Trenchless Innovations from Germany

made in Germany

Dr.-Ing. Klaus Beyer
Executive Director

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

GSTT

Trenchless Innovations from Germany

made in Germany

NO – DIG MOSCOW
26th September 2018

NO-DIG MOSCOW

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GSTT

GSTT – German Society for Trenchless Technology e.V.

made in Germany

The German Society for Trenchless Technology advocates the pioneering trenchless technology that ***combines economic efficiency and environmental protection.***

This modern approach for installing underground supply lines can be utilized for ***drinking water, wastewater, gas, heating, telecommunications*** *or* ***electricity lines****.*

GSTT's goal is to promote this modern technology that has been ***proven and tested worldwide over 30 years****. Together with international partners, GSTT is continuously working on advancing the science and the practice of trenchless technology for the public and environmental benefit.*

GSTT

ISTT – International Society for Trenchless Technology

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

Trenchless Innovations from Germany

made in Germany

- Inspection
- Repair / Renovation
- Renewal / New Construction

GSTT

Trenchless Innovations from Germany

made in Germany

- Inspection
- Repair / Renovation
- Renewal / New Construction

GSTT

CCTV-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

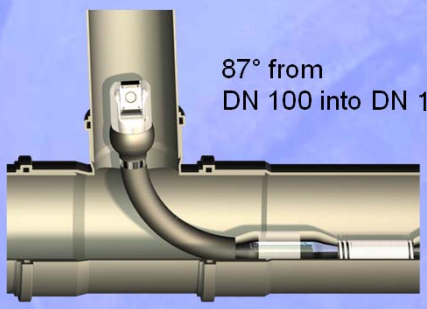
Able to negotiate bends
87˚ from DN 100

Camera diameter
56 mm.

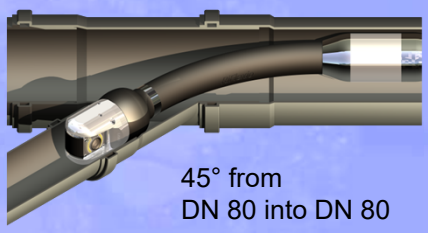
ritec GSTT

CCTV-Inspection for smal diameter HD pushing with water

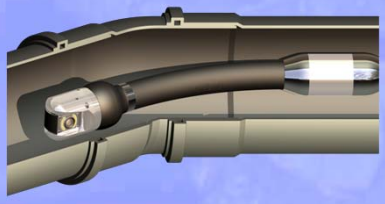
made in Germany



87° from
DN 100 into DN 100



45° from
DN 80 into DN 80



Pan & tilt camera head and
unimpeded view

ritec GSTT

CCTV-Inspection for Sewage Laterals with documentation

made in Germany

Lindauer Schere & ASYS 3D

(scissors from the German town Lindau)

- bendable pan and tilt colour camera for the holistic recording and documentation of lateral sewer
- Retractable guide device allows always a free and clear camera image
  → completely panned by
- 90° degrees and circled 360 degrees
- Inspection of branched pipe systems from DN 100 to DN 200
- Range up to 40 m in the lateral pipe (pushing technology)
- Range up to 120 m in the lateral pipe (water high pressure technology)
- **3D-seawage measurement ASYS 3D**

GSTT

CCTV-Inspection for smal diameter HD pushing with water

made in Germany

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CCTV-Inspection for Sewage Laterals with documentation

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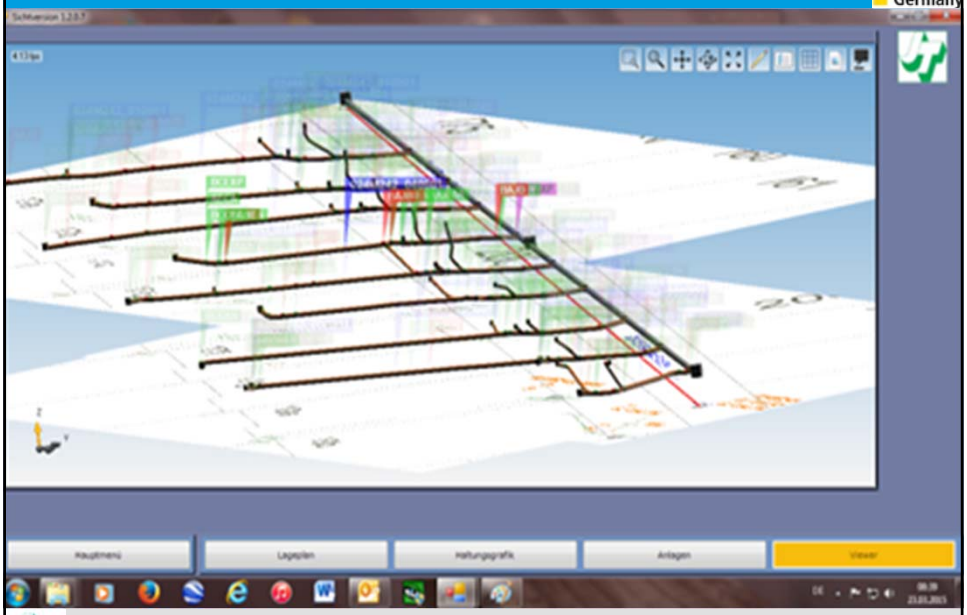

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Trenchless Innovations from Germany

