



**37TH INTERNATIONAL
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FLORENCE 2019**

Fortezza da Basso • FLORENCE (Italy)

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HDD-Drilling in hard and hardest Rock in Europe – examples of job sites

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HDD drilling in hard and hardest rock in Europe – examples of job sites



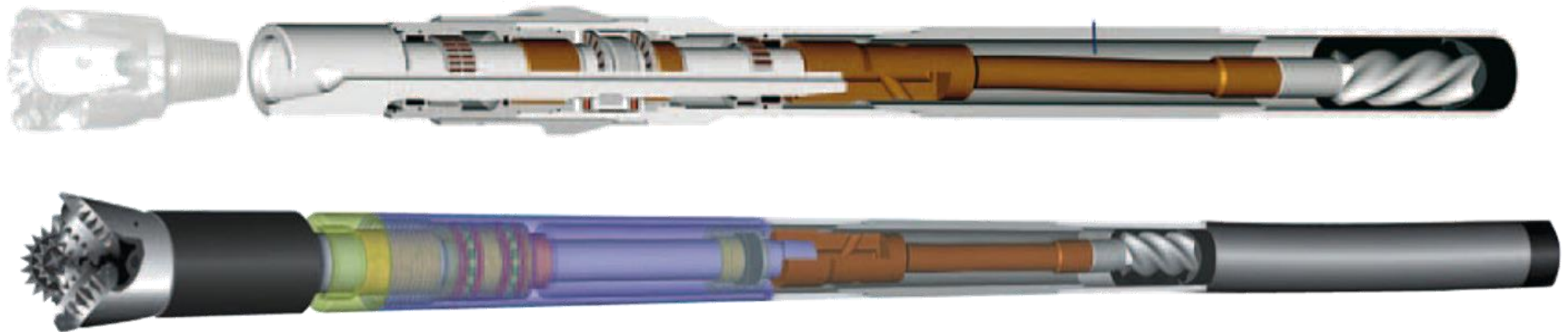
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**Big differences
in ground and
even much
more
differences in
hard rock
itself**

HDD drilling in hard and hardest rock in Europe – examples of job sites

Mud Motors from Tracto-Technik, Type Grundorock



HDD drilling in hard and hardest rock in Europe – examples of job sites



HDD Hole opener in operation in Postojna



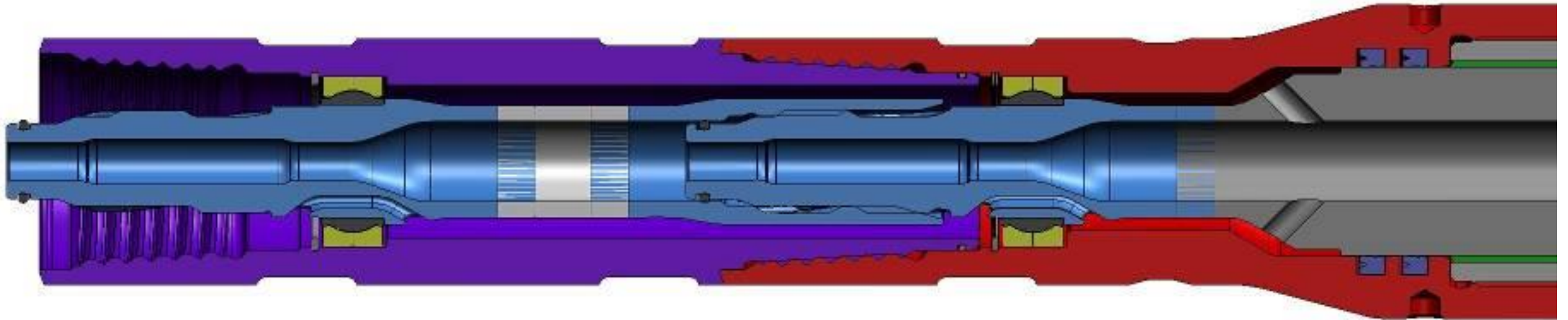
HDD drilling in hard and hardest rock in Europe – examples of job sites



