursting method. The people authorised were extremely satisfied and agreed that this method should be used even more frequently in the future.

The Grundoburst 1250G rig is placed in position in the starting pit.

The tightly connected rod lengths are pushed through the old pipe.

The expander with the new pipe attached arrives in the target pit.

This picture shows the limited space available for the bursting job.

The Grundoburst 1250G rig is placed in position in the starting pit.

The initial task in the Linzerstrasse in Amstetten was not easy. An old rainwater sewer ND 300, made of steel armoured concrete was to be exchanged against a polypropylene pipe with nominal size ND 400. The old pipeline was neither statistically nor hydraulically in accordance with today's requirements. Even the manholes had to be renewed in context with the project.

It was, first of all, a general written condition not to disrupt the road traffic on the adjacent, busy two-lane motorway access road. Furthermore, the pipe line path was extremely difficult to access, as it ran extremely close to a parallel slope wall.

For this reason a quick jobsite completion, preservation of the road surface, as well as possible and minimal excavation work, was a necessity for consideration of the pipe bursting method by the planners and for the tender.

The company Baumeister Karl Fürholzer GmbH from Arbing received the go-ahead to carry out the work. For the very first time in Austria the Grundoburst 1250 with 125 tons pulling force from the manufacturer TRACTO-TECHNIK was applied. The machine technique is available with either 20, 40, 80, 125 or 250 t pulling force.

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Undercrossing the River Mosel with extended uphill bore

The trenchless installation of a pipeline below the River Mosel is a special challenge in itself, due to the generally known rocky geology in the surroundings. But in this case further difficulties made the task even more difficult.

In the written tender, the Bernkastel-Kues general council asked the architectural engineering office to consider the complex nature of the project. As the tender was won by the contractor S & V Tiefbautechnik GmbH based in Landshut, situated high up, over the mountain side made the pulling in of the pipeline below the river bed and after a distance of 185 m and a bore radius of 120 m the transition to the drive up the steep path on the opposite river bank takes place. The pilot bore took 3 working days to complete. The run of the bore path was constantly surveyed by a cable guided Digitrac detection system.

The reason for the bore was the installation of a drinking water pipeline GGG ND 200 situated approx. 10 m behind the entrance pit. On the opposite side, from the intermediate pit to the target, the drinking water pipe will be installed further up to the youth hostel Burg Landshut situated high up, overlooking the Mosel.

The carefull planning of the architectural engineering office had to be transferred into practise. With core bores up to depths of 17 m on each bank of the Mosel a geological profile was made. The results showed that various soft to solid rock formations of strongly worn clay shale to bulky clay shale with hard quartzite layers were to be expected.

The tender was won by the construction company Otto Schröder/Ger many whose daughter company, S & V Tiefbautechnik GmbH carried out the task. The hard and any bore spoils were caught in the target pit on the steep slope, pumped into a container and driven to the bore side for recycling.

An advantage in this case was the fact that the Grundrock rock drilling motor only requires a low drilling fluid quantity. Apart from the flow rate of the drilling fluid, the pressure is also important for the operation of the bore hole motor. When the drilling fluid flows this allows the rotor inside the bore hole motor to rotate – the higher the flow rate means the quicker the rotation. The pressure is converted into torque inside the motor and surmounts the resistance which the rock opposes to the roller chisel. The higher the pressure, therefore the higher the torque. Also, the quality of the ball bearings and the intelligent arrangement of the fluid channels and the head exits. The "bent" housing allows for inclination steering between 1 and 4° 4 per metre.

After crossing the Mosel at a depth of 17 m below water level or 13 m below the river bed and after a distance of 185 m and a bore radius of 120 m the transition to the drive up the steep path on the opposite river bank takes place. The pilot bore took 3 working days to complete. The run of the bore path was constantly surveyed by a cable guided Digitrac detection system.

Two further working days were necessary for the expanding process with a 10” (250 mm) hole opener. The clearance and smoothing of the bore hole was carried out with a relevant backreamer. Drilling fluid and any bore spoils were caught in the target pit on the steep slope, pumped into a container and driven to the bore side for recycling.

For all operation steps approx. 250 cbm drilling fluid was used, although it has to be considered, that the pilot bore over the final third clearly reduced the return flow of the drilling fluid, which points to fissures in the ground below.

During the bore process the welding team were occupied with welding the 12 m pipe lengths together. The tight conditions on the mountain side made the pulling in process even more difficult when positioning the pipeline. To reduce the pulling forces an excavator was additionally brought in to place the pipes in a more convenient position.