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

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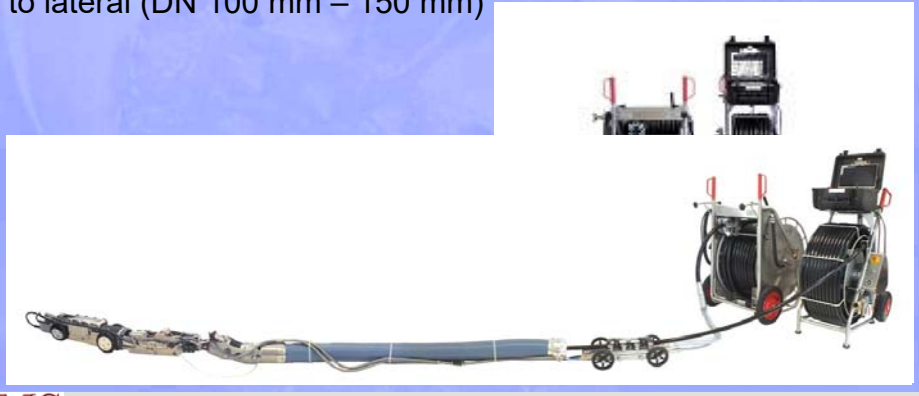
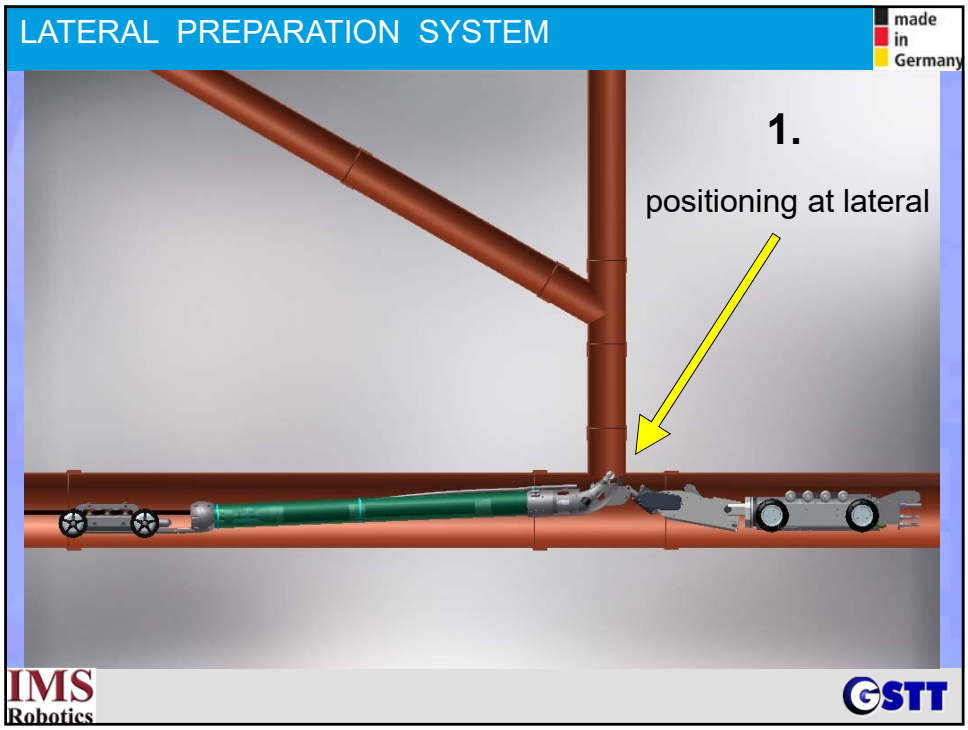
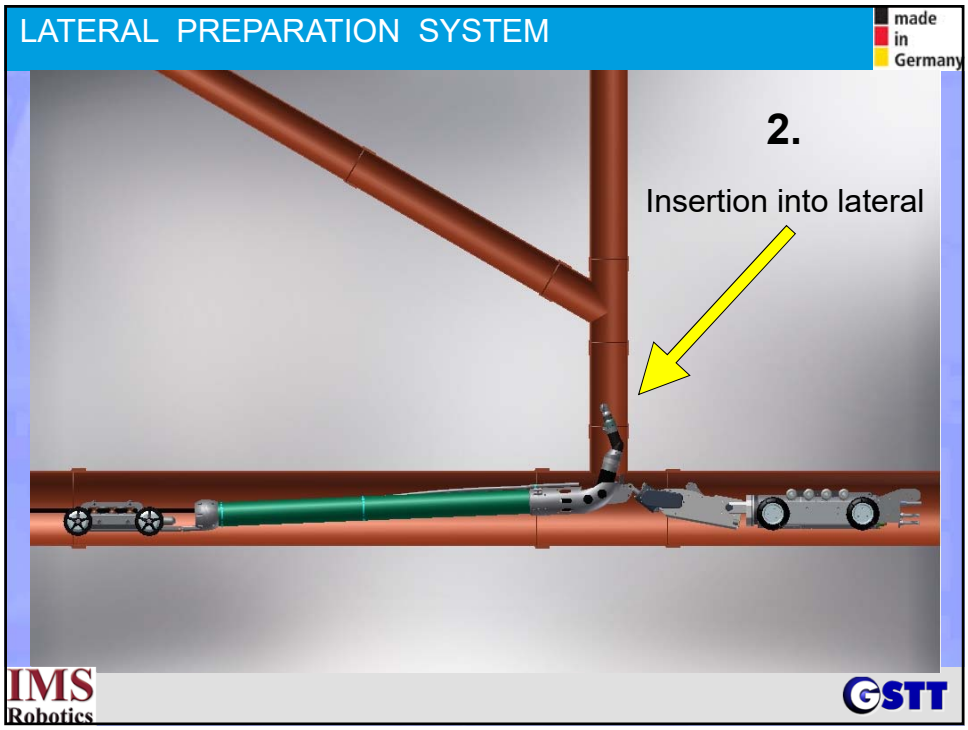


