

Trenchless Innovations from Germany

made in Germany

**TRENCHLESS Romania**  
15<sup>th</sup> June 2017  
Bucharest

**Trenchless Romania**

Dr.-Ing. Klaus Beyer  
Executive Director

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

**GSTT**



**iSTT** – International Society for Trenchless Technology

Approx. 3.500 members in approx. 55 countries (Societies in 28 regions)

Logos of member societies:

- ASTT (Australia)
- UGL
- ABRATT
- BATT (Bulgarian Association for Trenchless Technologies)
- HKSTT
- GSTT
- CTSTT
- CISTT
- OSTT
- NoDig Infra
- ISTT
- ISTT
- GSTT
- IBSTT (Asociación Iberoica de Tecnología Sin Zanja)
- OSTT
- JSTT
- LBTA
- NSTT
- NASTT
- PFTT (Polska Fundacja Techniki Bezotworczywania)
- POBT
- SSST
- SgSTT
- saSTT
- RoSTT
- AKATED TSITT
- AKATED
- UKSTT

**GSTT**

## Trenchless Innovations from Germany



- Inspection
- Repair / Renovation
- Renewal / New Construction



## Trenchless Innovations from Germany



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- Repair / Renovation
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## CCTV-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 :

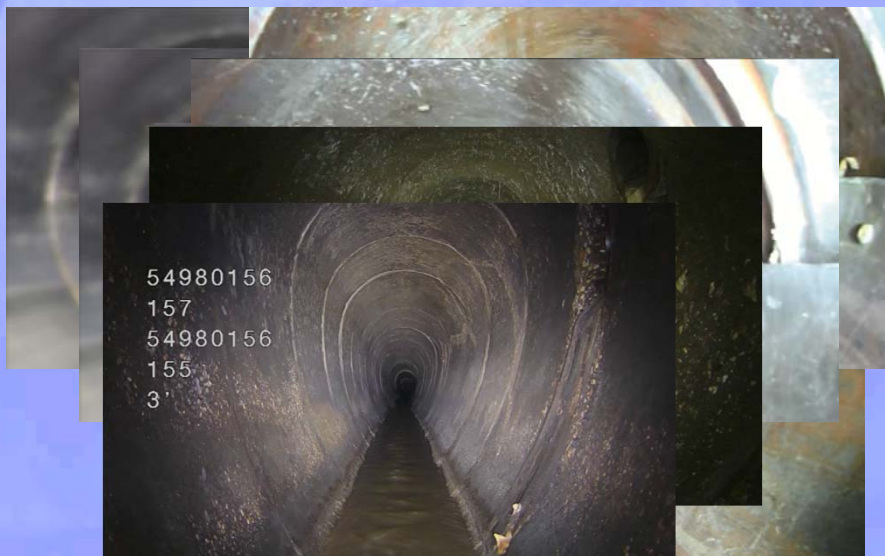
- Tilt angle -45°/+90°
- Gas-sensor
- Additional HDMI output
- Changable battery
- Tripod und harness
- Holder for drop manhole
- Sun shade



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## CCTV-Inspection - Electronical sewer mirror FastPicture

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## CCTV-Inspection for small diameter HD pushing with water

made  
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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.

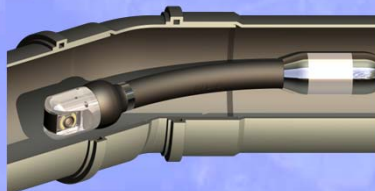
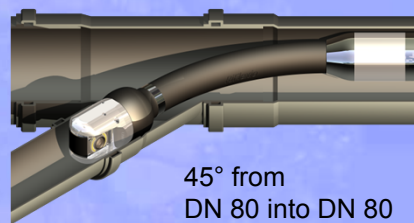
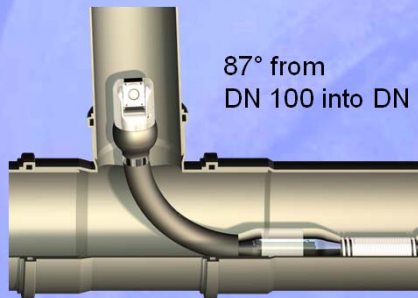


ritec

GSTT

## CCTV-Inspection for small diameter HD pushing with water

made  
in  
Germany



Pan & tilt camera head and  
unimpeded view

ritec

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## Trenchless Innovations from Germany