**Grundodrill 18 ACS with
double rod
technology**

HDD drilling in hard and hardest rock in Europe – examples of job sites

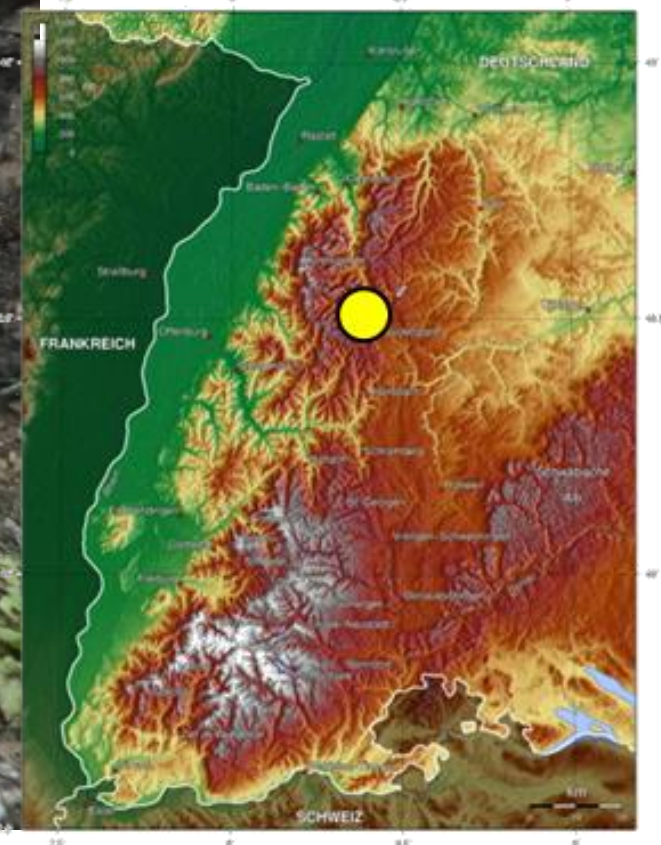
**All condition HDD system with patented and special double rod construction:
Power by internal rod system, steering and protection by external rod system.**



HDD drilling in hard and hardest rock in Europe – examples of job sites

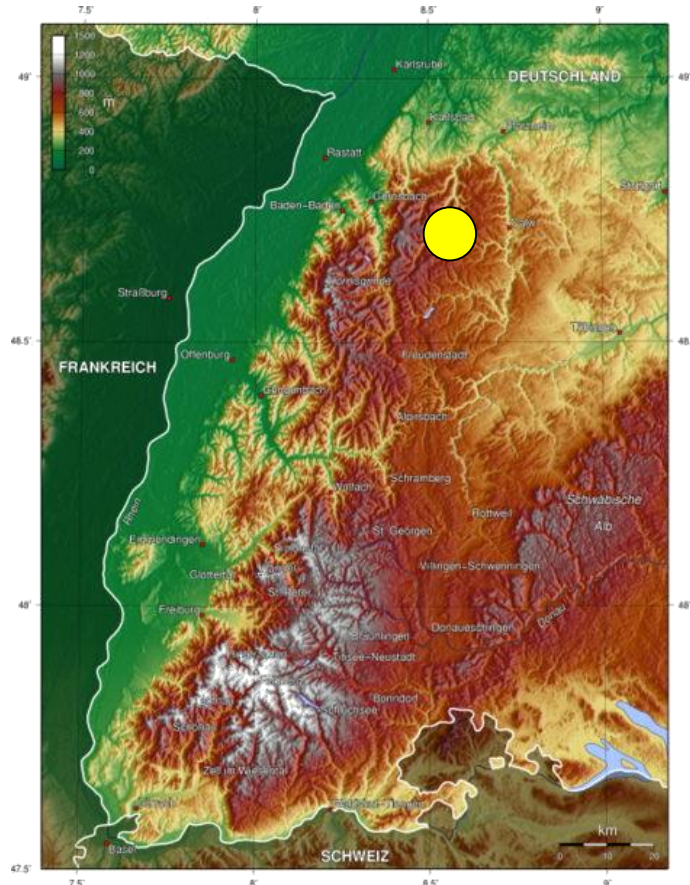


**Rockbreaker Drillhead for
18 ACS**



HDD drilling in hard and hardest rock in Europe – examples of job sites

Crossing a Gorge using an Grundodrill 25 N and a Mud Moter 375 in Schwarzwald (North)