IMS Robotics

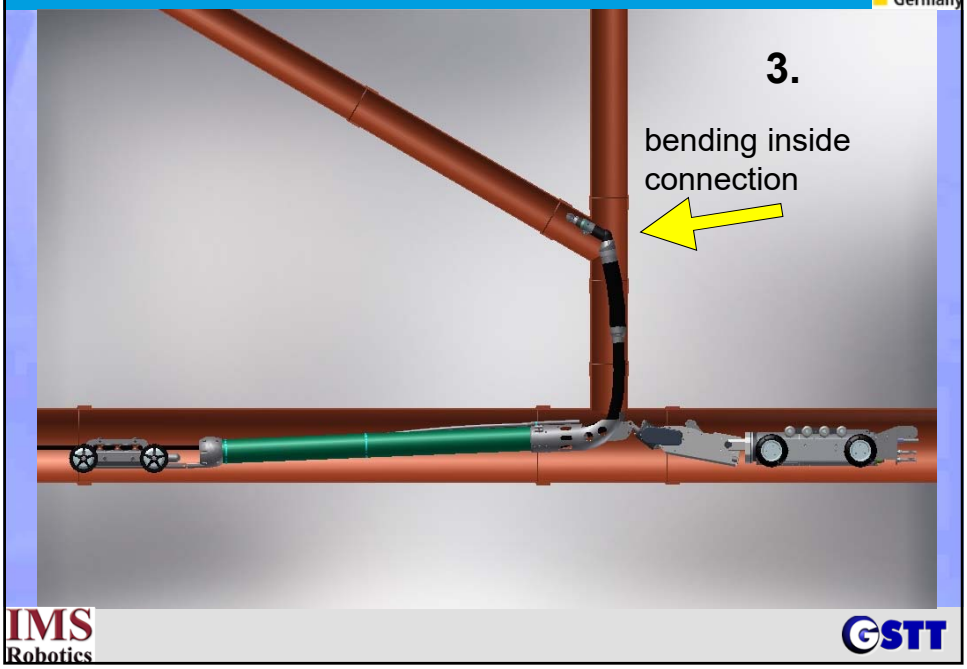
GSTT


LATERAL PREPARATION SYSTEM
made in Germany
1.
positioning at lateral
IMS Robotics
GSTT


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

LATERAL PREPARATION SYSTEM

made in Germany



IMS Robotics

GSTT

LATERAL PREPARATION SYSTEM

made in Germany

IMS Robotics

GSTT

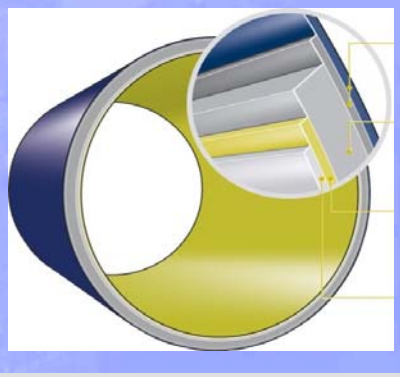
CIPP - Cured-in-place pipe rehabilitation with double wall

made in Germany

Alphaliner500G with double wall construction:

- A special, patented double wall construction
- Extremly tight, resin rich back wall with closed foil shell
- Covering of the structural load-bearing core of the Alphaliner
- Protection against environmental influences
- Perfect long-term safety
- Extension of the service life
- DIBt approval Z-42.3-447

Double wall and outer film
Structural thickness –
Statically relevant element
Defined wear protection layer
Removable inner film



RELINEEUROPE

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-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

GSTT

CIPP - Cured-in-place pipe rehabilitation of pressure pipes

made in Germany



- A new company in the RELINE UV®-Group since January 2017
- APTEC = Advanced Liner Technology for Pressure Pipes
- Development and manufacturing of UV light-curing GRP hose liner for rehabilitation of pressure mains
- Offering system solutions for no-dig rehabilitation of
  - Pressure drainage pipelines (sewerage, fire water mains, industrial and raw water)
  - Gas pipelines
  - Potable water pipelines

RELINE APTEC Advanced Liner for Pressure Pipes

GSTT

Rehabilitation of pressure pipes with The Primus Line® system

made in Germany

The Primus Line® system is a trenchless technology for the rehabilitation of pressure pipelines for different applications such as water, gas and oil.

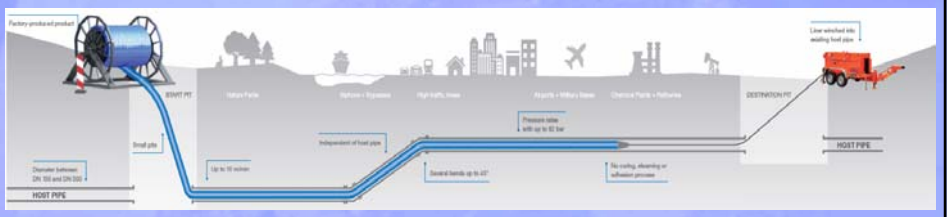
- Long installation lengths of up to 2,500 m per pull and bends of up to 45 degrees
- Pressure rates with up to 82 bar, independent from host pipe
- Small footprint and minimal equipment requirements
- Factory produced product: No curing, steaming or adhesion process
- Life span of 50 years

PRIMUS LINE

GSTT

Rehabilitation of pressure pipes with The Primus Line® system

made in Germany



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- Factory produced product: No curing, steaming or adhesion process
- Life span of 50 years

PRIMUS LINE 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!**

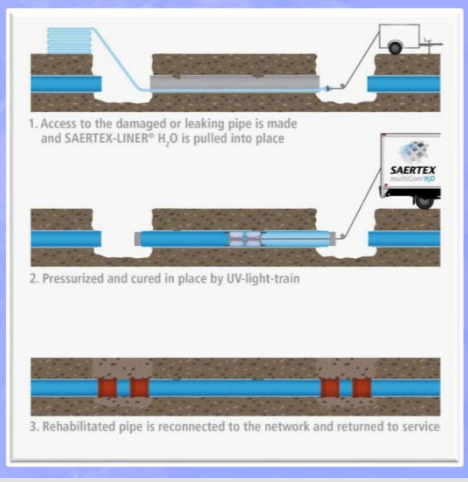
Structural classification of the Liner
- according to DIN EN ISO 11295 / AWWA M28

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.

