Trenchless Innovations from Germany

made in Germany

International No-Dig Beijing 2016
10th - 12th October 2016

Prof. Jens Hölterhoff
Chairman

German Society of Trenchless Technology e.V. (GSTT)

GSTT

Trenchless Innovations from Germany

made in Germany

- Inspection
- Repair / Renovation
- Renewal / New Construction

GSTT

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GSTT

TV-Inspection - Electronical sewer mirror FastPicture

made in Germany

The new FastPicture camera was developed to quickly monitor the condition of the sewer.

Technical Properties:

- FULL HD -camera (1920x1080)
- Zoom 360 x (30 x optical / 12 x digital)
- Battery and mains operation power supply
- Recording with digital recorder (H.264) by USB

Some new options :

- Tilt angle -45°/+90°
- Gas-sensor
- Additional HDMI output
- Changable battery
- Tripod und harness
- Holder for drop manhole
- Sun shade

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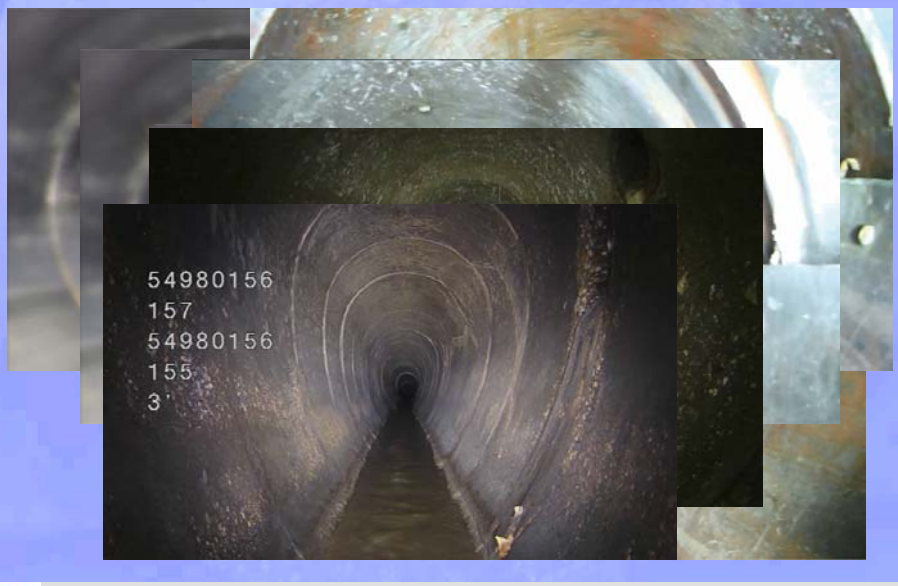
TV-Inspection - Electronical sewer mirror FastPicture

made in Germany



GSTT

TV-Inspection for smal diameter HD pushing with water

made in Germany

Pan & tilt camera, turn off able

Operating range DN 80 – 200

Able to negotiate bends
45˚ from DN 80

Able to negotiate bends
87˚ from DN 100

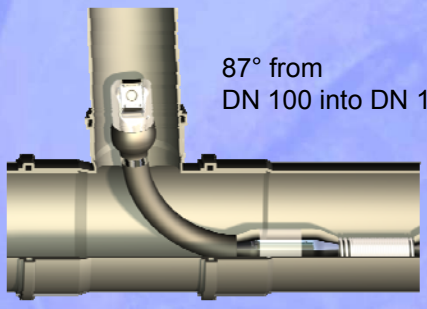
Camera diameter
56 mm.

ritec

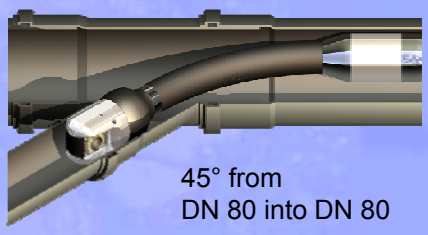
GSTT

TV-Inspection for smal diameter HD pushing with water

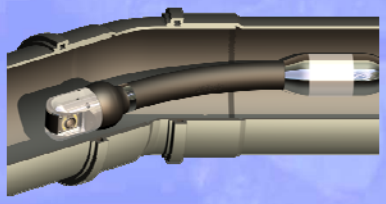
made in Germany



87° from
DN 100 into DN 100



45° from
DN 80 into DN 80



Pan & tilt camera head and
unimpeded view

The MAC method (Mecanique d`Auscultation des Conduits)

made in Germany

1. Find the weakness in waste water sewer

2. Determination of the suitable rehabilitation method for the sewer

3. Attend the rehabilitation procedure

4. Review the success of the rehabilitation procedure

5. Prove the long-term effect of the rehabilitation procedure

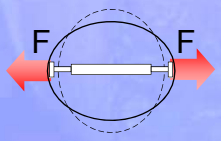
The MAC method (Mecanique d`Auscultation des Conduits)

made in Germany

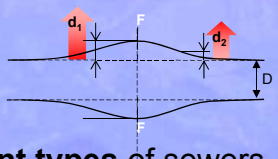
Specification of the MAC system:

- To gauge the deformation force and the deformation trajectory

global stiffness:
$K_G = F/d_1$



Transfer factor:
$\Omega = d_2/d_1$



- Measuring **different types** of sewers
- Size of sewers: useable by **DN 800** to **DN 1500**
- Various **materials:** concrete, brick or synthetic
- **Non-destructive** method of measurement

The MAC method (Mecanique d`Auscultation des Conduits)

made in Germany

Target: Inspection and testing the stability of large pipes:

Trenchless Innovations from Germany

made in Germany

- Inspection
- Repair / Renovation
- Renewal / New Construction

GSTT

LATERAL PREPARATION SYSTEM

made in Germany

SEWER to LATERAL (STL)

WOLDWIDE UNIQUE SATELLITE SYSTEM
for cutting, inspection and cleaning
from main sewer (DN 200 mm – 600 mm)
to lateral (DN 100 mm – 150 mm)

Winner of the

iSTT

NO DIG AWARD 2015

IMS Robotics

GSTT

LATERAL PREPARATION SYSTEM

made in Germany

SEWER to LATERAL (STL)

