

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

TRENCHLESS Romania
13th June 2019
Bucharest



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GSTT

- Inspection
- Repair / Renovation
- Renewal / New Construction

- Inspection
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- Renewal / New Construction

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**



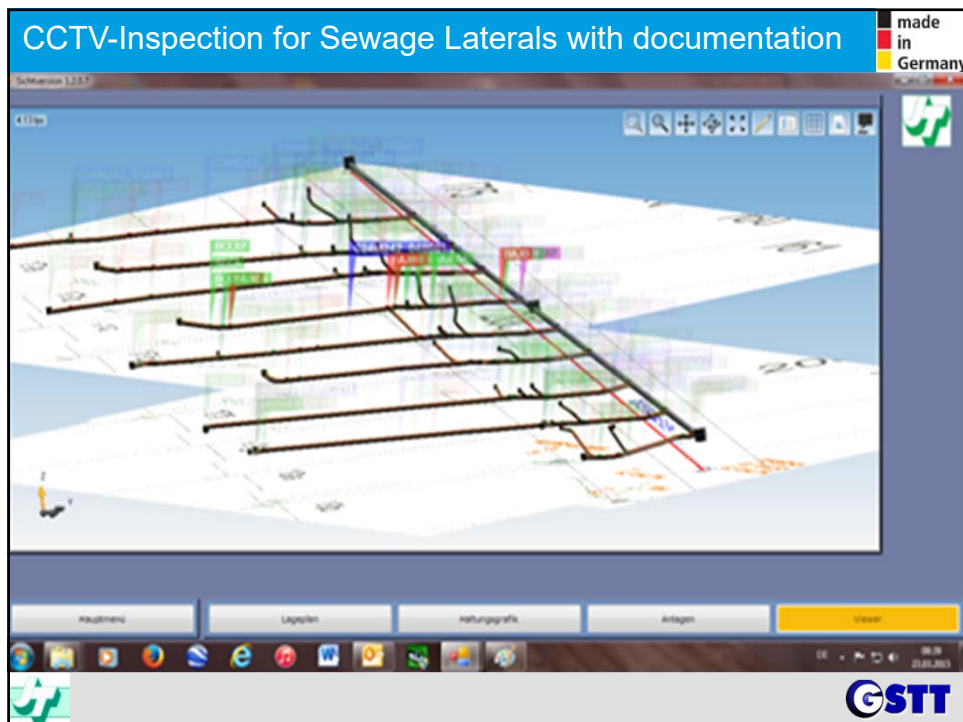
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CCTV-Inspection for small diameter HD pushing with water

made
in
Germany



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Automatic condition assessment of sewer CCTV-Inspection

made in Germany

AUZUKA

This project AUZUKA is sponsored by the Federal Ministry for Education and Research (BMBF) in the field of photonics.

Another 9 companies are involved in this project.

Automatic condition assessment of sewer CCTV-Inspection

made in Germany

This Viewer - Detection system is based on self learning artificial intelligence (AI) for image recognition .

Automatic condition assessment of sewer CCTV-Inspection

made in Germany


This Viewer - Detection system is based on self learning artificial intelligence (AI) for image recognition .


Artificial intelligence for image recognition PANORAMO ArtIST

made in Germany

This PANORAMO **ArtIST** - Artificial Intelligence System (AI)

- Assisted or automatic defects recognition
- Based on methods of artificial intelligence and PANORAMO films
- Implementation with learning computer systems (machine learning / deep learning)





IBAK


GSTT


Artificial intelligence for image recognition PANORAMO ArtIST

made in Germany

This PANORAMO **ArtIST** - Artificial Intelligence System

- 1. step: Detection and classification of connections already with very high probability
- Next steps: Detection and classification of connections already with very high probability
 - Next Send IKAS evo Films to the Cloud
 - Analysis in Cloud
 - Retrieve results
 - Processing follows in IKAS






IBAK

GSTT


Artificial intelligence for image recognition PANORAMO ArtIST 




IBAK 

LaserScan Measurement ORPHEUS 2 and 3 (HD) 

- Precise laser measurement for circular and egg-shaped profiles
- For inspection of new pipe constructions and for the preparation of the liner size selection in pipe rehabilitation
- New LaserScan deformation measurement
 - Measures profile over entire length of main sewer line
 - For pipes DN 150 and up
 - Deformation is graphically displayed on the monitor
- Data collection and analysis:
 - Rotating camera head with 2 integrated lasers when reversing the camera tractor
 - Video is recorded and saved
 - Non-evaluable areas (e.g., water in the pipe bottom) are masked out
 - Evaluation takes place in the office or in the vehicle