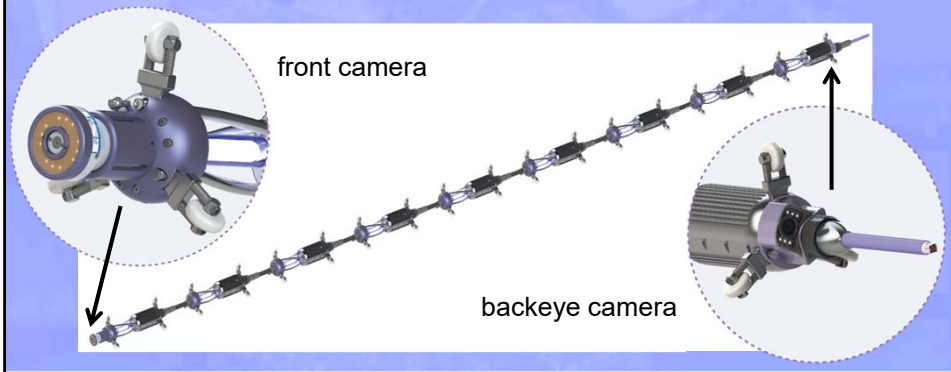


SAERTEX multiCom H2O GSTT

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.

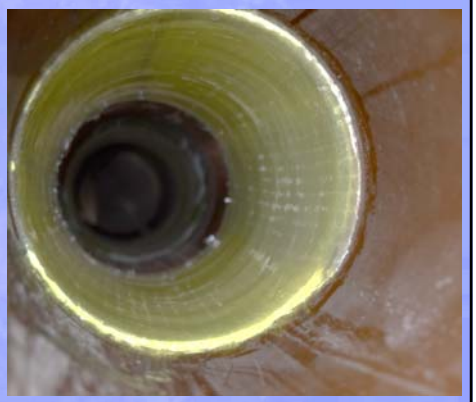


UV-Patch System for short liners

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



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.

IBG HydroTech

GSTT

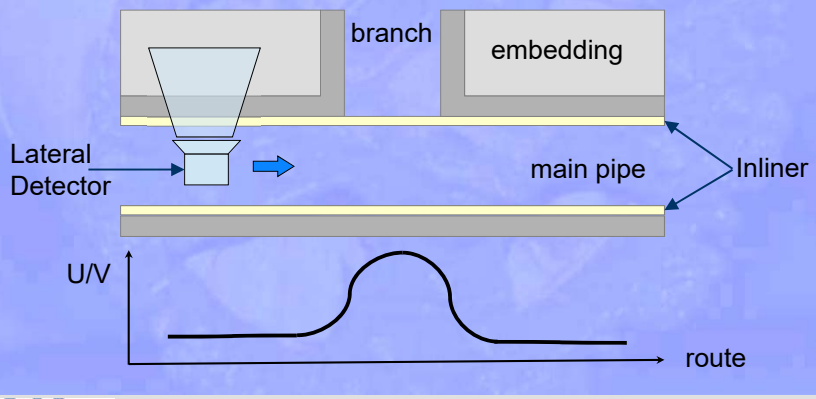
CIPP – Lateral detector

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

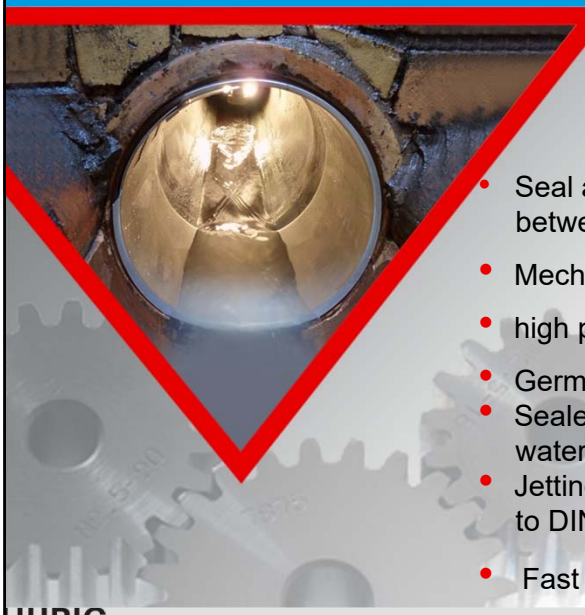
With this innovative technology it is possible to locate and cut open branches (size DN 80 or larger) to be opened after liner insertion.

IBAK robotics

GSTT

CIPP – Linerend sleeve for the connection of liner systems

made in Germany



QUICK LOCK

- Seal against residual intrusion between liner / old pipe
- Mechanical protection against
- high pressure cleaning
- German DIBt approval
- Sealed against sewer infiltration water up to 1 bar
- Jetting resistant according to DIN 19523 testing
- Fast and easy installation process

UHRIG

GSTT

Heating and Cooling with Waste Water

made in Germany

UHRIG

GSTT

Manhole rehabilitation technologies

made in Germany

cleaning equipment

HERMES TECHNOLOGIE

GSTT

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

HERMES TECHNOLOGIE

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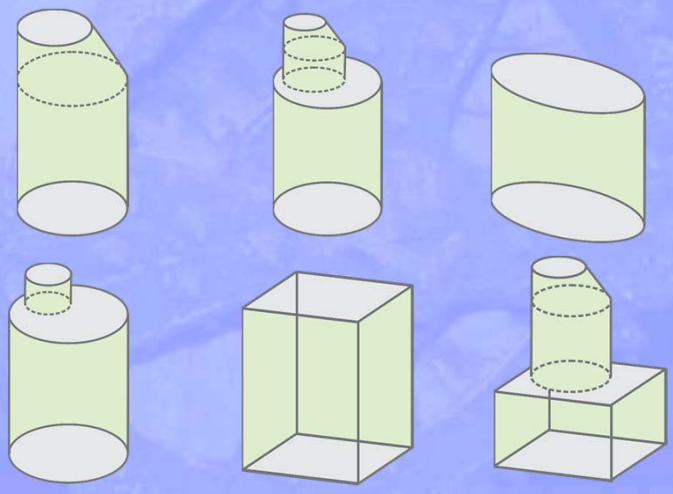
Manhole rehabilitation technologies