- Narrow field conditions
- Upper mottled sandstone, Compressive strength up to 220 MPa
- Length 144m
- Roller chisel 517, diameter 4-3/4"
- 3 PE-HD-pipes 90mm bundled
- Height difference appx. 26m

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Crossing a Gorge using a
Grundodrig 25 N and a TT
Mud Motor 375 in
Schwarzwald (North)**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Crossing a Gorge using a
Grundodrill 25 N and a TT
Mud Moter 375 in
Schwarzwald (North)**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Same situation
from an other
perspective**

HDD drilling in hard and hardest rock in Europe – examples of job sites



Hard rock drilling in the City of Freiberg, capital of former silver mining in Germany

Job site data

Place: Freiberg in Saxonia

Soil: Gneiss rock with 250 MPa!
(very hard)

Bores: 2 parallel drillings with 138 m length below
multiple railway lines for 20kV earth cables

Machine: Grundodrill 20 S machine with a Grundorock 3
 $\frac{3}{4}$ " mud motor and 10" hole opener

HDD drilling in hard and hardest rock in Europe – examples of job sites



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Freiberg job site

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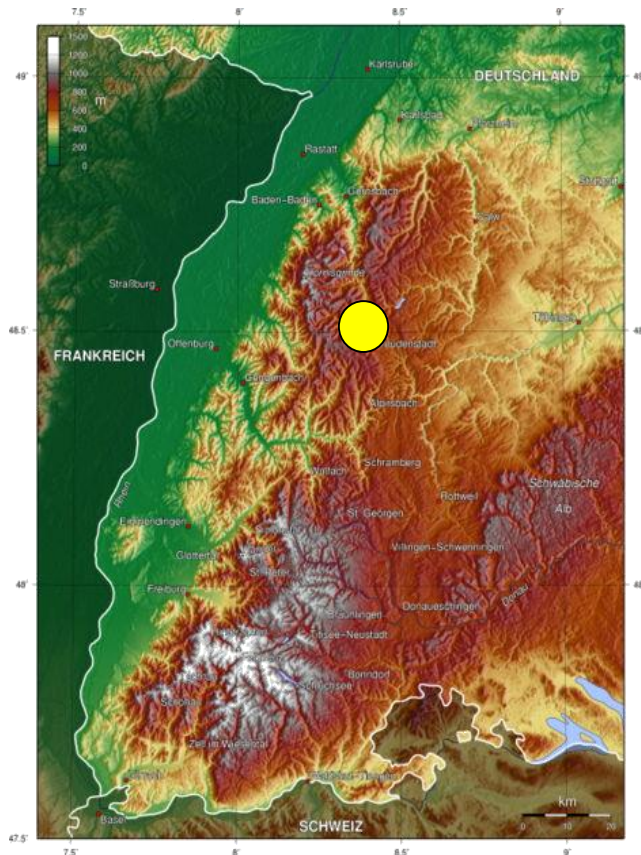
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Freiberg job site

HDD drilling in hard and hardest rock in Europe – examples of job sites

Crossing of a wild mountain river at Murg / Northern Black Forest



Job site data

Place: near Forbach

between Gernsbach and
Freudenstadt / Germany

Soil: Granite boulders and massive granite
(220 – 230 MPa)