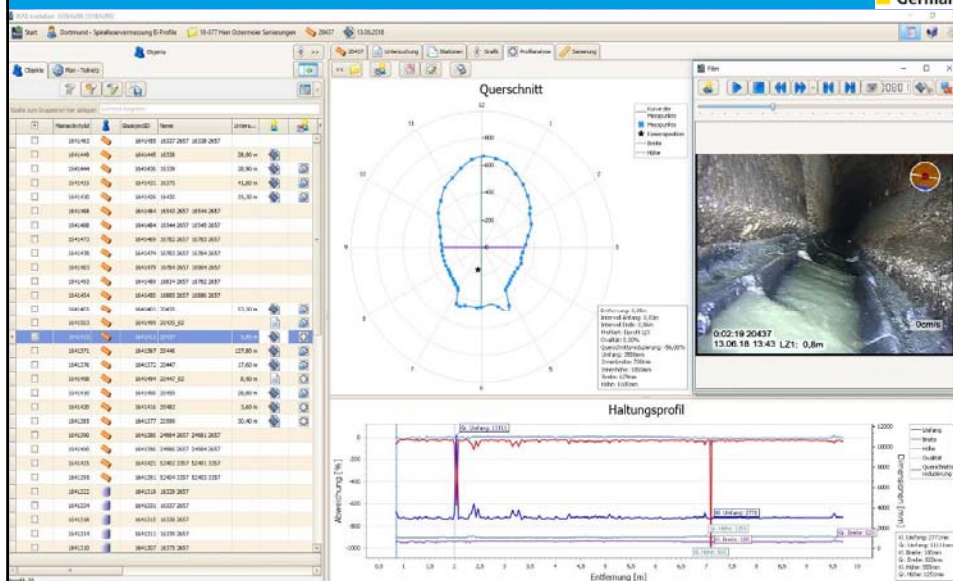
IBAK 

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Germany**

-



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Germany**



Trenchless Innovations from Germany



- Inspection
- Repair / Renovation
- Renewal / New Construction

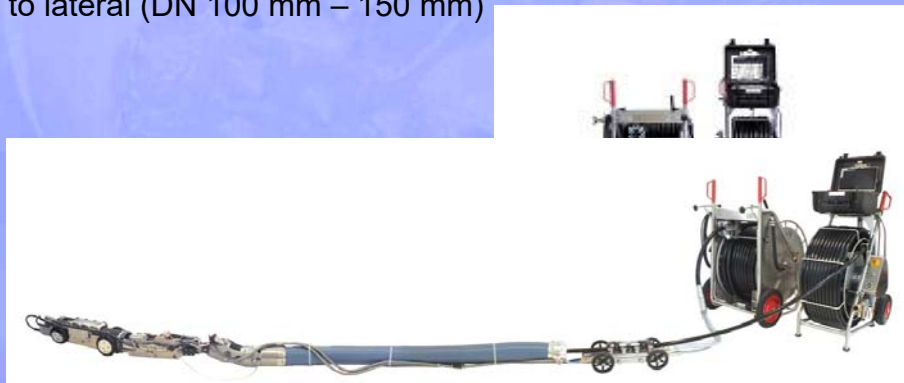


LATERAL PREPARATION SYSTEM



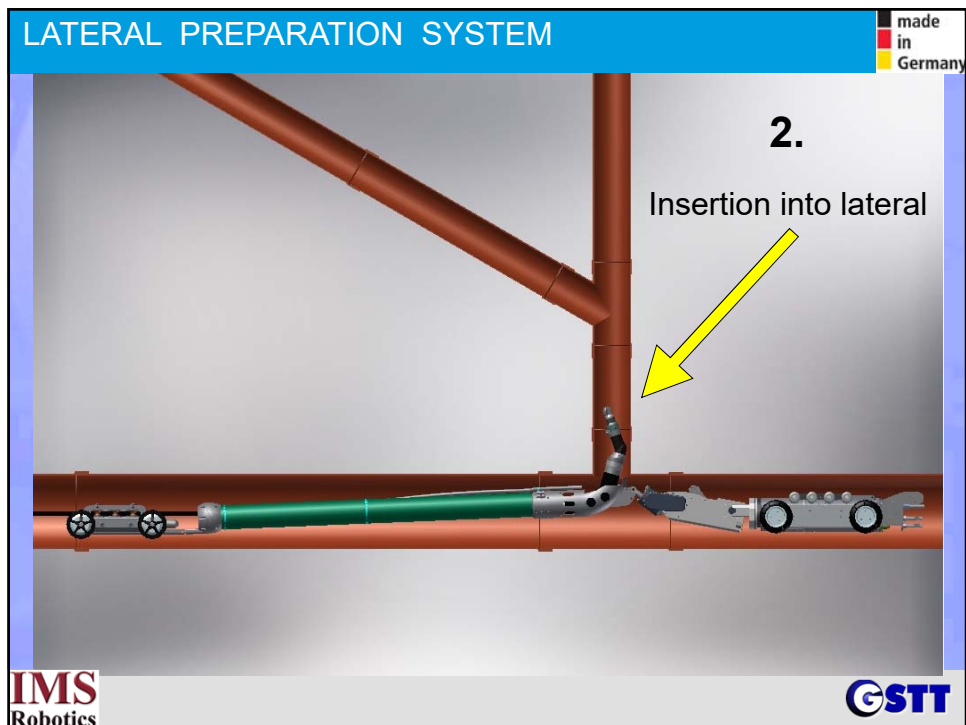
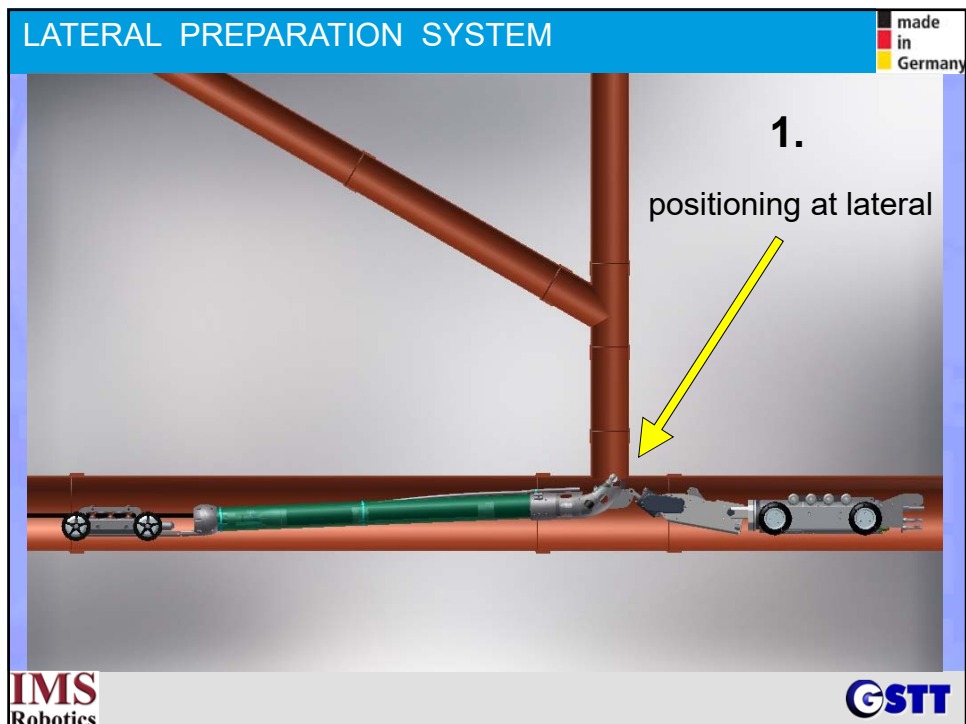
SEWER to LATERAL (STL)