made in Germany

GRP – Liner with UV curing technology
in different shapes of usual manholes



VERTILINER®

GSTT

Manhole rehabilitation technologies

made in Germany

VERTILINER®

GSTT

Manhole rehabilitation technologies

made in Germany

VERTILINER®

GSTT

Trenchless Innovations from Germany

made in Germany

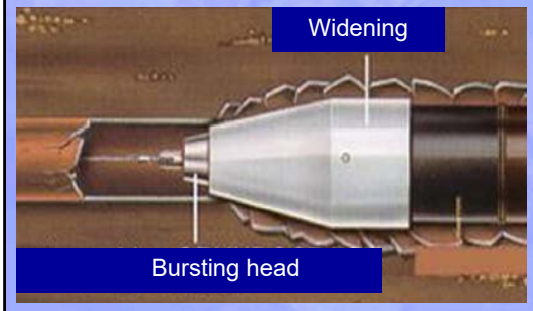
- Inspection
- Repair / Renovation
- Renewal / New Construction

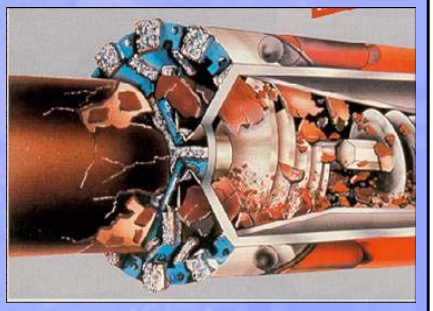
GSTT

PRM – Pipe Replacement Method

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.





pipe bursting pipe eating

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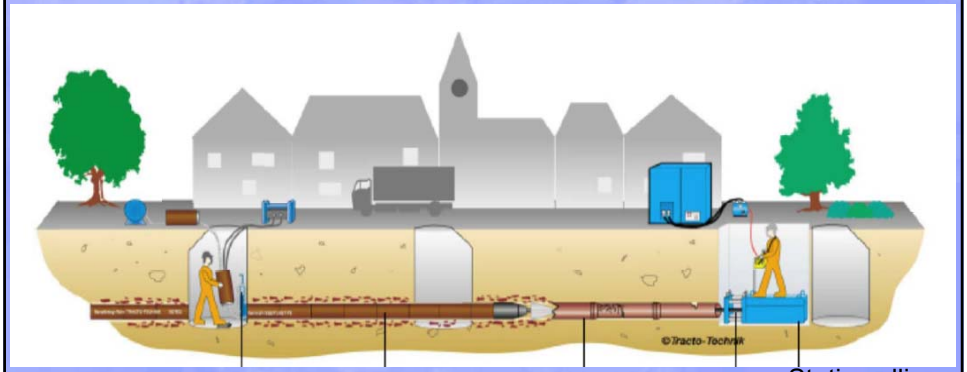
GSTT

PRM – Pipe Replacement Method

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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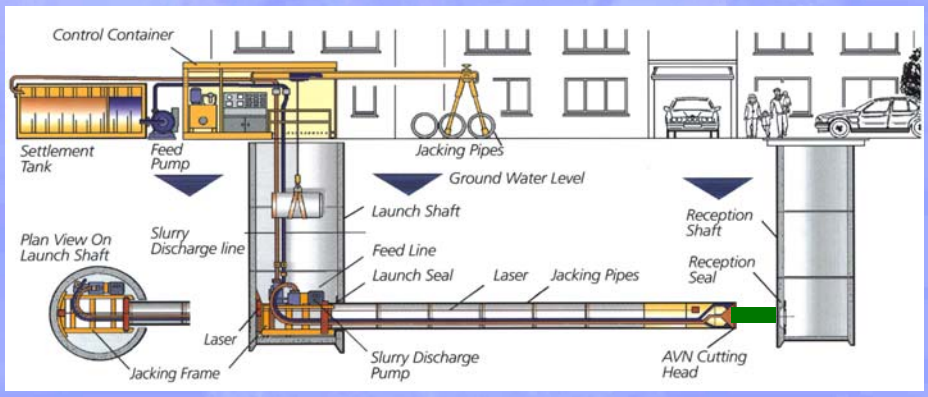
PRM – Pipe Replacement Method

made in Germany

Pipe Eating systems

technical perfected systems

…but too long construction time



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PRM – Pipe Replacement Method

made in Germany

An Example: Advance length 60 meters, d = days

<u>Pipe-eating method with slurry system:</u>
set up 3.5 d, pipe eating 6.0 d, dismantling 2.0 d Σ 11.5 d

<u>Pipe-eating method with guided auger system:</u>
set up 2.5 d, pipe eating 6.0 d, dismantling 1.5 d Σ 10 d

<u>The new Invention method with short pipes*:</u>
set up 1.0 d, pulling process 2.5 d, dismantling 0.5 d Σ 4 d
*for example polymer concrete jacking pipe

<u>The new Invention method with PE Long pipes:</u>
set up 1.0 d, pulling process 1.0 d, dismantling 0.5 d Σ 2.5 d

60 % - 80 % lower construction time!

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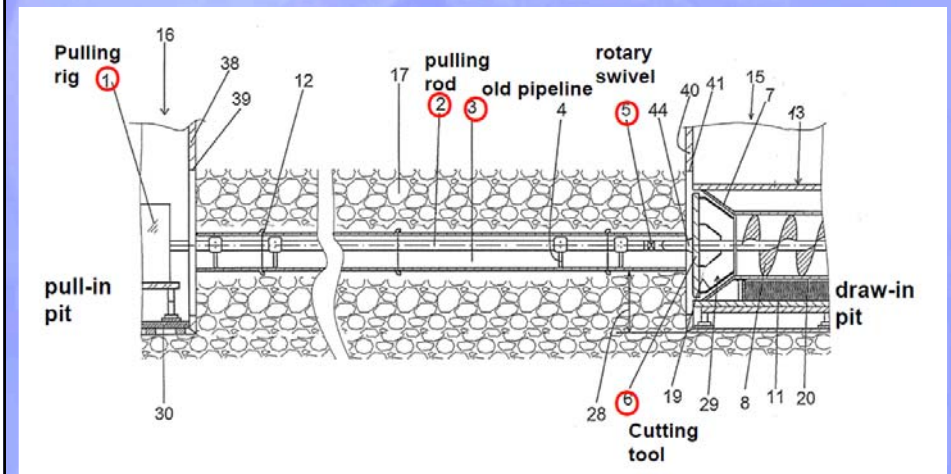
PRM – Pipe Replacement Method

made in Germany



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PRM – Pipe Replacement Method