- Inspection
- Repair / Renovation
- Renewal / New Construction



## LATERAL PREPARATION SYSTEM



### SEWER to LATERAL (STL)

WORLDWIDE 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



NO DIG  
AWARD 2015





LATERAL PREPARATION SYSTEM

made  
in  
Germany

**SEWER to LATERAL (STL)**

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



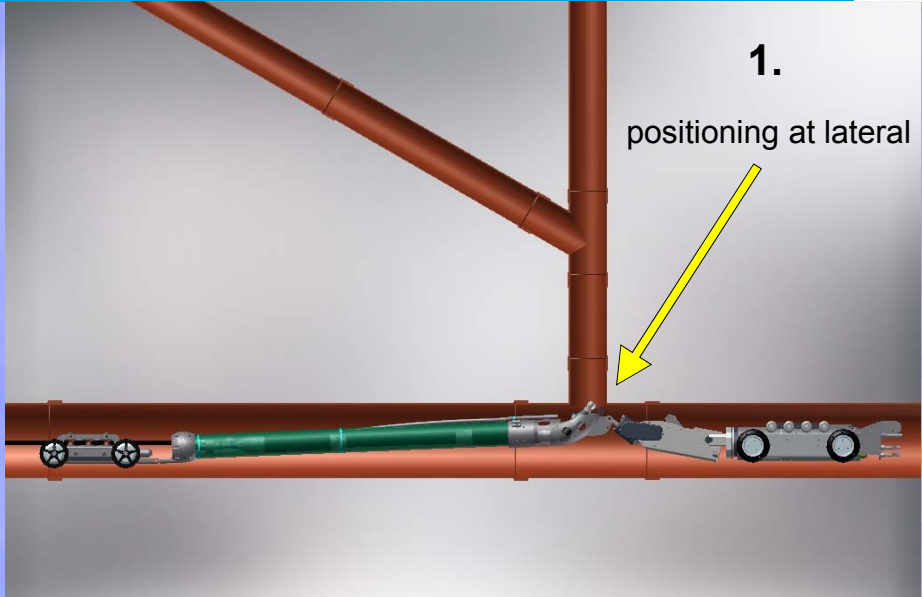
IMS  
Robotics

GSTT

LATERAL PREPARATION SYSTEM

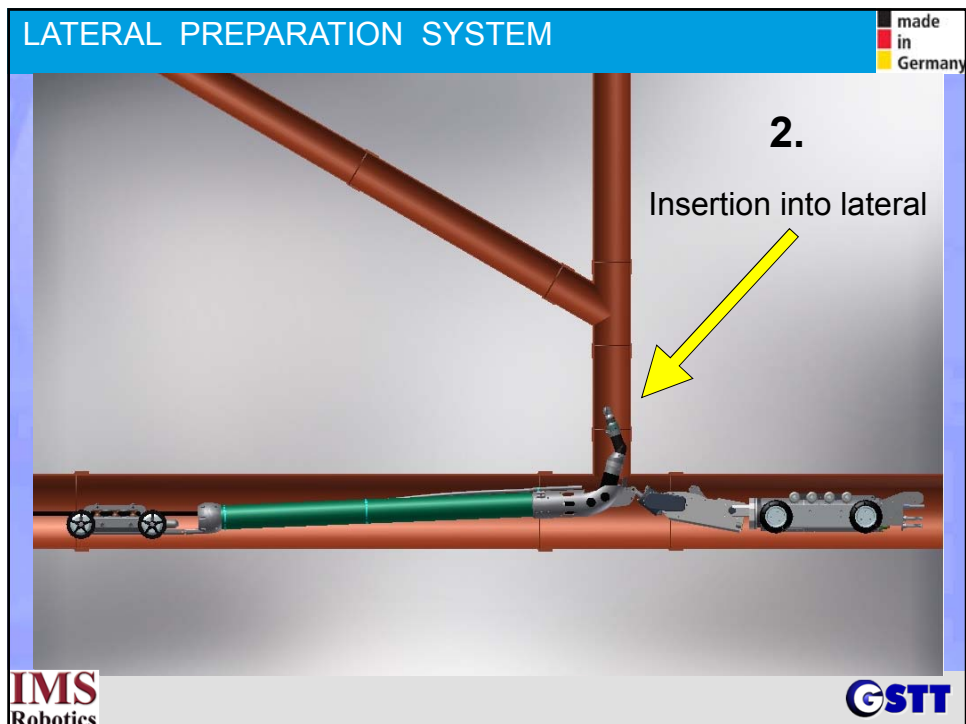
made  
in  
Germany

**1.**  
positioning at lateral



IMS  
Robotics

GSTT





**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-term value 5% quantile acc. DIN EN 1228	16304 MPa
Elastic modulus long-term value acc. DIN EN 1228	12445 MPa
Elastic modulus short-term value 5%- quantile acc. DIN EN ISO 178	13857 MPa
Bending strength short-term 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

RELINER EUROPE®

GSTT



## CIPP - UV curing technology - Benefit of the undersize



- 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.



## CIPP - Cured-in-place pipe rehabilitation - expandability



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



Before installation  
of the Berolina-Liner

After installation  
of the Berolina-Liner



## CIPP - UV curing technology for Drinking Water

made  
in  
Germany

### SAERTEX-LINER® H<sub>2</sub>O

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

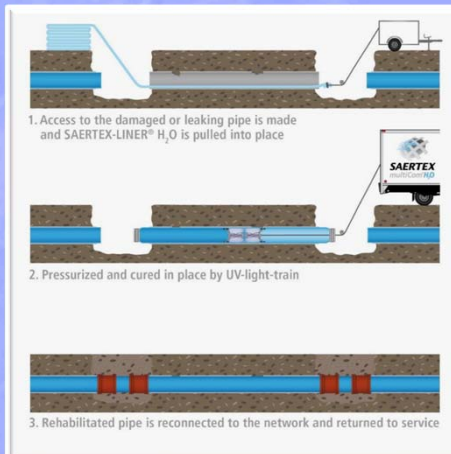
Due to high mechanical properties

- Very thin walls are used
- High pressure applications are possible

Diameter range

- 8 - 48 in (200 - 1200 mm)