2015 WOLDWIDE UNIQUE SATELLITE SYSTEM
for cutting, inspection and cleaning
from main sewer (DN 200 mm – 600 mm)
to lateral (DN 100 mm – 150 mm)

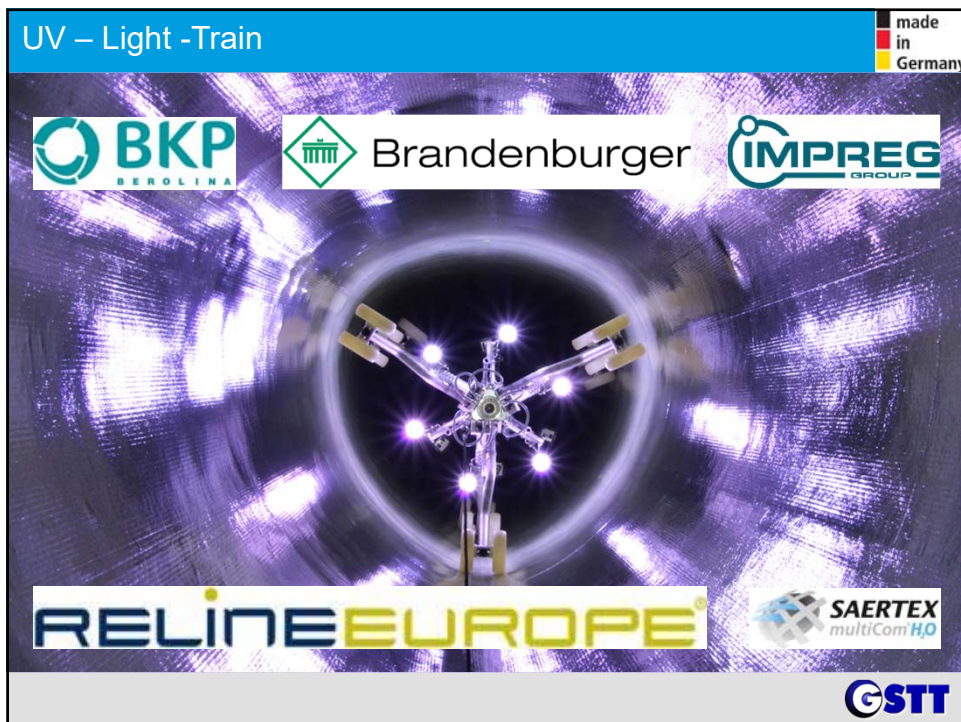


IMS
Robotics









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

made in Germany

Alphaliner500G with double wall construction:

- A special, patented double wall construction
- Extremely 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