WOLDWIDE UNIQUE SATELLITE SYSTEM
for cutting, inspection and cleaning
from main sewer (DN 200 mm – 600 mm)
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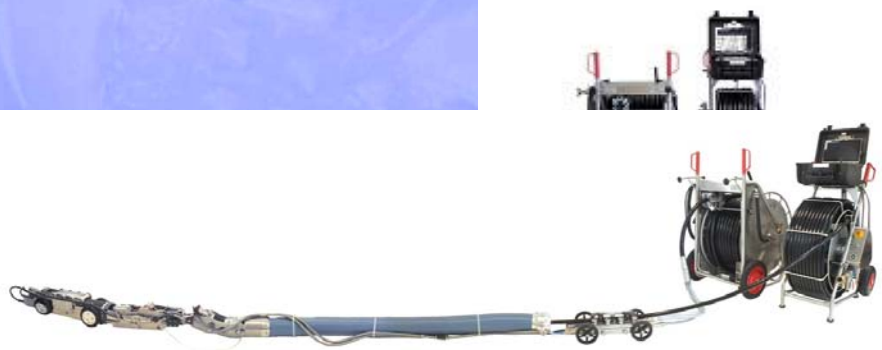
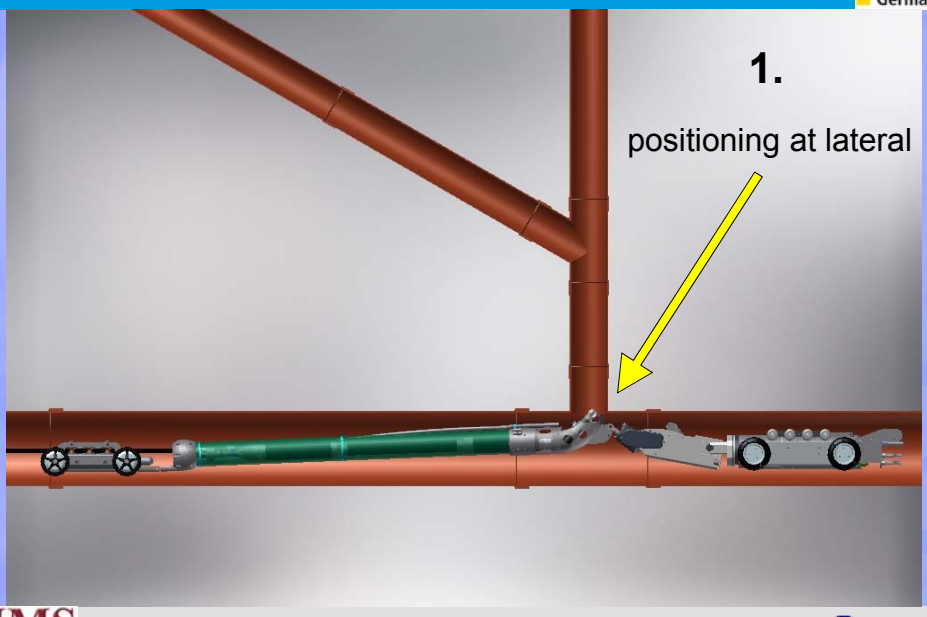