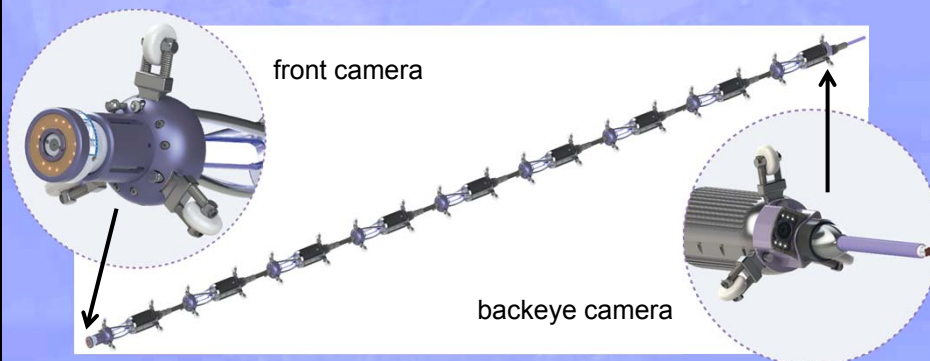
The Liner can withstand external and internal pressure, including a vacuum.



## 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



**nVision** - All of the benefits at a glance:

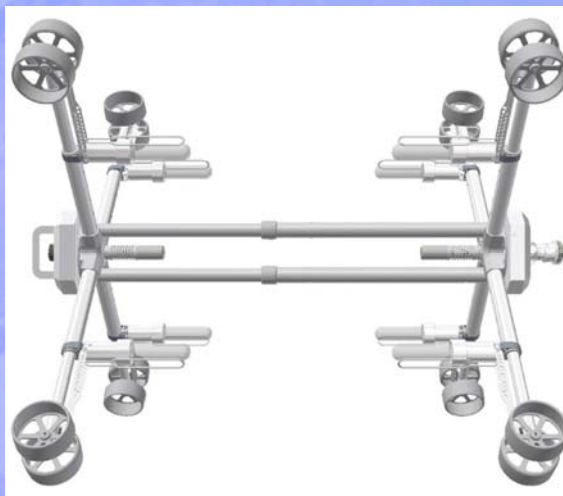
- Revolutionary ignition technology
- Cables can be extended up to 1,000 meters
- Cuts the control cabinet size by more than half
- No temperature problems for the cable or cable drum
- Infinitely variable output of up to 2,000 watts per beam
- Simultaneous video recording of front and backeye camera 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



- 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



## 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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Cleaning • Robotic • WPT  
Lining Systems

CSTT

## 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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Lining Systems

CSTT



## STREET TO HOME

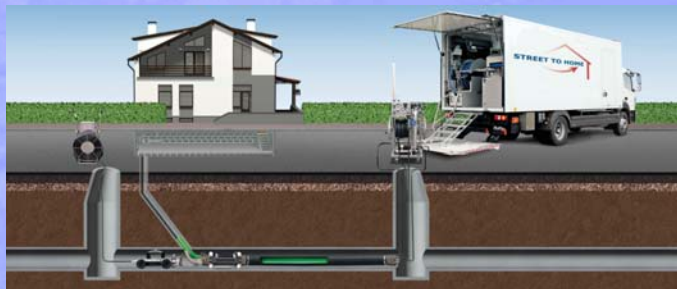
made  
in  
Germany

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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Lining Systems

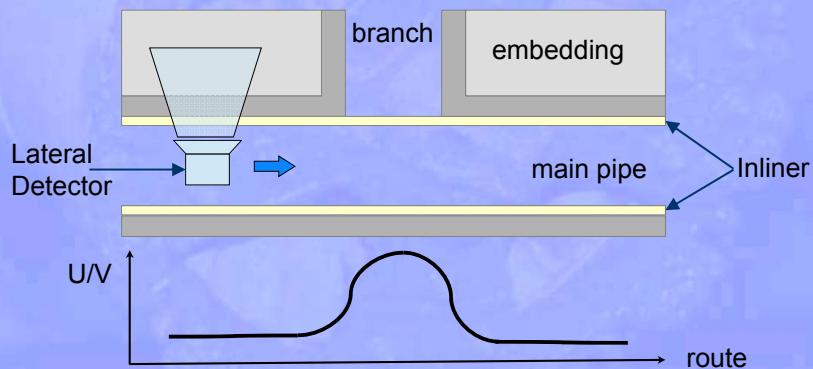
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## CIPP – Lateral detector

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






## 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.



Gefördert durch:  
 Bundesministerium für Wirtschaft und Energie  
 aufgrund eines Beschlusses des Deutschen Bundestages

CIPP – Lateral detector



## 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.

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



Gefördert durch:  
 Bundesministerium für Wirtschaft und Energie  
 aufgrund eines Beschlusses des Deutschen Bundestages

Manhole rehabilitation technologies

made in Germany

cleaning equipment

M-Coating ready to begin, after cleaning with the TSSR



HERMES TECHNOLOGIE

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Manhole rehabilitation technologies