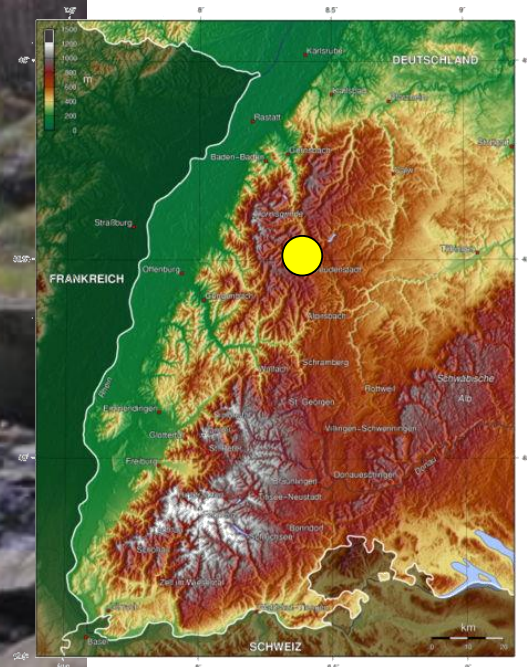
**Installation of 5 PE pipes for electricity (20kV) and
fiber optics, length: 88 m**

Machine: Grundodrill 18 ACS
with double rod system and
Rockbreaker 6 ½" drillhead
Final bore hole Ø 10" =
254 mm

HDD drilling in hard and hardest rock in Europe – examples of job sites



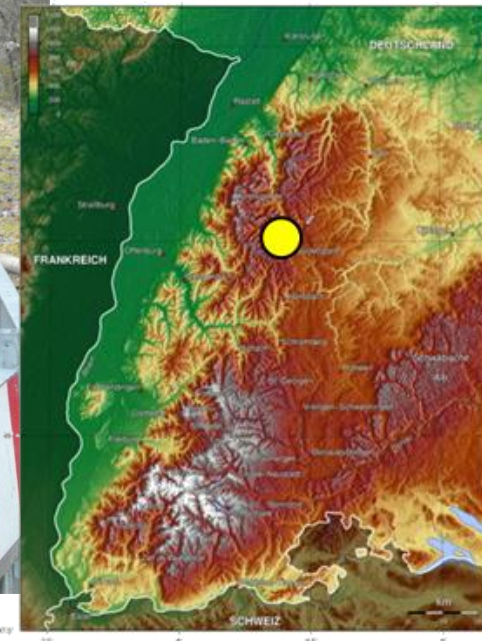
**Murg Valley in
Northern Black
Forest**