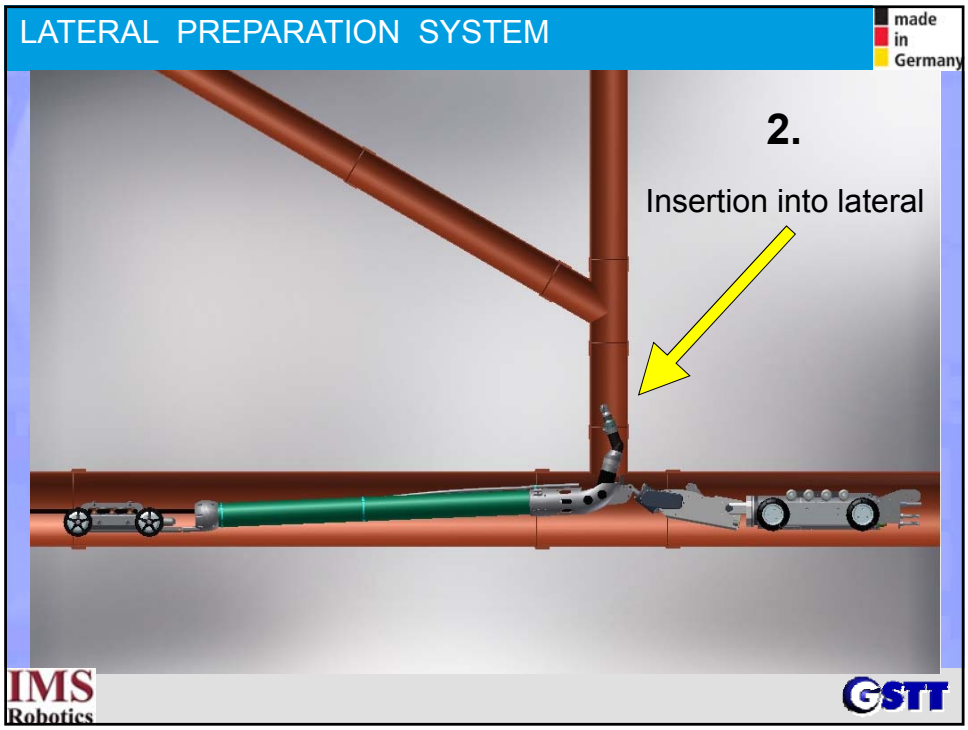
IMS Robotics GSTT

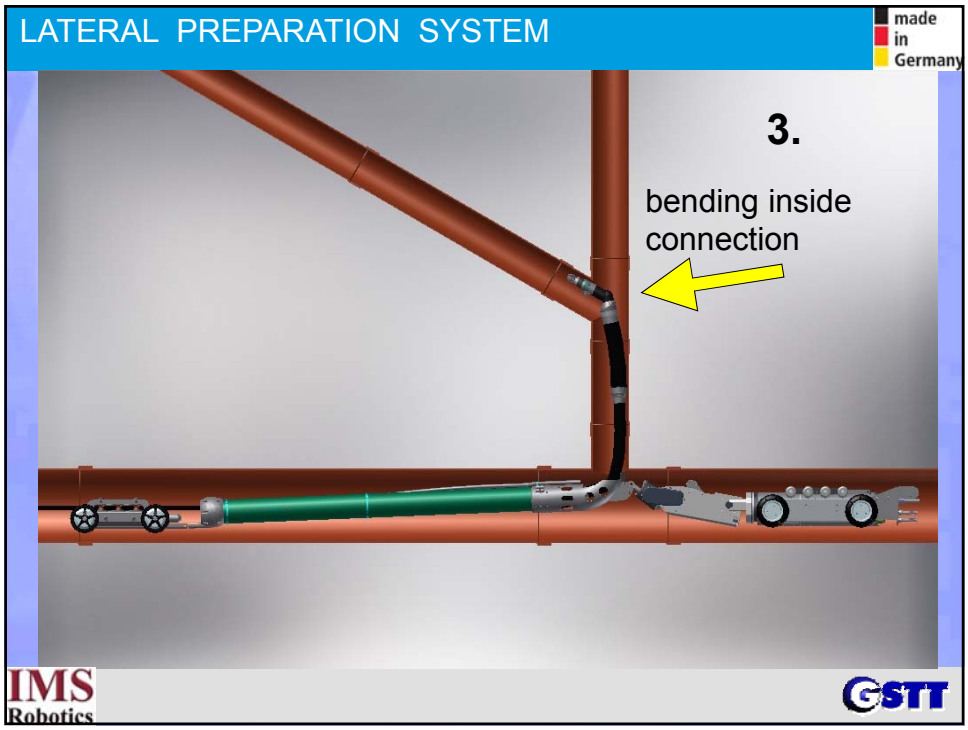
LATERAL PREPARATION SYSTEM

made in Germany



IMS Robotics GSTT


LATERAL PREPARATION SYSTEM
made in Germany
2.
Insertion into lateral
IMS Robotics
GSTT


LATERAL PREPARATION SYSTEM
made in Germany
3.
bending inside connection
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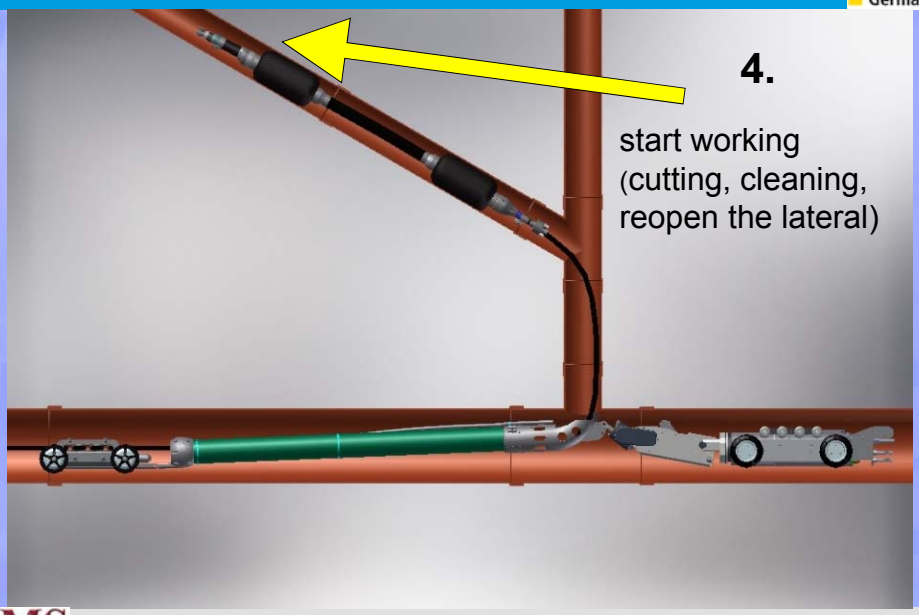
LATERAL PREPARATION SYSTEM

made in Germany



4.

start working
(cutting, cleaning,
reopen the lateral)

IMS Robotics

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CIPP - Cured-in-place pipe rehabilitation up to 1800 mm

made in Germany

Alphaliner1800 for diameters up to DN 1800:

- Unique glass fibre material based on the innovative “Ultrapipe” ECR glass fibre
- Higher transparency, better and quicker curing
- Different layout of the random and transverse fibre orientation to create technical properties

Alphaliner1800	Technical data
Elastic modulus short-term value acc. DIN EN 1228	20380 MPa
Elastic modulus short-terme value 5% quantile acc. DIN EN 1228	16304 MPa
Elastic modulus long-term value acc. DIN EN 1228	12445 MPa
Elastic modulus short-terme value 5%- quantile acc. DIN EN ISO 178	13857 MPa
Bending strength short-terme value 5% quantile acc. DIN EN ISO 178	280 MPa
Bending strength long-term value	213 MPa
Reduction factor 50 years	1,31 [-]
Wearout value as per CEN/TR 15729	0,23mm
Wear layer	0,5mm
Grouping DWA-M 144-3	MKG 24
DIBt approval	Z-42.3-447

RELINEEUROPE

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CIPP - UV curing technology - Benefit of the undersize

made in Germany

- No wrinkles in deformed pipes and offsets.
- Lateral connections easily detected.
- Reduction and prevention of annular gaps between host pipe and the liner (corrosion in concrete pipes can increase its diameter).
- Static design formulas allow only very limited gaps. Annular gaps dramatically influence the loading capability of a CIPP.

BKP BEROLINA GSTT

CIPP - Cured-in-place pipe rehabilitation - expandability

made in Germany

Job site - Berolina-Liner ID 800 [32 inch] 11,0 mm wall thickness

BKP BEROLINA GSTT

CIPP - UV curing technology - highest mechanical properties

made in Germany

The innovative GRP-Liner for the trenchless rehabilitation of sewer pipes with the world's ***highest*** mechanical properties up to ***DN 1600 mm***

- Extremely high mechanical properties
- Better handling through lower weight
- Shorter curing time
- Even more economical
- Approved by DIBt Z-42.3-350

Short-term circumferential E-Modul (ring stiffness)	≥	20,500 N/mm²
Long-term circumferential E-Modul (ring stiffness)		**16,000 N/mm²**
Short-term bending E-Modul (three-point bending)	≥	16,800 N/mm²
Short-term bending strength (three-point bending)	≥	270 N/mm²
Long-term bending strength (three-point bending)		210 N/mm²
Reduction factor A after 10 000 h		1.28
Dimension range		DN 150 - 1,600 mm
Wall thickness in cured condition		3 - 15 mm

Also available with internal coating as solid ingredient:
SAERTEX-LINER® Premium Type S+

SAERTEX multiCom

GSTT

CIPP - UV curing technology for Drinking Water

made in Germany

SAERTEX-LINER® H_2O
The world's first curable GRP-Liner for the trenchless rehabilitation of potable water pipes: **Third party approved, environmentally friendly & sustainable!**