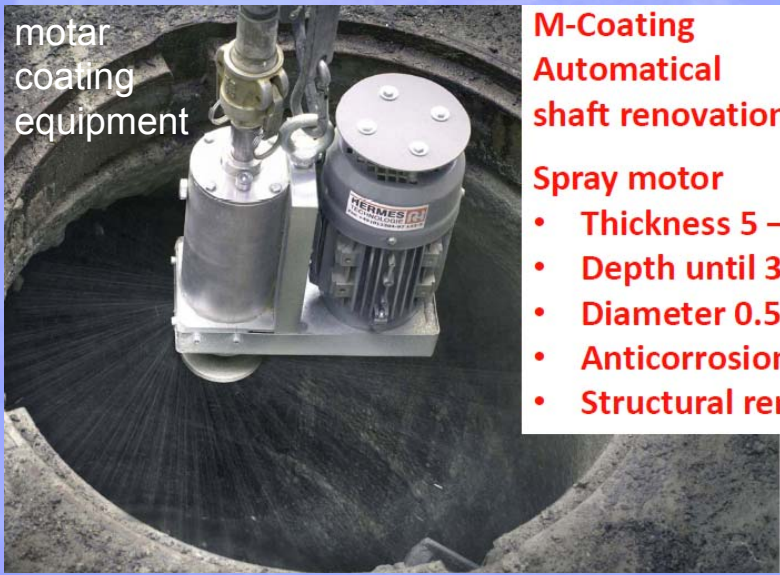
made in Germany

motor coating equipment

**M-Coating**  
**Automatic shaft renovation**

**Spray motor**

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



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Manhole rehabilitation technologies

made in Germany

motar coating



M-Coating after partial coating with ERGELIT



HERMES TECHNOLOGIE

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Manhole rehabilitation technologies

made in Germany

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

HS Coating Head

MC

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## Trenchless Innovations from Germany



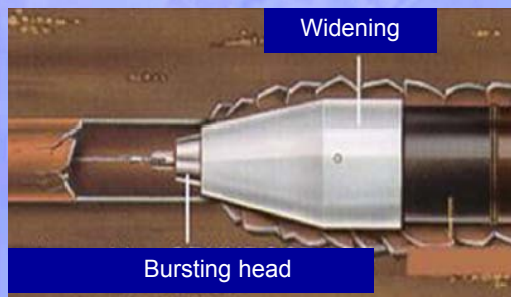
- Inspection
- Repair / Renovation
- Renewal / New Construction



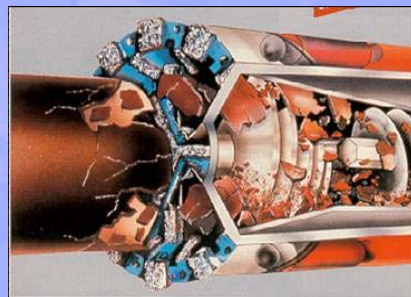
## PRM – Pipe Replacement Method



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



pipe bursting



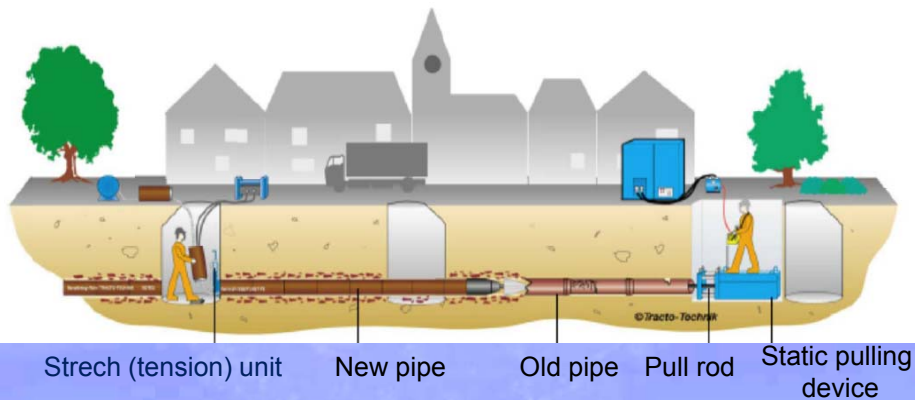
pipe eating

## PRM – Pipe Replacement Method

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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.



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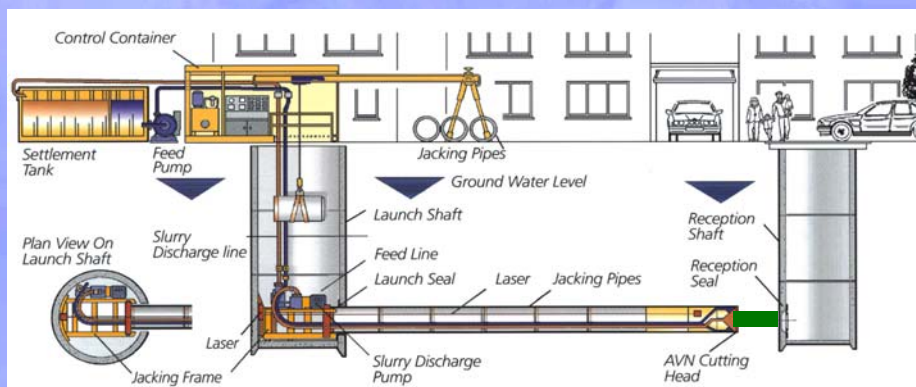
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## PRM – Pipe Replacement Method