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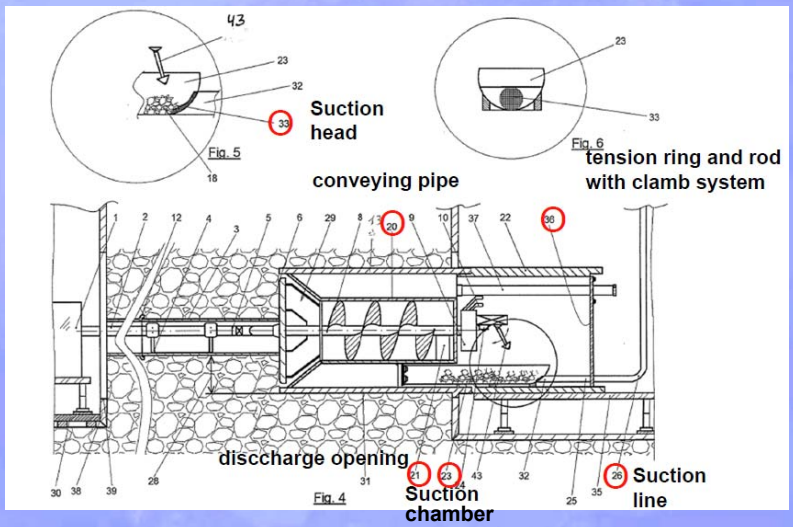

removal of drilled material is done with a suction excavator

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PRM – Pipe Replacement Method

made in Germany

PROF. HÖLTERHOFF INGENIEUR CONSULTING

Bohrtec

GSTT

PRM – Pipe Replacement Method

made in Germany

PROF. HÖLTERHOFF INGENIEUR CONSULTING

Bohrtec

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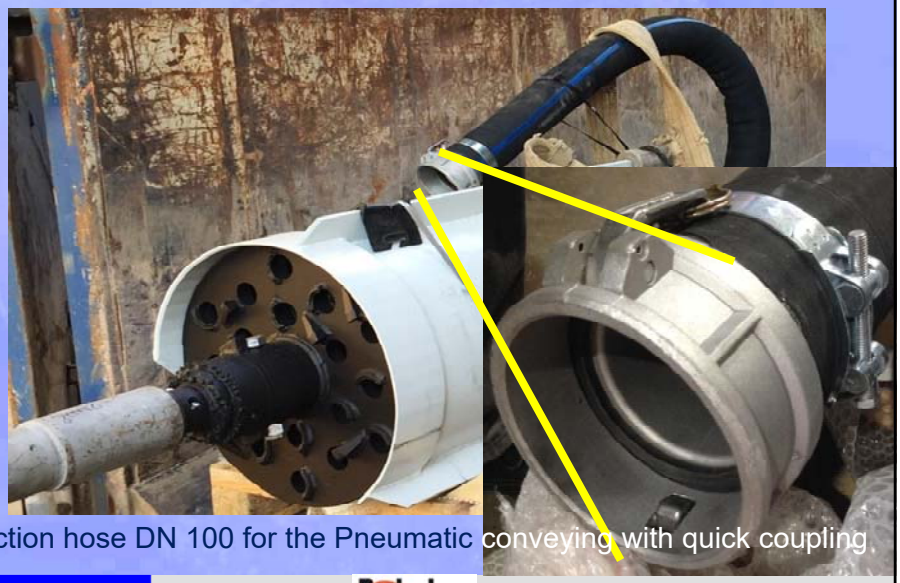
PRM – Pipe Replacement Method

made in Germany



Suction hose DN 100 for the Pneumatic conveying with quick coupling

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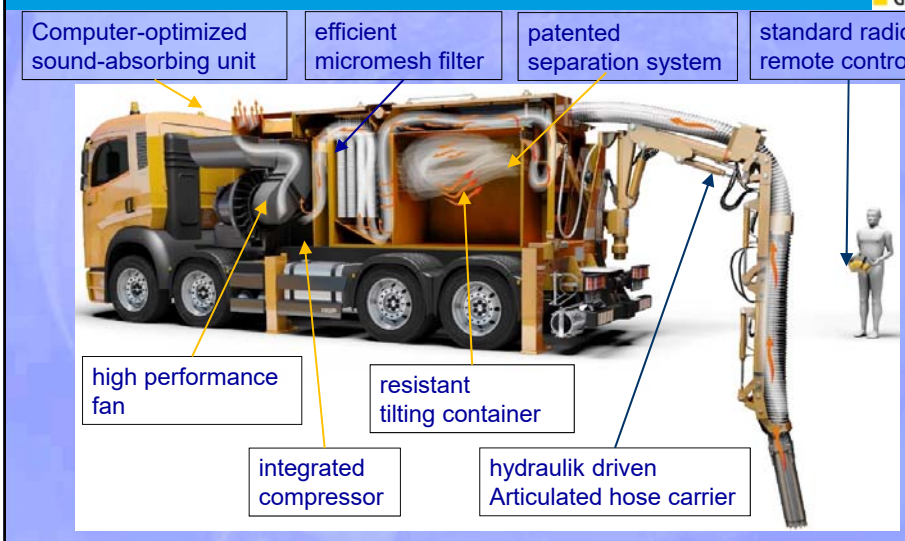
Bohrtec