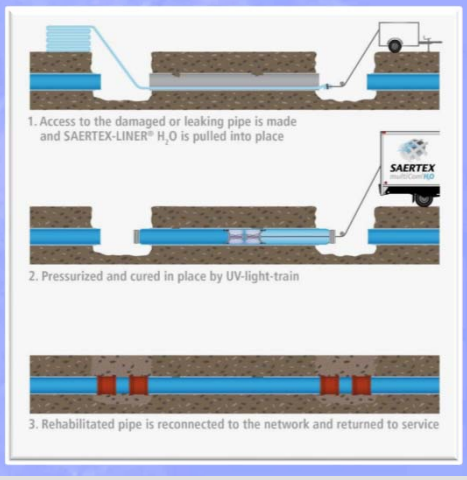
Structural classification of the Liner
- according to DIN EN ISO 11295 / AWWA M28

Certifications:
- NSF / ANSI Standard 61
- DVGW – W 270 and KTW Guideline,
- Ordinance 2914:2011

Due to high mechanical properties
- Very thin walls are used
- High pressure applications are possible

Diameter range
- 8 - 48 in (200 - 1200 mm)

The Liner can withstand external and internal pressure, including a vacuum.



SAERTEX multiCom H2O

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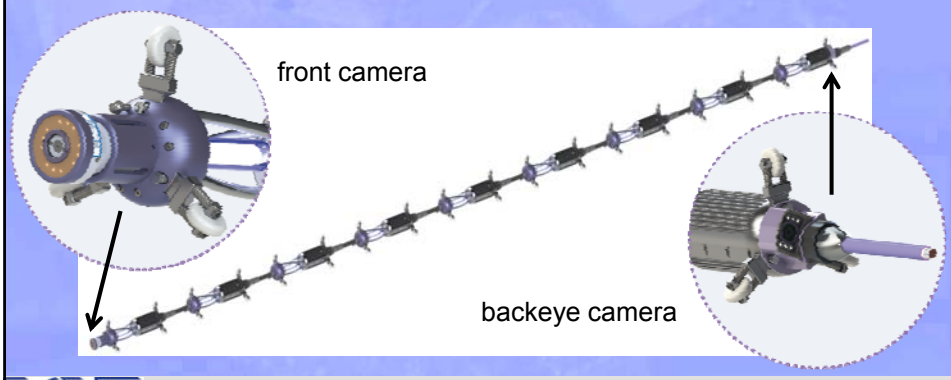
New UV System for Renovating Drinking-water Pipelines

made in Germany

With the revolutionary nUVision concept for light curing of drinking-water pipelines, I.S.T. is putting a patent-protected technology on the market that allows for cables up to 1,000 meters in length.



New UV System for Renovating Drinking-water Pipelines

made in Germany

nUVision - All of the benefits at a glance:

→ Revolutionary ignition technology
→ Cables can be extended up to 1,000 meters
→ Cuts the control cabinet size by more than half
→ No temperature problems for the cable or cable drum
→ Infinitely variable output of up to 2,000 watts per beam
→ Simultaneous video recording of front and backeye camera images
→ Optimal quality control for the curing process at every liner position
→ The individual modules of the light chain can be plugged in anywhere
→ BUS system for constant data transmission of all curing parameters

UV-Core DN 1100 -1600

made in Germany

- Light core with 8 UV-bulbs *(opt. 16 UV-bulbs, 750 watts each)*
- 1200 / 1500 watts per bulb
- (12 KW total output)
- electric driven set-up of the single core
- manual extension for optimum
- illumination

IBG HydroTech® Cleaning • Robotic • WPT Lining Systems

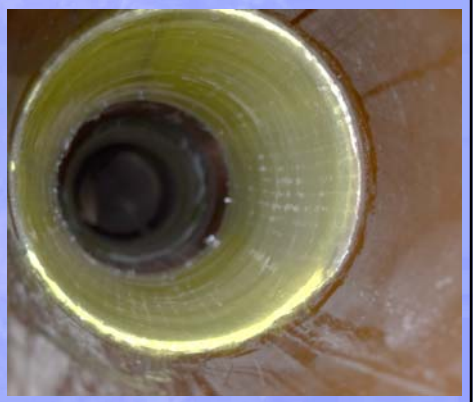
GSTT

UV-Patch System for short liners

made in Germany

allows the rehabilitation of damaged pipe sections
From DN 150-600 (6“ – 24“)

- max. occupancy with short liners up to 100 cm (40“)
- 3 UV-bulbs (250 watts each)
- articulated joint for better inserting through manhole into the channel
- curing time of only 8 minutes



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Multi Tophat cap placement-system

made in Germany

for lateral rehabilitation in main pipes from DN 250-600 (10” – 24”)

Flexible system to use for:

1. cold-curing top-hat profiles with silicate resins
2. top-hat profiles with epoxy resins (incl. heating shield)
3. UV-curing with UP-resin (polyester)

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STREET TO HOME

made in Germany

for lateral relining from of the main pipe

The system allows inverting GRP-Liner against flow direction with open-end-method :

Positioning unit and inversion unit are placed into the main pipe (> DN 250 relined) from two opposing manholes.

From there, after coupling of the units, the rehabilitation of the lateral (> DN100) is carried out.

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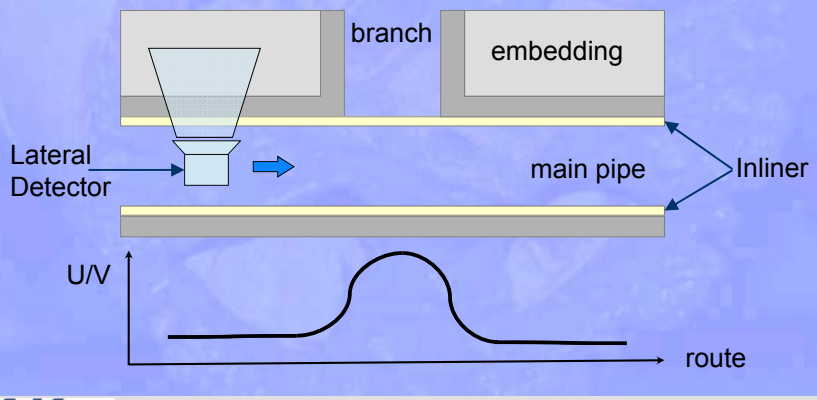
CIPP – Lateral detector

made in Germany

IBAK – Lateral Detector

Sensor system for locating branches in rehabilitated sewer pipes

Proceeding: An antenna is routed along the liner wall.
The output signal of the sensor changes depending on the structure detected behind the wall.