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 |

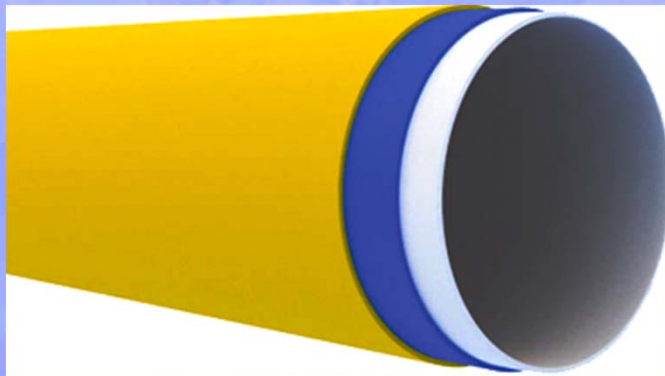
RELINEEUROPE®



iMPREGLiner GL16

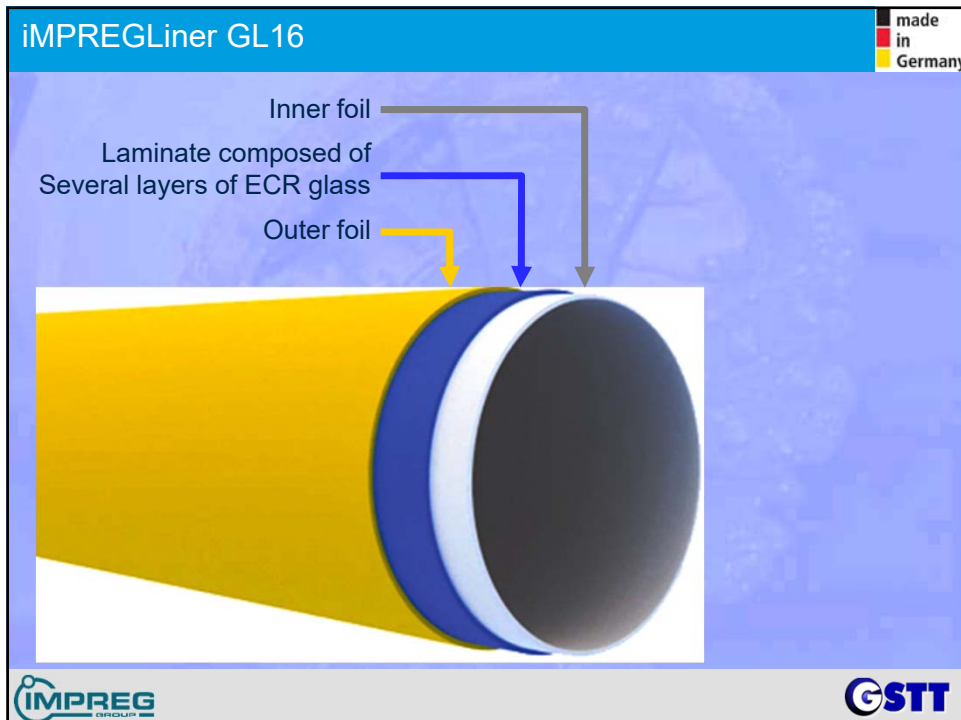


- Patented yellow outer foil protects the liner from UV rays and damage during transport
- Covers all nominal diameters from DN 150 up to DN 1600
- Profiles include: circular, egg-shaped, mouth or box, as well as special profiles
- Dimension changes within a section



iMPREG
GROUP





CIPP - UV curing technology for Drinking Water

made in Germany

SAERTEX-LINER® H₂O

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.

1. Access to the damaged or leaking pipe is made and SAERTEX-LINER® H₂O is pulled into place

2. Pressurized and cured in place by UV-light-train

3. Rehabilitated pipe is reconnected to the network and returned to service

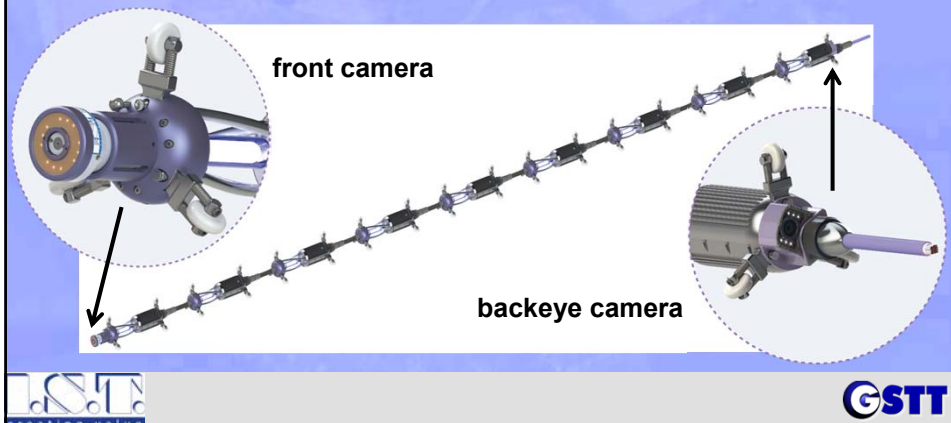
SAERTEX
multiCom H₂O

CSTT

New UV System for Renovating Drinking-water Pipelines



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.



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.



IBAK
robotics

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

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

STREET TO HOME

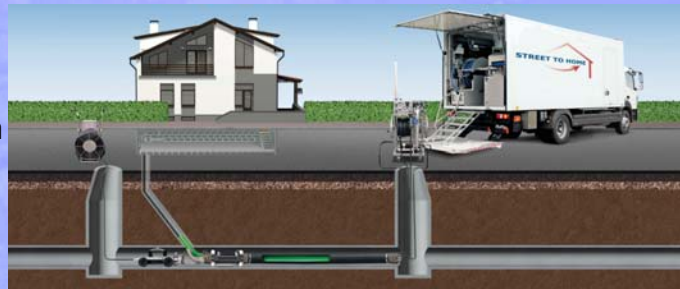
made
in
Germany

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®
Cleaning • Robotic • WPT
Lining Systems