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### Pipe Eating systems

technical perfected systems  
...but too long construction time



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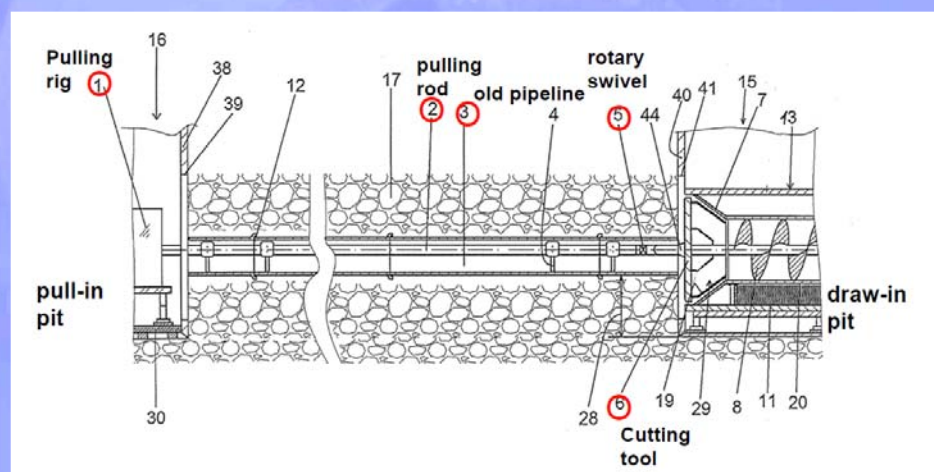
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## Pipe Eating systems

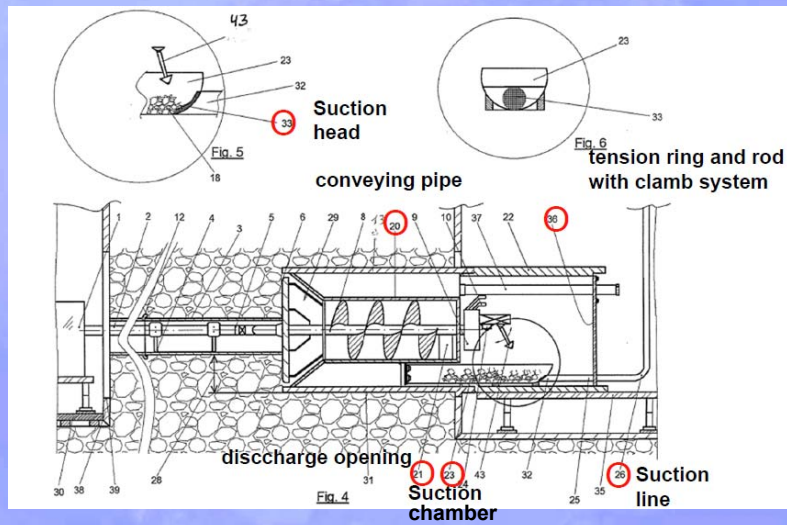
The new inventive technology will especially be utilized when regular pipe - bursting can no longer be applied, because the soil cannot be displaced or because a necessary dimension enlargement is not sufficient displaced, or respectively if there is a guideline that the old pipe must be removed completely.

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



## PRM – Pipe Replacement Method

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removal of drilled material is done with a suction excavator

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## PRM – Pipe Replacement Method

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in  
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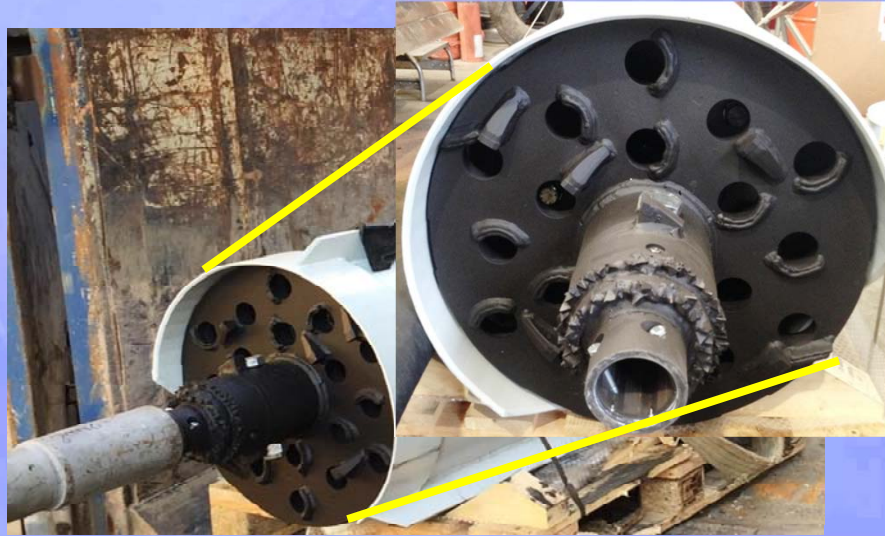
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Bohrtec

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## PRM – Pipe Replacement Method

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in  
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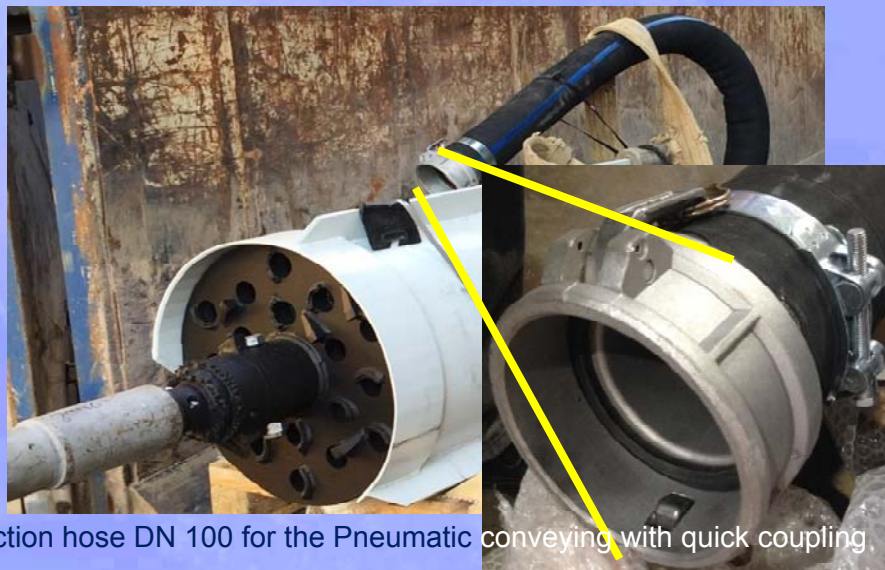
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## PRM – Pipe Replacement Method

made  
in  
Germany



Suction hose DN 100 for the Pneumatic conveying with quick coupling.