IBAK robotics

GSTT

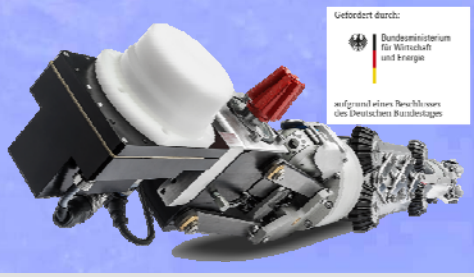
CIPP – Lateral detector

made in Germany

IBAK – Lateral Detector

Sensor system for locating branches in rehabilitated sewer pipes

With this innovative technology it is possible to locate and cut open branches (size DN 80 or larger) to be opened after liner insertion.



IBAK robotics

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CIPP – Lateral detector

made in Germany

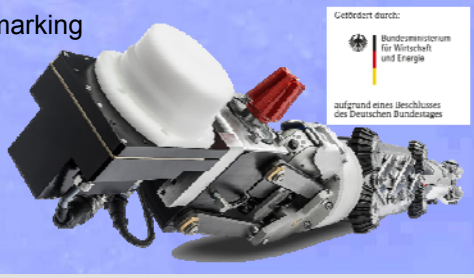
IBAK – Lateral Detector

Sensor system for locating branches in rehabilitated sewer pipes

The sections graphic from the camera inspection serves as basis
- it is not necessary to scan the entire pipe again.

It is possible to find dry branches as well as those with water behind the liner.
The operator receives a visual reference of where the optimal opening point is.

- 1st step: it can be marked with a marking device that is adapted on the cutter robot
- 2nd step: the cutter automatically moves to the optimal opening point, and thus it can be reliably opened



IBAK robotics

GSTT

Manhole rehabilitation technologies

made in Germany

cleaning equipment

HERMES TECHNOLOGIE

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Manhole rehabilitation technologies

made in Germany

motar coating equipment

M-Coating
Automatical shaft renovation

Spray motor

- Thickness 5 – 100 mm
- Depth until 30 m
- Diameter 0.5 – 3,0 m
- Anticorrosion
- Structural renovation

HERMES TECHNOLOGIE

GSTT

Manhole rehabilitation technologies

made in Germany

motar coating

M-Coating after partial coating with ERGELIT

HERMES TECHNOLOGIE

GSTT

Manhole rehabilitation technologies

made in Germany

Automatically coating of hybrid-silicate ombran CPS in the case of biogenic acid corrosion

HS Coating Head

MC GSTT

Trenchless Innovations from Germany

made in Germany

- Inspection
- Repair / Renovation
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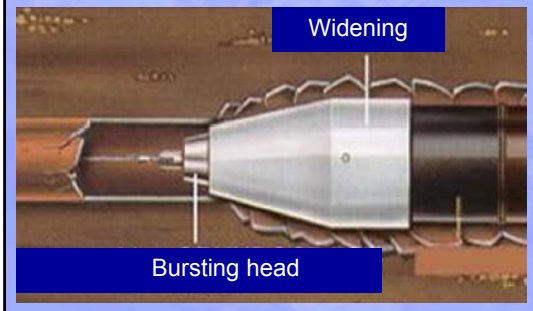
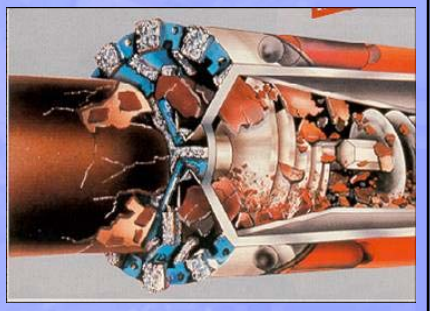
PRT – Pipe Replacement Technology

made in Germany

So far only pipe bursting and modified micro tunneling systems (pipe-eating method) are available for a pipeline corridor, trenchless replacement of old pipelines.





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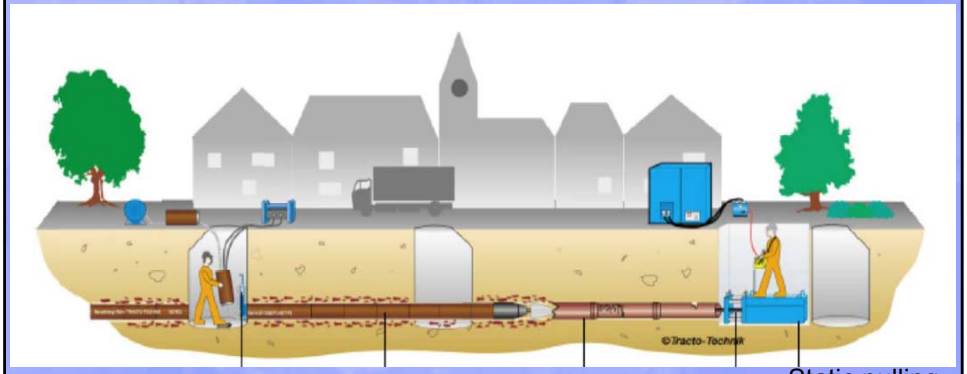
PRT – Pipe Replacement Technology

made in Germany

Pipe bursting method

A prerequisite to utilize this method is that the surrounding ground can be displaced; major increases of dimensions are often problematic or impossible.



Strech (tension) unit | New pipe | Old pipe | Pull rod | Static pulling device

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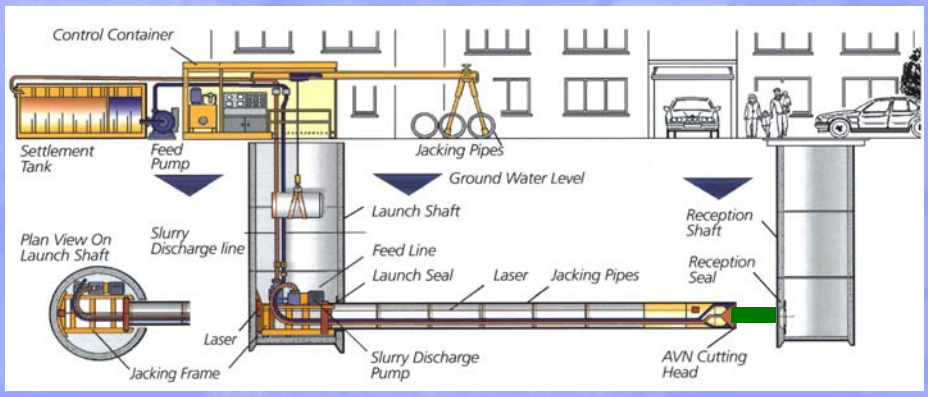
PRT – Pipe Replacement Technology

made in Germany

Pipe Eating systems

technical perfected systems

…but too long construction time



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PRT – Pipe Replacement Technology

made in Germany

Pipe Eating systems

The new inventive technology will especially be utilized when regular pipe - bursting can no longer be applied, because the soil cannot be displaced or because a necessary dimension enlargement is not sufficient displaced, or respectively if there is a guideline that the old pipe must be removed completely.