GSTT

PRM – Pipe Replacement Method

made in Germany



Suction Excavator - patented suction principle

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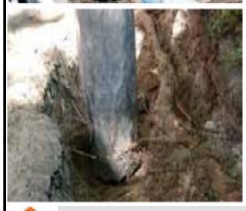
Suction Excavators – a wealth of applications

made in Germany

CIVIL ENGINEERING

DISPOSAL

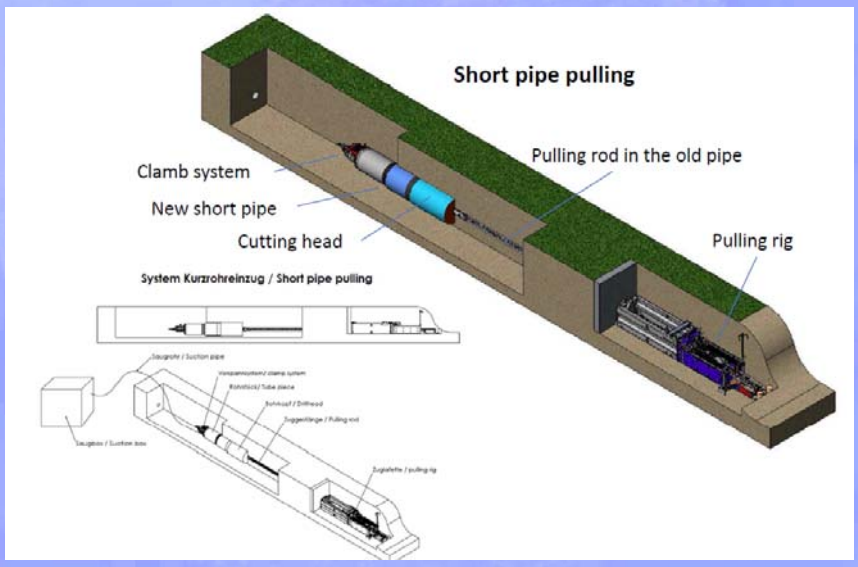


CLEANING OF FLAT ROOFS

GSTT

PRT – Pipe Replacement Technology

made in Germany



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INGENIEUR CONSULTING

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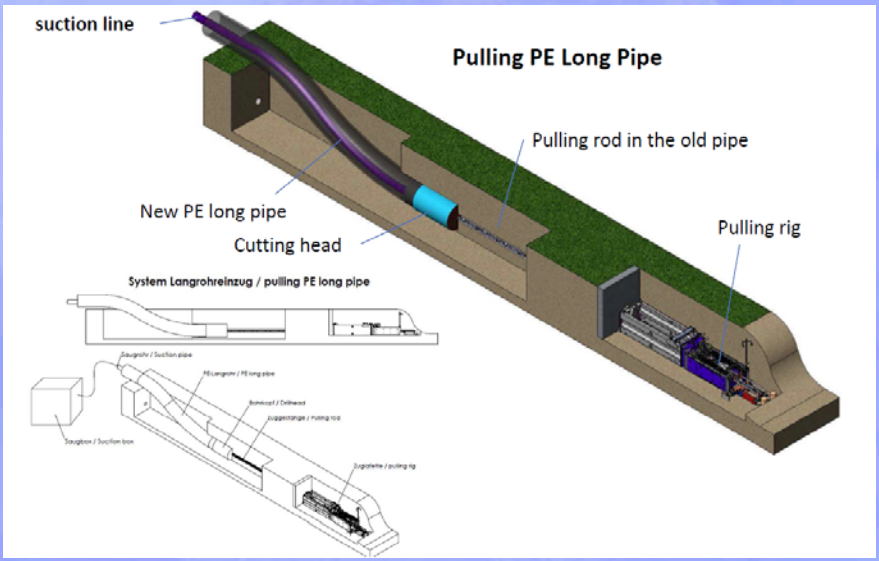
PRT – Pipe Replacement Technology

made in Germany



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PRM – Pipe Replacement Method

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.)