GSTT

CIPP – Liner-end-sleeve for the connection of liner systems

made
in
Germany

DN 150 – DN 600

- 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

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



HERMES TECHNOLOGIE

GSTT

Manhole rehabilitation technologies

made in Germany

motor coating

M-Coating after partial coating with ERGELIT



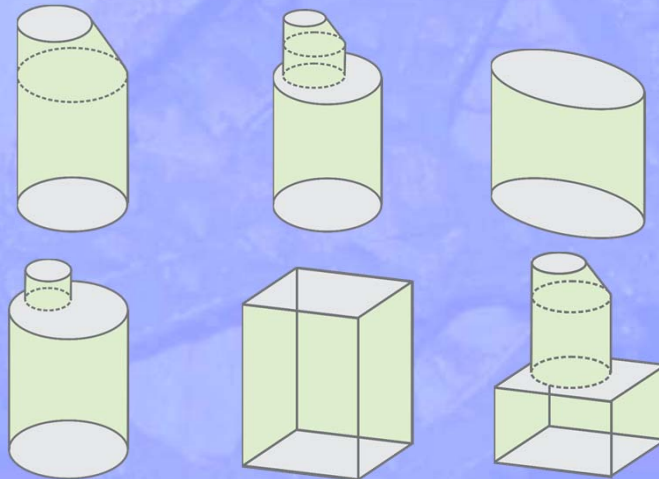
HERMES TECHNOLOGIE

GSTT

Manhole rehabilitation technologies

made
in
Germany

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



VERTILINER®

CSTT

Manhole rehabilitation technologies

made
in
Germany



VERTILINER®

CSTT

Manhole rehabilitation technologies

made
in
Germany



VERTILINER®

GSTT

Manhole rehabilitation technologies

made
in
Germany

UV curing GFR manhole liner quick rehabilitation in 4 hours



Brandenburger

GSTT

Manhole rehabilitation technologies



Manhole rehabilitation with a flexible material – covers the manhole bottom

Endless production for DN 600 – 1000 and up to DN 1000 - 1600



Brandenburger

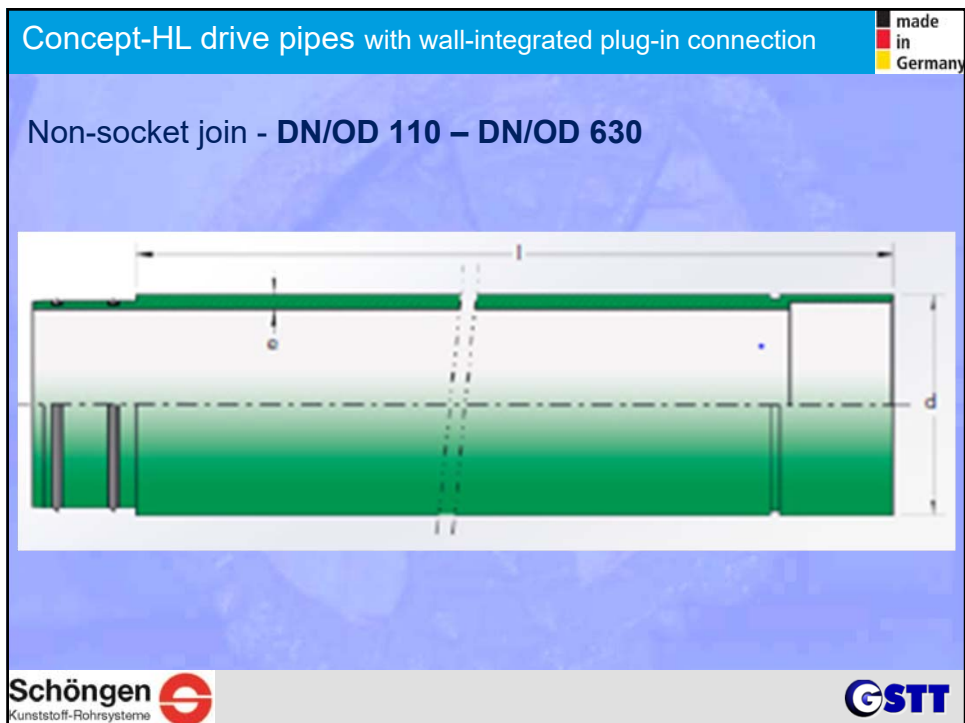
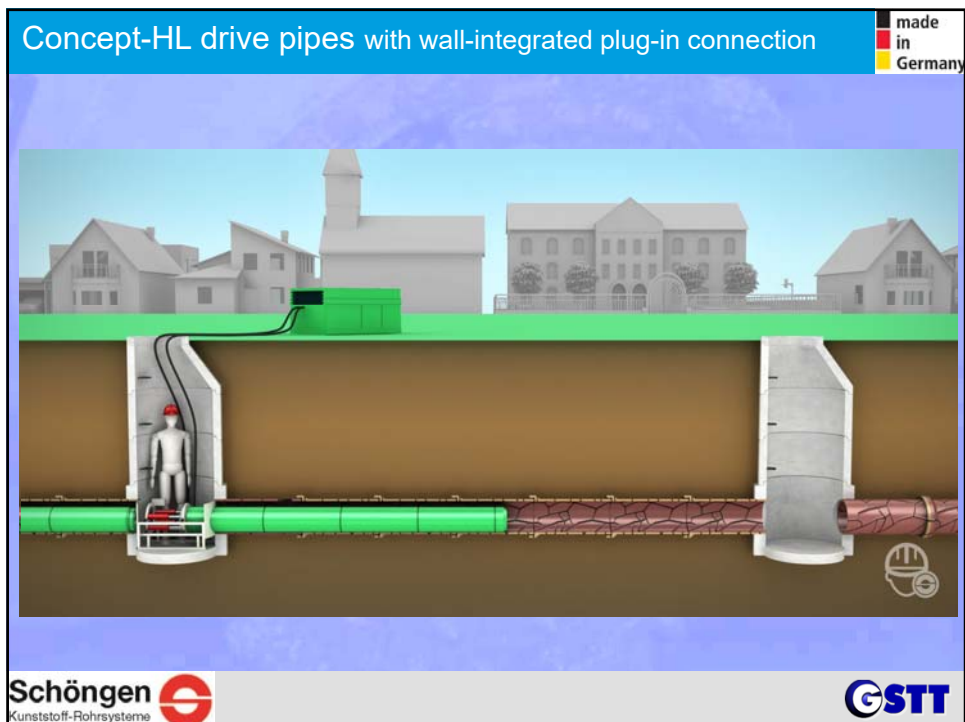