With this new technology it is possible to lower the construction time by 60 - 80%.

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PRT – Pipe Replacement Technology

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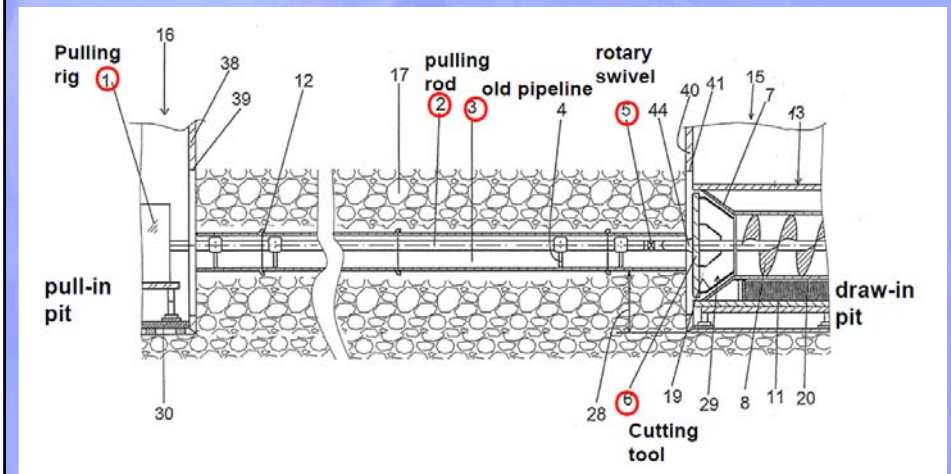

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PRT – Pipe Replacement Technology

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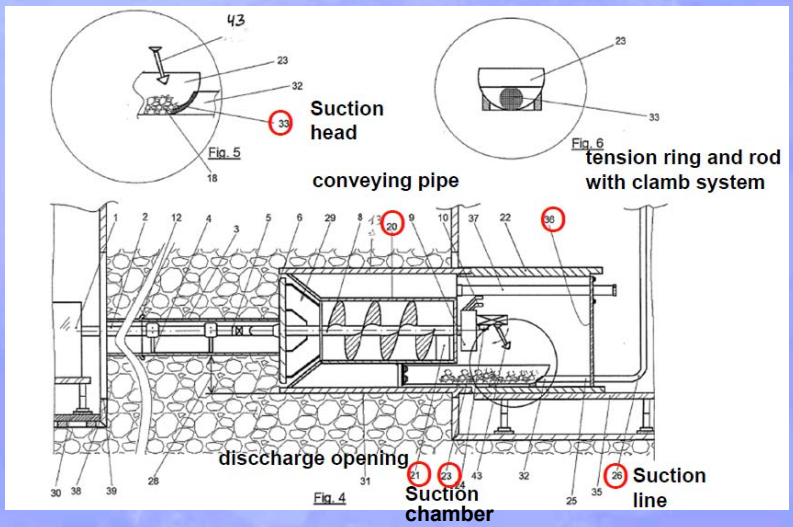

removal of drilled material is done with a suction excavator

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PRT – Pipe Replacement Technology

made in Germany

Pipe replacing machine OD 559 mm
for experimental construction site in
Berlin in August 2016
(other diameters are possible)

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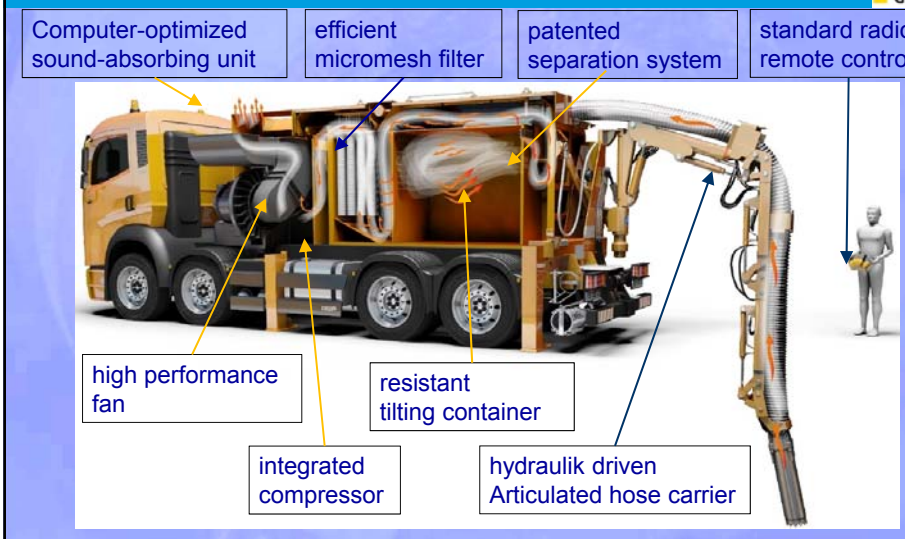
PRT – Pipe Replacement Technology

made in Germany



Suction Excavator - patented suction principle

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PRT – Pipe Replacement Technology