PROF. HÖLTERHOFF INGENIEUR CONSULTING

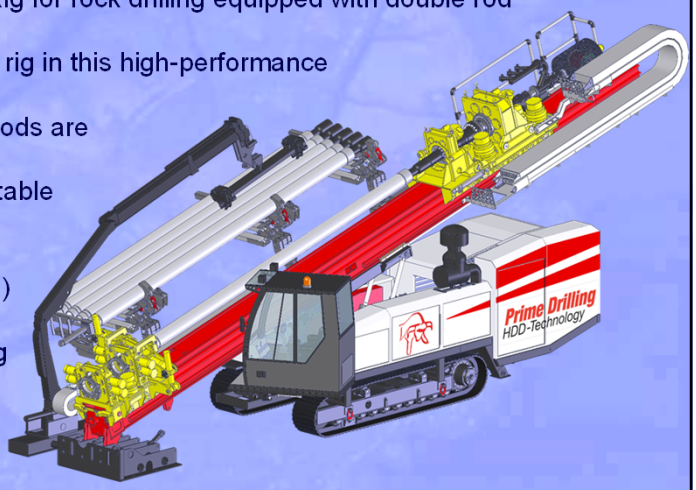
GSTT

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

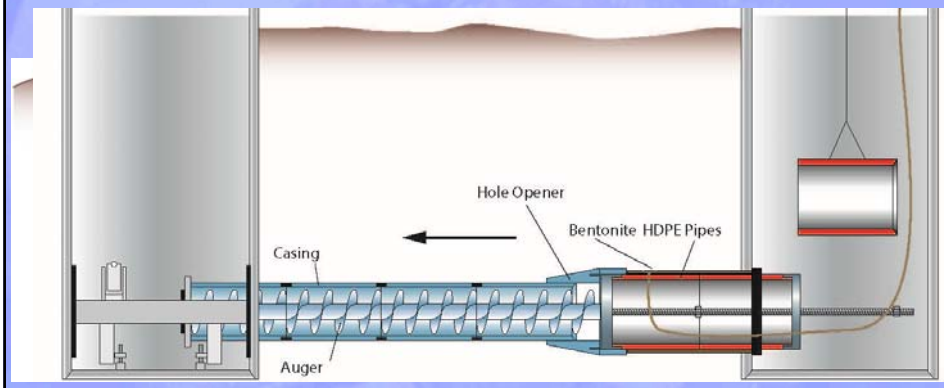
made in Germany

Prime Drilling HDD-Technology

GSTT

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

made in Germany



Bohrtec GSTT

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

made in Germany

Bohrtec GSTT

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

made in Germany

Here the construction as a pedestrian umbrella underpass

Bohrtec GSTT

Trenchless underground cable construction EPOWERPIPE

made in Germany

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

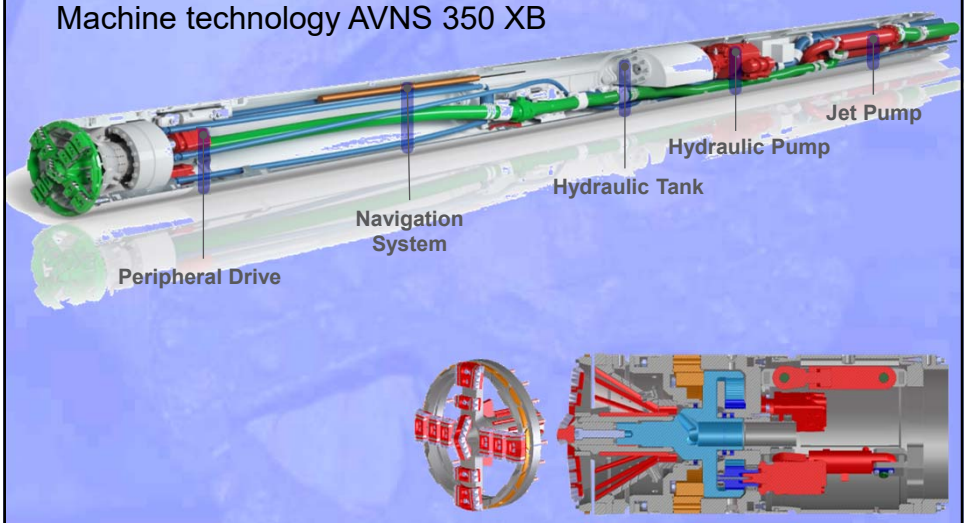
HERRENKNECHT GSTT

Trenchless underground cable construction

POWER PIPE

made in Germany

Machine technology AVNS 350 XB



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Trenchless underground cable construction

POWER PIPE

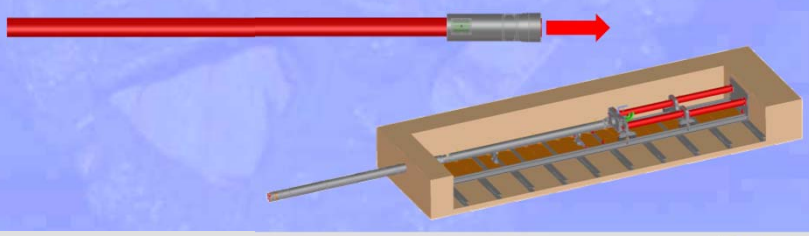
made in Germany

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



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Trenchless underground cable construction

POWER PIPE

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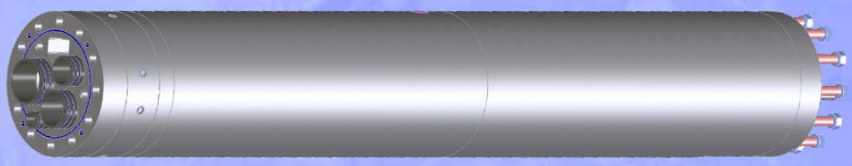
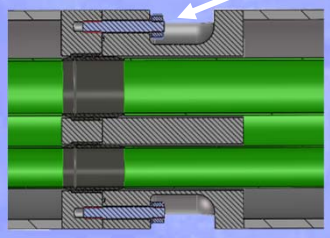
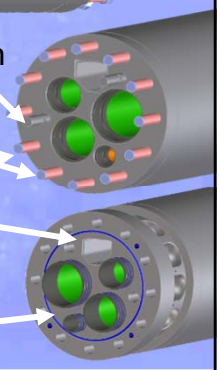
Steel pilot pipes & connection principle



Pilot pipe length: 9 m

Interlocking position for Jacking frame





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Keyhole-Technology + Trenchless Technique

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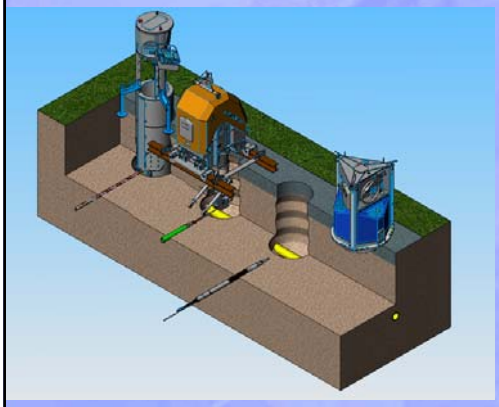
A Tiny Circle - the Construction Pit of the Future



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

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Keyhole-Technology + Trenchless Technique

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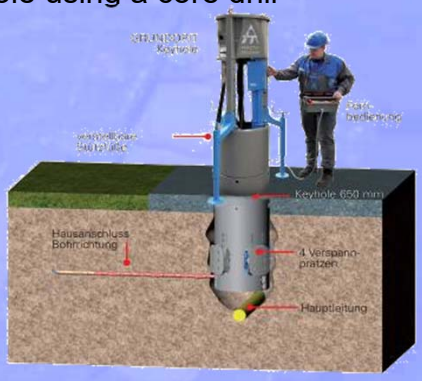
Establishing a keyhole using a core drill



- 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.

TRACTO-TECHNIK

GSTT

Trenchless Innovations from Germany

Thank you for your attention

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