Trenchless Innovations from Germany



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Concept-HL drive pipes with wall-integrated plug-in connection

made in Germany

Multi-grid type welded connection - **DN/OD 180 – DN/OD 630**

Schöngen Kunststoff-Rohrsysteme

GSTT

Concept-HL drive pipes with wall-integrated plug-in connection

made in Germany

Multi-grid type connection - **DN/OD 110 – DN/OD 630**


Schöngen Kunststoff-Rohrsysteme

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Concept-HL drive pipes with wall-integrated plug-in connection

made in Germany

High tensile grid typeconnection - DN/OD 160 – DN/OD 630



Schöngen Kunststoff-Rohrsysteme

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Dry Suction Excavator - patented suction principle

made in Germany

Computer-optimized sound-absorbing unit

efficient micromesh filter

patented separation system

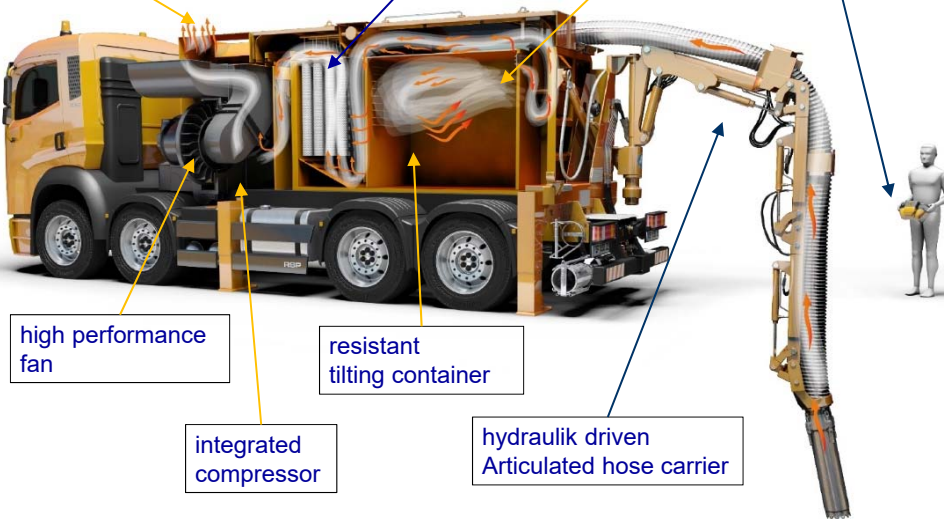
standard radio remote control

high performance fan

resistant tilting container

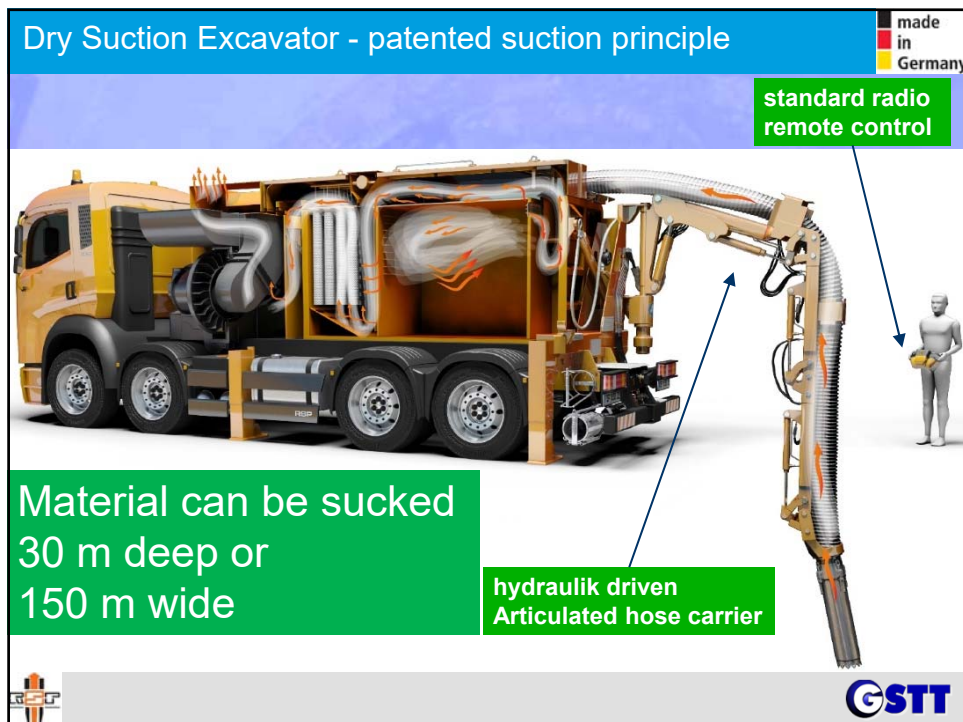
integrated compressor

hydraulik driven Articulated hose carrier



RGF

GSTT



Dry Suction Excavator - dump material

made
in
Germany



GSTT

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

GSTT

High speed pipe and cable ploughing technology for open te

made in Germany

FRANK FÖCKERSPERGER

GSTT

HDD - Rock Drilling Rig

made in Germany

with Prime Double Rod System and „on board“ pump

Prime Drilling HDD-Technology

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
- high torque at the casing (up to 90 kNm)
high torque at drill pipe (up to 35 kNm)
- Use of any common locating system possible
- Application with standard drill pipes