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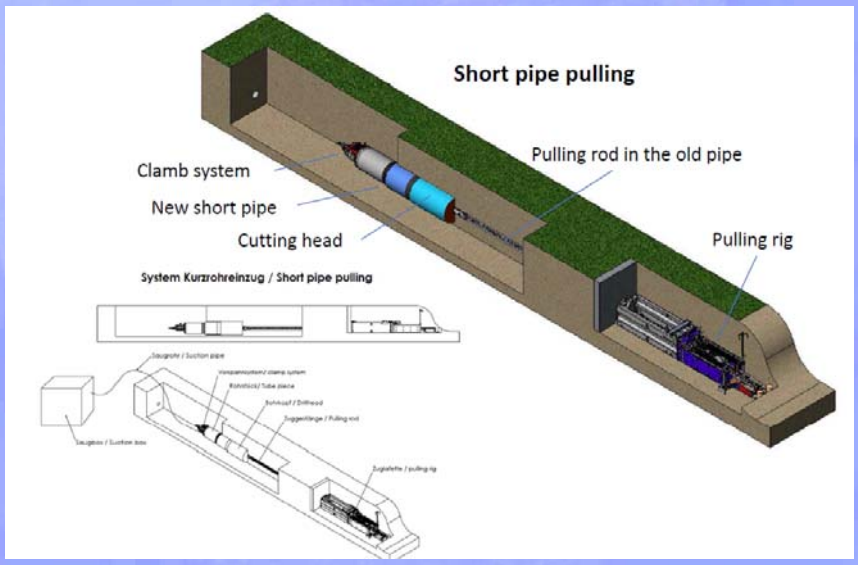

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PRT – Pipe Replacement Technology

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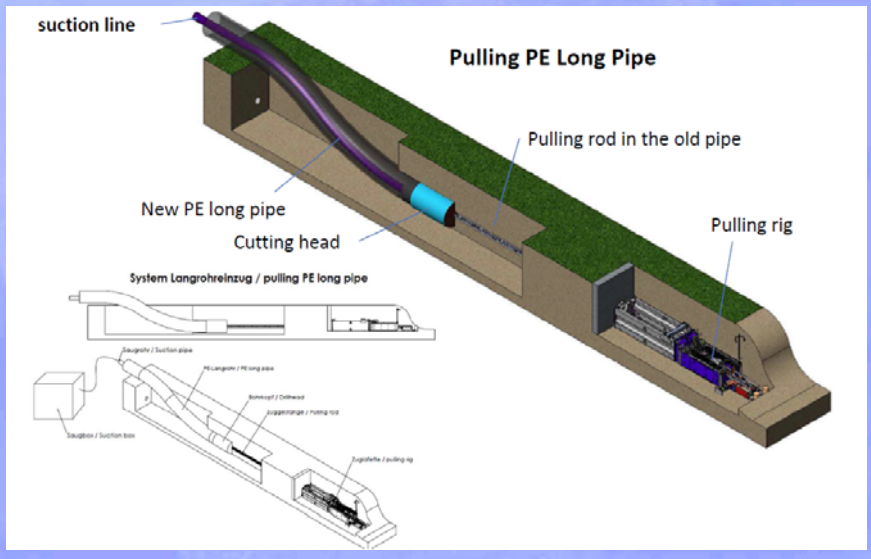

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PRT – Pipe Replacement Technology

made in Germany

Pulling rig

Clamb system

Pulling rod

Hydraulic aggregate

A lot of the components can be used for other applicabilties (pipe bursting etc.)

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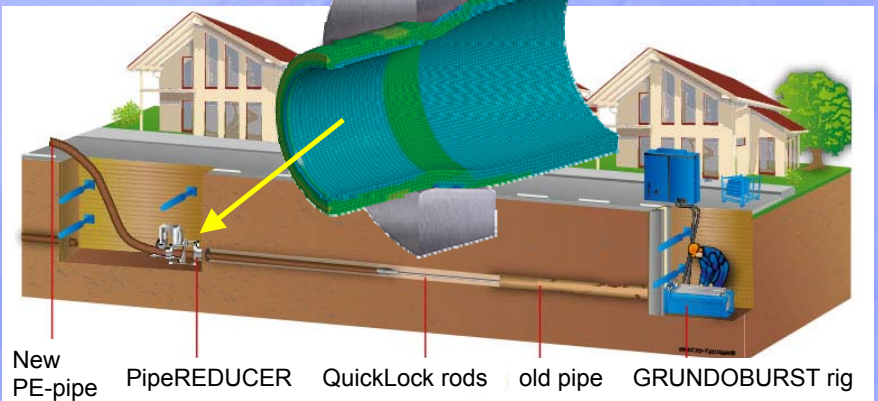
PE close-fit pipe lining

made in Germany

GRUNDBURST with P[illegible]UCER



New PE-pipe | PipeREDUCER | QuickLock rods | old pipe | GRUNDOBURST rig

In the process of pulling in, the PE pipe string is reduced by 5 - 12 %, due to cold deformation. When the pulling-in operation is completed, the pipe string can relax against the wall of the old pipe in a close fit (memory effect).

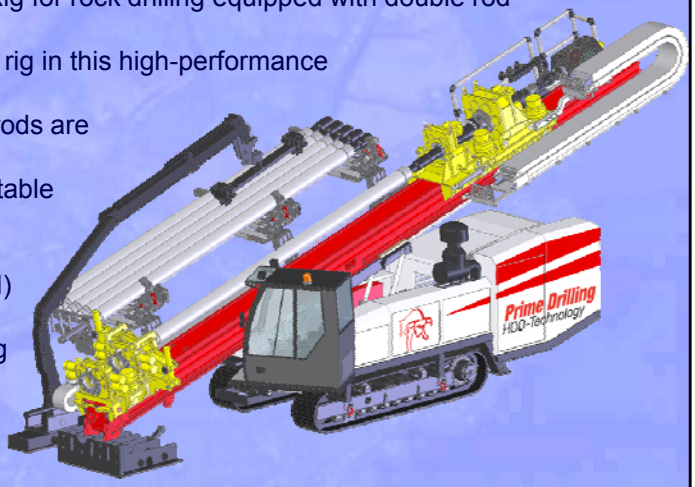
GSTT

HDD - Rock Drilling Rig

made in Germany

with Prime Double Rod System and „on board“ pump

- HDD-Compact Rig for rock drilling equipped with double rod magazine
- First rock drilling rig in this high-performance category (> 50 t)
- Inner and outer rods are independently
- driven by two flotable rotary heads
- high torque (up to 90,000 kN)
- Use of any common locating system possible
- Application with standard drill pipes