HDD drilling in hard and hardest rock in Europe – examples of job sites

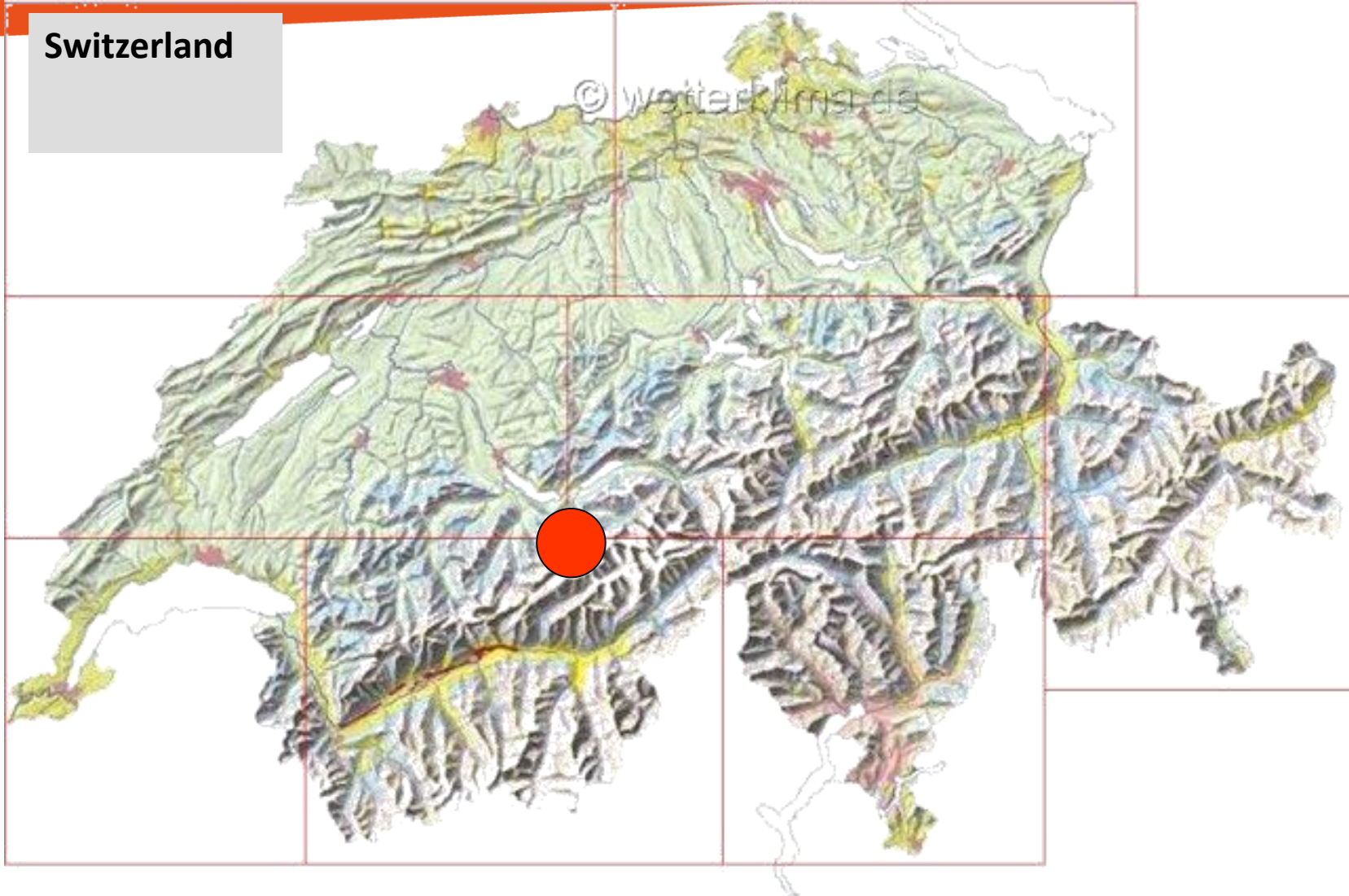


**Crossing of a
mountain river
below boulders
at Murg /
Nordschwarzwald**



HDD drilling in hard and hardest rock in Europe – examples of job sites

Switzerland



**HDD Rock
drilling under
the Kander
River
in Kandersteg /
Switzerland
Surrounding
Mountains up
to 3700 m**

**Installation of fibre
optic cables for
communication**

Conditions of the river crossing with Grundodrill 18ACS under the Kander near Kandersteg in the central Switzerland

- Extreme small ways to the job site, only for bikers and walkers
- Geology: Mixture of hard limestone layers, marl- and clay zones, and extreme blocky material from the Kander-Glacier (partly from the size of an house), Boulders, Rock fall area
- Use of roller cones with TCI bits type 517, diameter 6-1/2"
- Drilling length 156m
- 2 PE-HD-pipes 63mm in a bundel

HDD drilling in hard and hardest rock in Europe – examples of job sites



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HDD drilling in hard and hardest rock in Europe – examples of job sites



**River
crossing
with 18ACS
under the
Kander -
Detection of
the drillhead**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**River
crossing of
Kander
with 18ACS
Drilling path**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**River
crossing
with
18ACS
under the
Kander**