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**PRM – Pipe Replacement Method** made in Germany

Computer-optimized sound-absorbing unit

efficient micromesh filter

patented separation system

standard radio remote control

Suction Excavator - patented suction principle

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**Suction Excavators – a wealth of applications** made in Germany

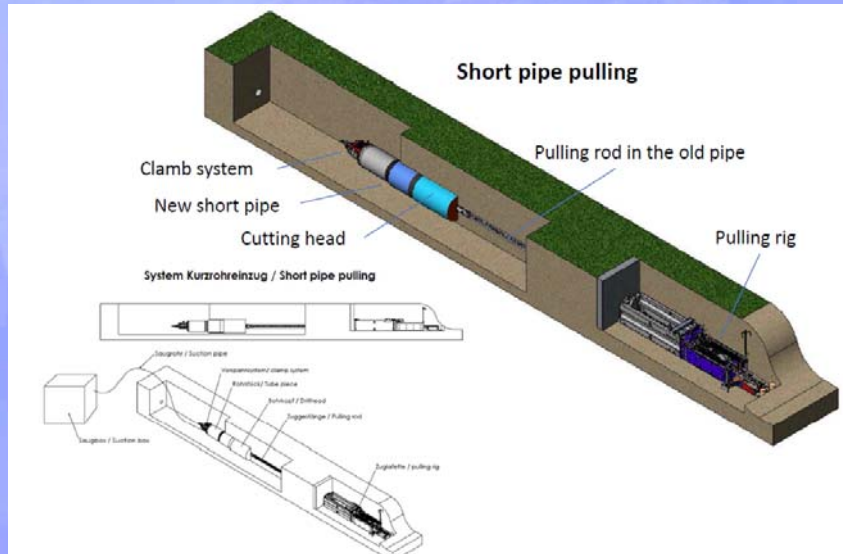
CIVIL ENGINEERING

DISPOSAL

CLEANING OF FLAT ROOFS

## PRT – Pipe Replacement Technology

made  
in  
Germany

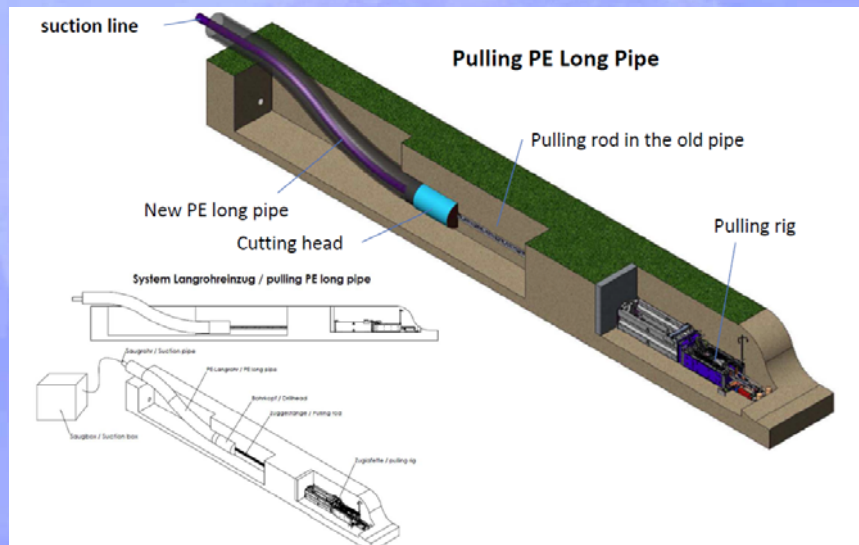


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## PRT – Pipe Replacement Technology

made  
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Germany



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## PRM – Pipe Replacement Method

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Germany



Pulling rig



Clamb system



Pulling rod



Hydraulic aggregate

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

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## High speed pipe and cable ploughing technology for open te