Prime Drilling
HDD-Technology

GSTT

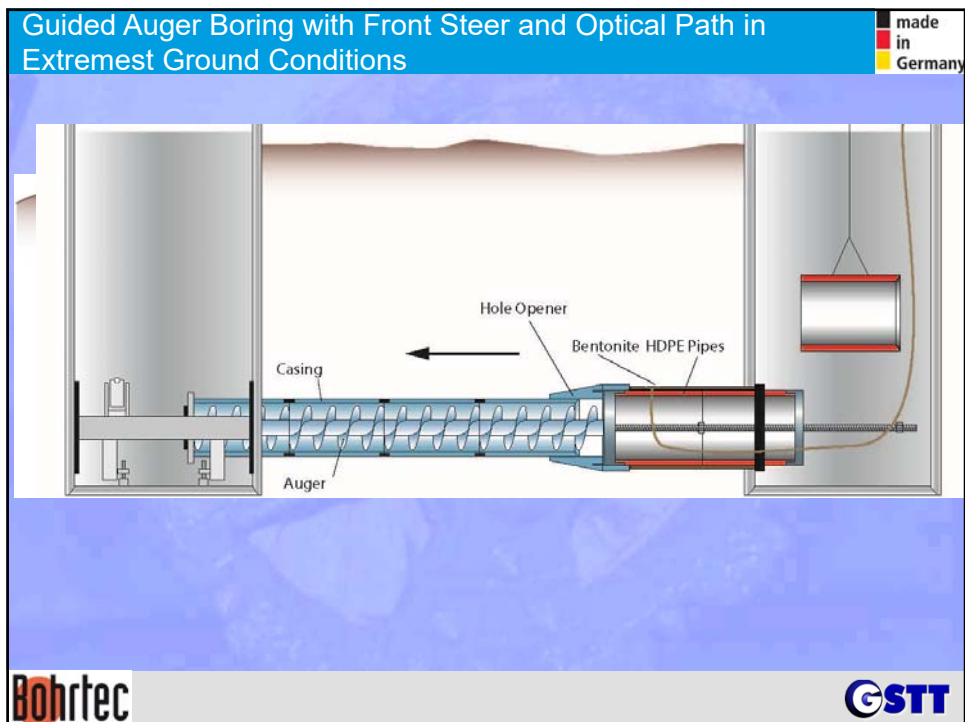
HDD - Rock Drilling Rig

made
in
Germany



Prime Drilling
HDD-Technology

GSTT



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

made
in
Germany

Here the construction as a pedestrian umbrella underpass



Bohrtec

GSTT

Trenchless underground cable construction **LEPOWER PIPE**

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



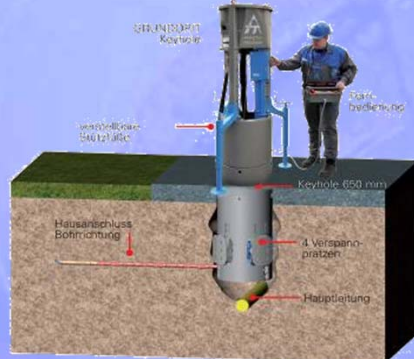
HERRENKNECHT
Trenchless Technology

GSTT

Keyhole-Technology + Trenchless Technique

made
in
Germany

A Tiny Circle - the Construction Pit of the Future



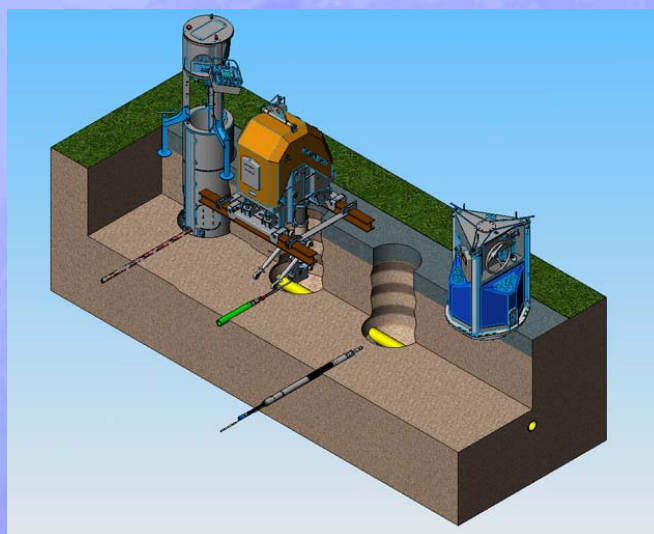
- the core drill CD 650 bores a hole of 650 mm in diameter in the road surface.
- after all other jobs are done, the bore core yielded in this working step is reinserted into the road surface, fitting perfectly.
- a suction excavator takes up the soil covering the main line
- installation of the Pit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



Keyhole-Technology + Trenchless Technique

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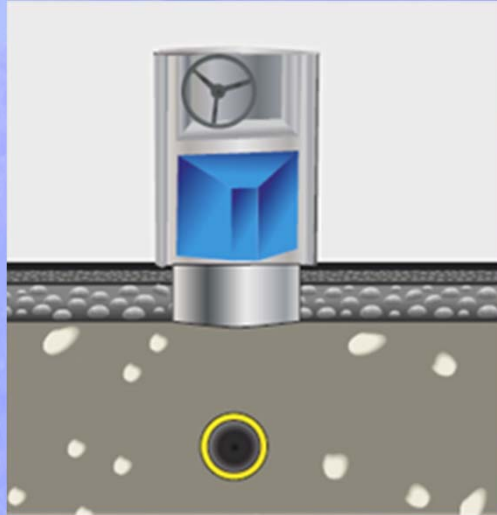
A Tiny Circle - the Construction Pit of the Future