**Arrival of the drillhead in
the aim pit**

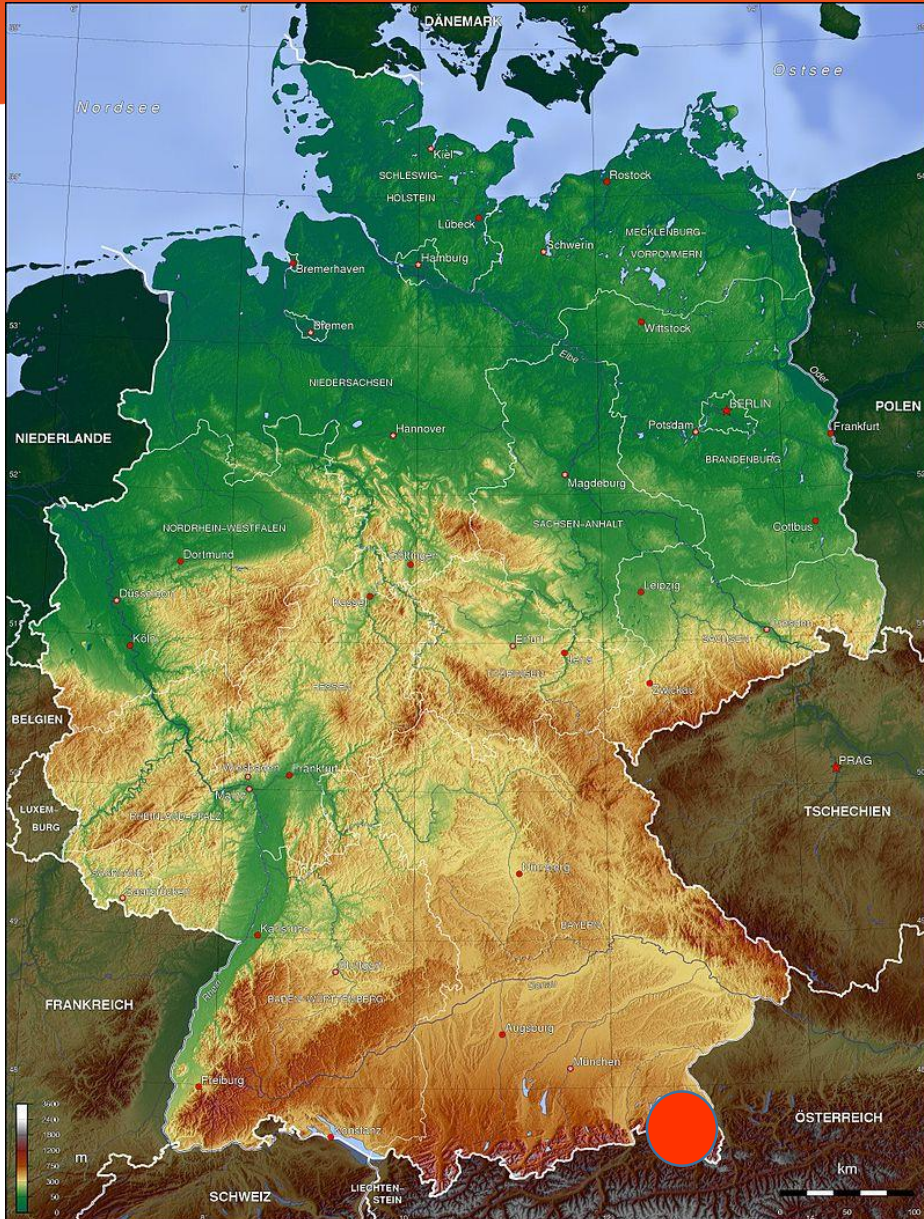
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**River
crossing with
18ACS,
Kander river**

**Last step: traction of
the pipes in the drill
hole**

HDD drilling in hard and hardest rock in Europe – examples of job sites



Job site in the German Alps

Schnaitzelreuth is located in Berchtesgader Land, Upper Bavaria

Pipe laying of a sewer pressure pipe in rock ground in a slope way

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HDD drilling in hard and hardest rock in Europe – examples of job sites



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Arriving of
the
Drillhead
after a
drilling
section

HDD drilling in Europe – exam



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Job site in
Schneizelreuth
near
Berchtesgaden

Traction of the
Sewer-Pressure
pipe

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Gastein Valley,
Salzburg Region,
Austria**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**HDD for
shortening a
natural gas pipe in
a rock fall region
at a gorge in the
Alps (High Tauern)**