The pulling forces were constantly checked by the tensile strength measuring device Grundolog III. The pipe installation process took only 4 hours to complete.

The newly installed pipe is to be connected to a connection line GGG ZM ND 150 to the transport line GGG ND 200 situated approx. 10 m behind the entrance pit. On the opposite side, from the intermediate pit to the target, the drinking water pipe will be installed further up to the youth hostel in an open trench construction method.

This proves once again that even the difficult projects can be carried out precisely with careful planning, combined with know-how and experience.
Combined application of HDD and Cable plowing

The town of Köngen near Stuttgart, inhabited by almost 10,000 people, belongs to the oldest settlements in the central Neckar region. Evidence of settlement reaches back over four thousand years, from the inhabited caves of the Neolithic period to the Celts, Romans and Alemannic population. The Roman castle Grinario was erected 90 AD. Even today, the Köngen region has numerous horse stables. Coincidence? It would be an interesting topic for research; but history is not our topic, we are talking about the ring closure of a cast iron potable water line in exactly this region – on the high plateau of Köngen round about the estates Rothof, Erlenhof, Birkenhof and Kempferhof.

The engineering office RBS-Wave GmbH, Stuttgart, was commissioned with the organisation of the project and had placed a tender for open trench installation. The special offer of the company Coburger Tief- und Leitungsbau, suggesting to carry out the installation using a trenchless solution, promised an economical advantage of about 10%. Therefore, the enterprise from Coburg was commissioned.

Their spectrum of capability includes the installation of 20 kV, low voltage, telecommunication and optical waveguide cables, drinking water and sewer lines, the assembly of lines and cables and the installation of drinking water and sewer line manholes. It is quite usual for them to apply pipe plow and milling techniques, just as well as HDD fluid-assisted drilling systems and the press and ream-boring methods. Their special suggestion, with its shorter installation time and less terrain damage to be expected, convinced the residents. The path track follows the course of the meadows and field borders and crosses beneath asphalted all-purpose rural roads and estate drives. Additionally, 7 house connections were renewed with the horizontal fluid-assisted drilling method and the soil displacement method using the Grundofrill hammer. The existing house connection manholes were also replaced by new manhole constructions.

1260 m of ND 150 ductile steel ZMU water line were installed (diameter at the joints 250 mm); of this total, 900 m were performed using the rocket plow method, the horizontal fluid-assisted drilling system was put into action for 140 m, installation of the remaining 220 m was done conventionally. A ND 200 ductile steel ZMU stub line (diameter at the joints 298 mm) with a total length of 445 m was additionally laid, mainly by means of horizontal, fluid-assisted drilling, performed in single lengths of 119, 90, 85 and 72 m. Installation depths varied between 1.40 m and 1.60 m.

The combined application of trenchless installation techniques is exemplary. The plow, in combination with HDD, was already used to install a 5 km long HDPE potable water line across the mud flats to a small North Sea island (Hallig). With the combination of both methods to lay cast iron pipes, however, the community of Köngen and the RBS-Wave GmbH, in co-operation with the Coburger Tief- und Leitungsbau, accomplished pioneering work. Both methods complement one another optimally. In open terrain, the plow shows plain advantages, but undercrossings of any kind, integrations etc. are best executed with the HDD technique.

While plowing in, the plow uses its “plow lamella” as a displacement body to make sufficient room for the pipe which is going to be pulled in. Due to this special method, a temporary slot is generated, causing a slight arching of the soil above the plow path. After the installation is completed, an excavator smooths out the irregularity and restores the original condition of the ground.

The drill rig Grundodrill 13 X was used for the HDD application. It was crucial to consider the joints of the cast iron pipes, which represented an obstacle for the pipe pulling process. They forced the crew to enlarge the bore hole up to a diameter of 350 mm in five single reaming stages. Smooth pipe connections naturally do not require this inconvenience. The cohesive clay soil, however, proved to be very favourable, providing a stable bore hole for pulling in the new line, free of obstacles and without any problems.

Because of its stiffness, the cast iron pipe would normally have to be pulled in from a pit, directly on installation level. A special construction allowed the crew to circumvent this necessity. The excavating company Coburger Tief- und Leitungsbau had built a ramp from which two pipes at a time could be lead into the pit in a workable inclination angle. Pulling in the pipes from the surface also simplified the handling of the cast iron pipes when they were connected.

All parties concerned were extremely satisfied with the accomplished measure which was completed in an extremely short time.