made  
in  
Germany



winch rope of up to 130 m length

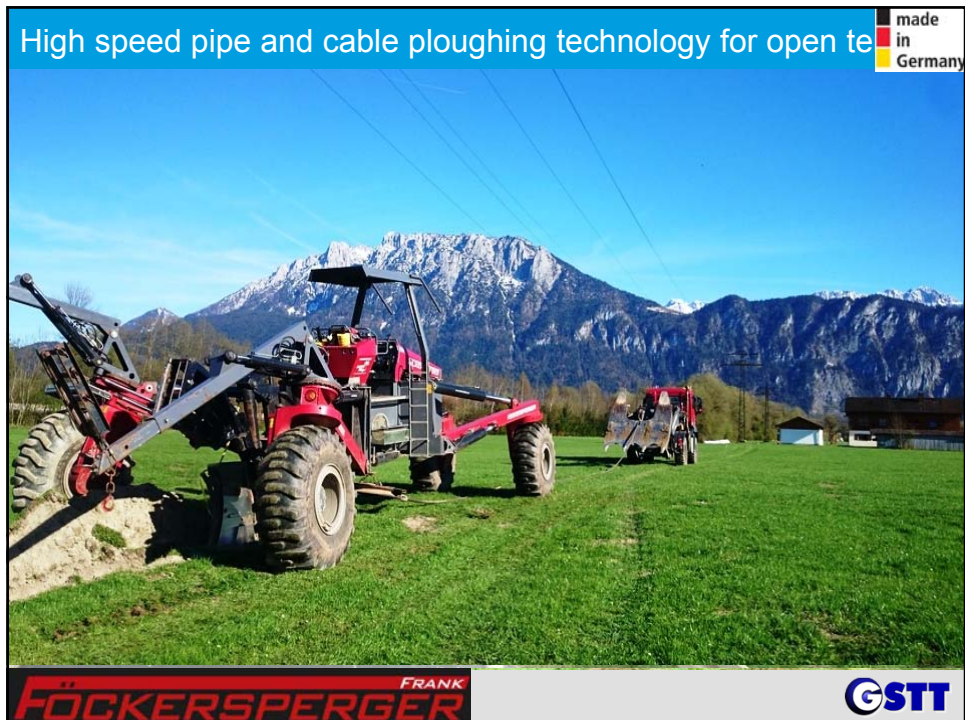
Hydraulic spider plough unit

pulling winch,  
pulling force up to 160 t

For power and broadband cables over long distances as well as **water and gas pipes** up to 355 mm Ø OD (in soft soils up to 450 mm Ø OD). Daily performance (meters installed) with a ploughing unit can **exceed 5.000 m** with only a small start and construction pit.

FRANK  
FÖCKERSPERGER

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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 flatable 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

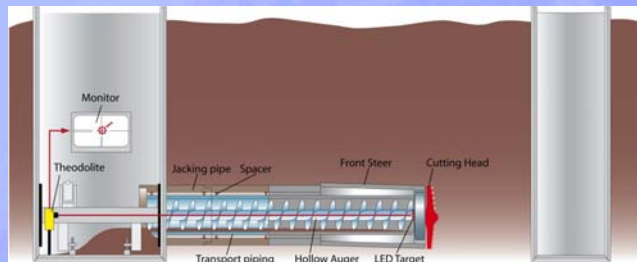


**Prime Drilling**  
HDD-Technology

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

made  
in  
Germany

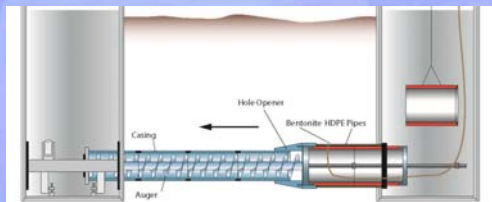


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## Hole Opener for Pulling Plastic Pipes on Line and Grade

made  
in  
Germany

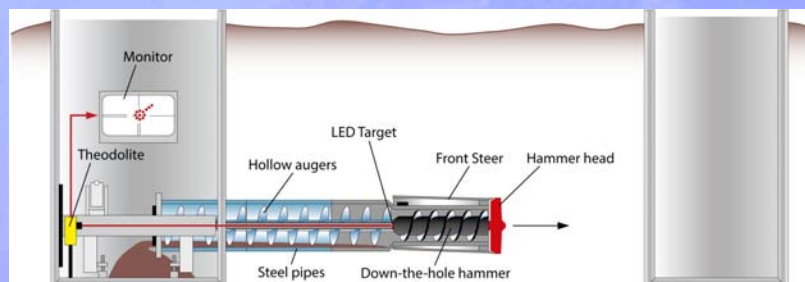


**Bohrtec**

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

made  
in  
Germany

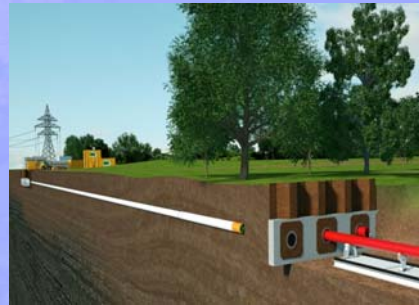


**Bohrtec**

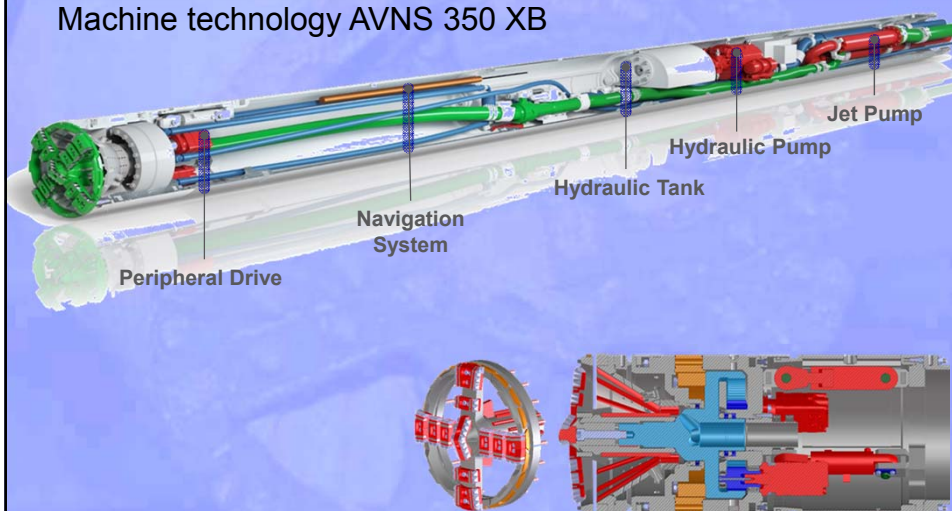
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### Requirements by Transition System Operator (TSO).