Prime Drilling HDD-Technology

GSTT

HDD - Rock Drilling Rig

made in Germany

Prime Drilling HDD-Technology

GSTT

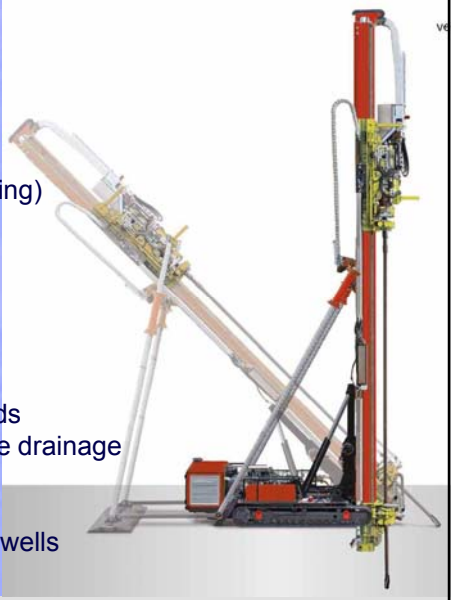
MDD – Rigs 0° - 90° (Multi Directional Drilling)

made in Germany

up to 5.000 kN pull force (500 t)
up to 120 kNm torque

Typical applications:

- recovery of inactive oil and gas wells
- recovery of operational wells (sidetracking)
- hydro-geological purposes
- production of other natural resources
- geological prospecting purposes
- exploration of crude hydrocarbons
- installation of pipelines
- mine rescue operations
- preliminary decontamination of coal beds
- preliminary decontamination of methane drainage
- arrangement of sea gates
- arrangement of discharge lines
- capital repairs of producing oil and gas wells

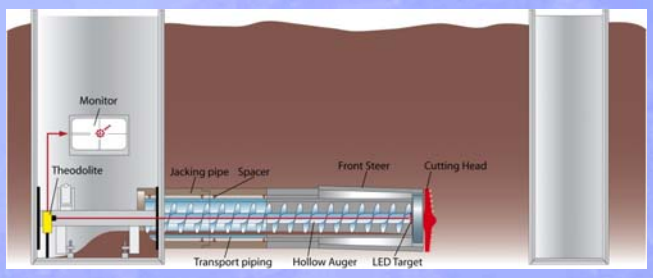


Prime Drilling HDD-Technology

GSTT

Guided Auger Boring with Front Steer and Inner Pipe Transport inside of Hobas OD860

made in Germany

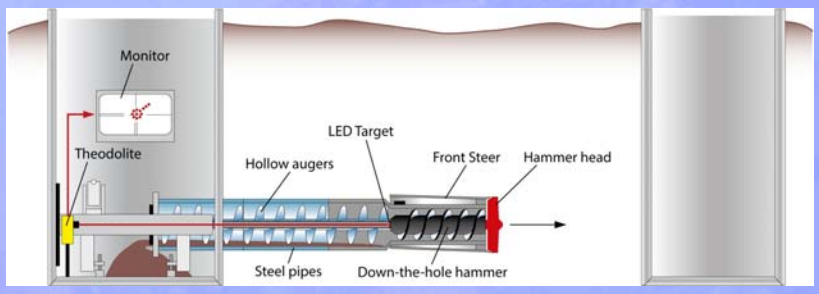


Bohrtec

GSTT

Guided Auger Boring with Front Steer and Optical Path in Extremest Ground Conditions

made in Germany



Bohrtec GSTT

Jacking Pipes - vitrified clay pipes

made in Germany

INTERMEDIATE JACKING STATION FOR VITRIFIED CLAY JACKING PIPE DN 1200

- second Job site: Peine (Germany), Dungelbeck
- Length 260 m, DN 1200
- ground condition: gravel,sand and ground water level 0,5m under earth surfaces
- construction company: STRABAG Germany

STEINZEUG KERAMO GSTT

Jacking Pipes - vitrified clay pipes

Microtunnelling with slurry systems

- Bolzano Italy
- 1200 m DN 800
- Difficult soil conditions, gravel and big stones
- Reinforced concrete caisson shafts
- construction company: MAX BÖGL (branch Schwabach) Germany

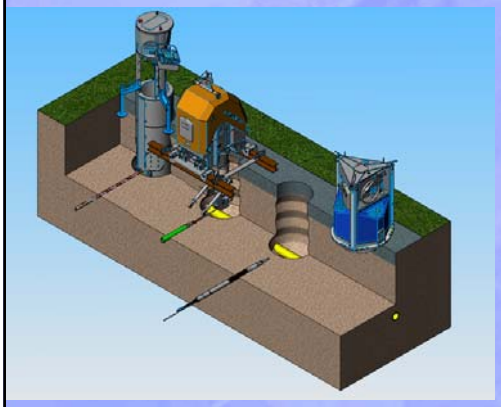
STEINZEUG KERAMO

GSTT

Keyhole-Technology + Trenchless Technique

made in Germany

A Tiny Circle - the Construction Pit of the Future



Application range:
- installation of new property service connections with non-directional **GRUNDOMAT impact moles**
- installation of new property service connections with the directional drill rig **GRUNDOPIT-K**
- replacement of new property service connections with the cable winch **GRUNDOTUGGER**
- sleeve sealing of cast iron and steel lines
- repair of high pressure PE pipe lines
- insertion of survey slots
- pipe line inspection
- corrosion protection sacrificial anodes

Where the keyhole technique is applied, surface damage and consequential costs only too well known from open trench installation methods are insignificant. The performance of soil and surface works is safer, more productive and less elaborate. Inspection of the construction pit is not required.

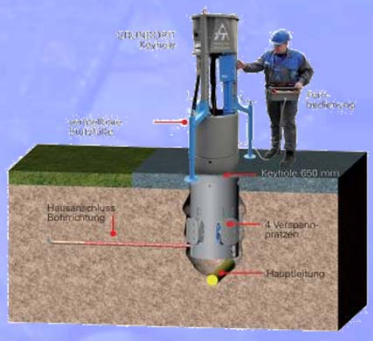
TRACTO-TECHNIK

GSTT

Keyhole-Technology + Trenchless Technique

made in Germany

Establishing a keyhole using a core drill



- the core drill CD 650 **bores a hole of 650 mm in diameter in the road surface**.
- after all other jobs are done, **the bore core** yielded in this working step is **reinserted into the road surface, fitting perfectly**.
- **a suction excavator takes up the soil** covering the main line
- **installation of the Pit K rig** and performance of the bore with wall duct into the basement
- **connection with the main line** is carried out above the surface.

Trenchless Innovations from Germany

made in Germany

We invite you, to visit the NO DIG BERLIN 2017 in conjunction with WATER BERLIN INTERNATIONAL.
Here you can see life the newest Trenchless Innovations from Germany

NO DIG BERLIN

Symposium and Exhibition
28 – 31 March 2017
www.**NODIGBERLIN**.com
Berlin Exhibition Grounds

More than 500 Visitors will transported with 20 busses to more than 15 sitevisites

Questions?

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Thank you for your attention

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