Keyhole-Technology + Trenchless Technique

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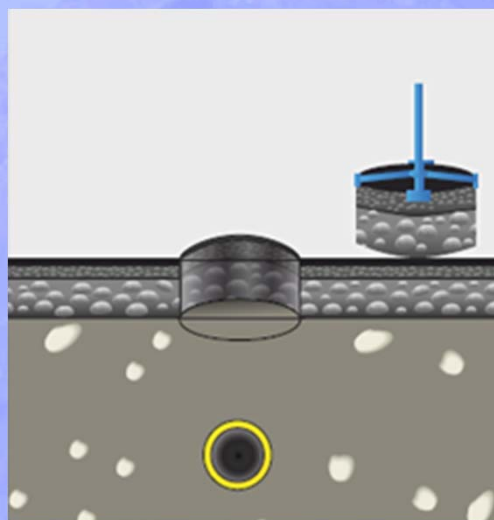
Creating the core bore with core drill unit



Keyhole-Technology + Trenchless Technique

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Germany

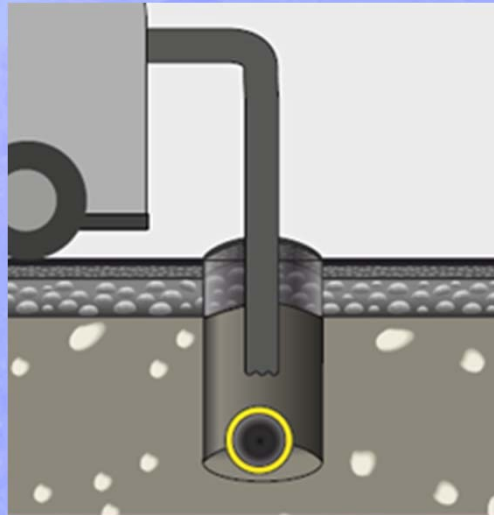
Removing the core



Keyhole-Technology + Trenchless Technique

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Germany

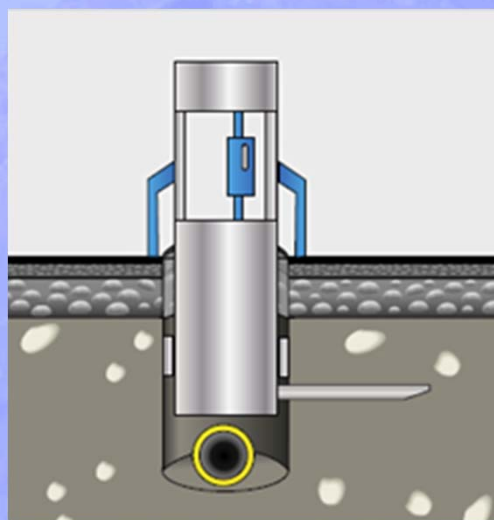
Extracting the keyhole



Keyhole-Technology + Trenchless Technique

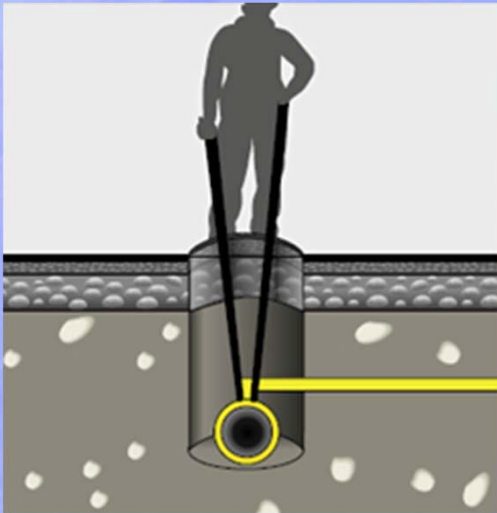
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HDD drilling and pipe pulling



Keyhole-Technology + Trenchless Technique

Installation work with LongHandled Toolings (LHT)



The diagram illustrates the installation of a new pipe using LongHandled Toolings (LHT). A worker stands on the ground surface, operating a long-handled tool that is inserted into a vertical access shaft. The tool is used to pull a yellow pipe segment from the ground into the existing underground pipe. The ground is shown with a gravel layer and a soil layer containing stones. The existing pipe is shown as a dark tunnel.

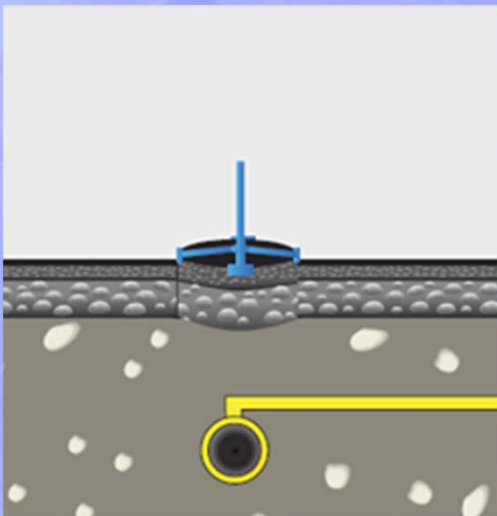
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TT
TRAKTO-TECHNIK

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Keyhole-Technology + Trenchless Technique

Reinstatement



The diagram illustrates the reinstatement of a pipe using Keyhole-Technology. A vertical access shaft is shown with a blue tooling head at the surface. The tooling head is used to pull a yellow pipe segment from the ground into the existing underground pipe. The ground is shown with a gravel layer and a soil layer containing stones. The existing pipe is shown as a dark tunnel.

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Keyhole-Technology + Trenchless Technique

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A Tiny Circle - the Construction Pit of the Future



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TRACTO-TECHNIK

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Thank you for your attention

Dr.-Ing. Klaus Beyer
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