- Limited job site, construction roads, preparation area
- No heavy equipment between launch and reception point
- Steerable installation of casing pipes for AC & DC lines
- Length: 1.000m – 1.500m
- Depth: 1,5 m to 4 m, constant
- Diameter: approx. DN 250 – DN 400
- Casing material: plastic, non-conductive, e.g. PEHD
- Distance between lines: 1 m – 2 m, constant



### Machine technology AVNS 350 XB





## Trenchless underground cable construction **EPOWER PIPE** made in Germany

### Principle

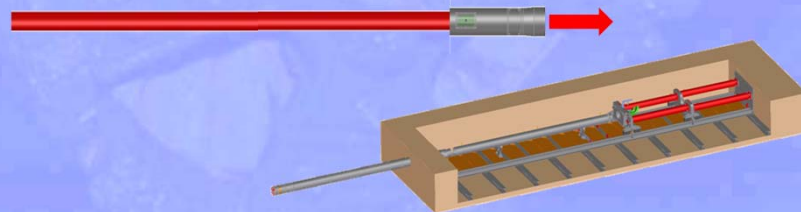
1. Pilot Bore with steel pipes



2. Removal of machine, jacking frame turned by 180°

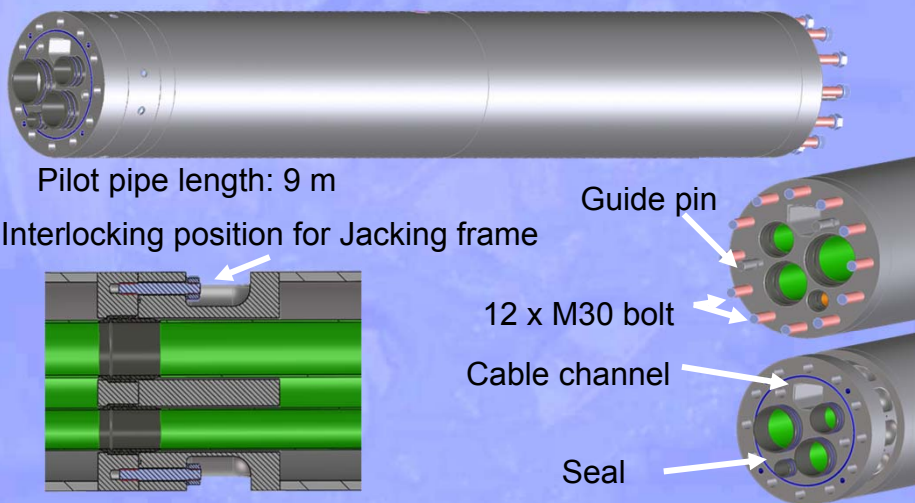


3. Mounting of a pullhead for pull-in of casing pipe



## Trenchless underground cable construction **EPOWER PIPE** made in Germany

### Steel pilot pipes & connection principle



Pilot pipe length: 9 m

Interlocking position for Jacking frame

Guide pin

12 x M30 bolt

Cable channel

Seal



## Jacking Pipes - vitrified clay pipes



### INTERMEDIATE JACKING STATION FOR VITRIFIED CLAY JACKING PIPE DN 1200

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



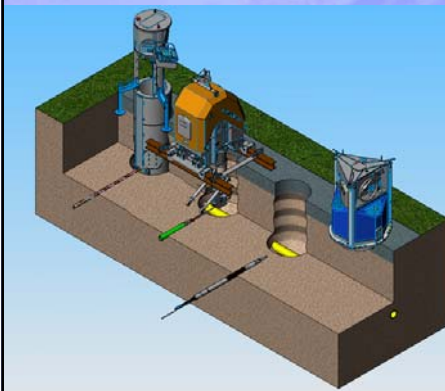
**STEINZEUG  
KERAMO**

**GSTT**

## Keyhole-Technology + Trenchless Technique



### 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.

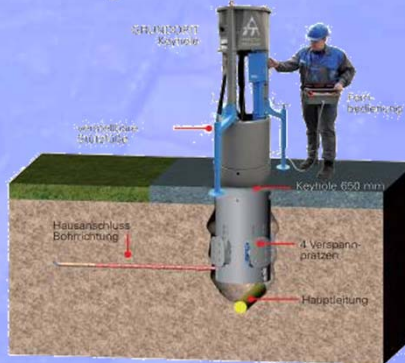


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## Keyhole-Technology + Trenchless Technique



### 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

We invite you, to visit the NO DIG BERLIN 2019 in conjunction with WATER BERLIN INTERNATIONAL.

Here you can see life the newest Trenchless Innovations from Germany



Symposium and Exhibition  
26 – 28 March 2019  
[www.NODIGBERLIN.com](http://www.NODIGBERLIN.com)  
Berlin Exhibition Grounds

2017 would transported 600  
Visitors with 15 busses to  
more than 15 sitevisites



Trenchless Innovations from Germany

**Thank you for your attention**

Dr.-Ing. Klaus Beyer  
Executive Director

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

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