HDD drilling in hard and hardest rock in Europe – examples of job sites

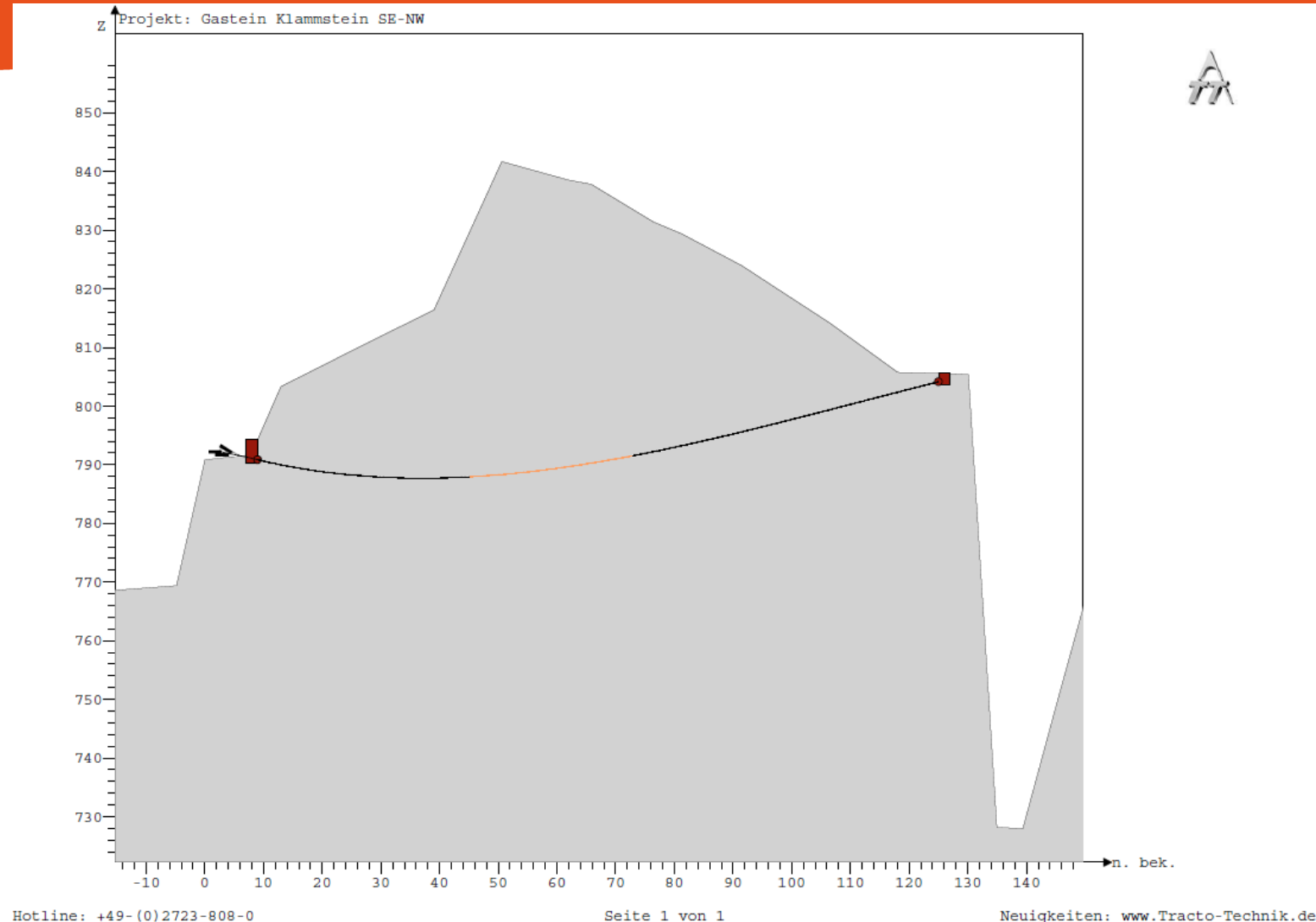


**Small
space for
machine
installation
above a
gorge**

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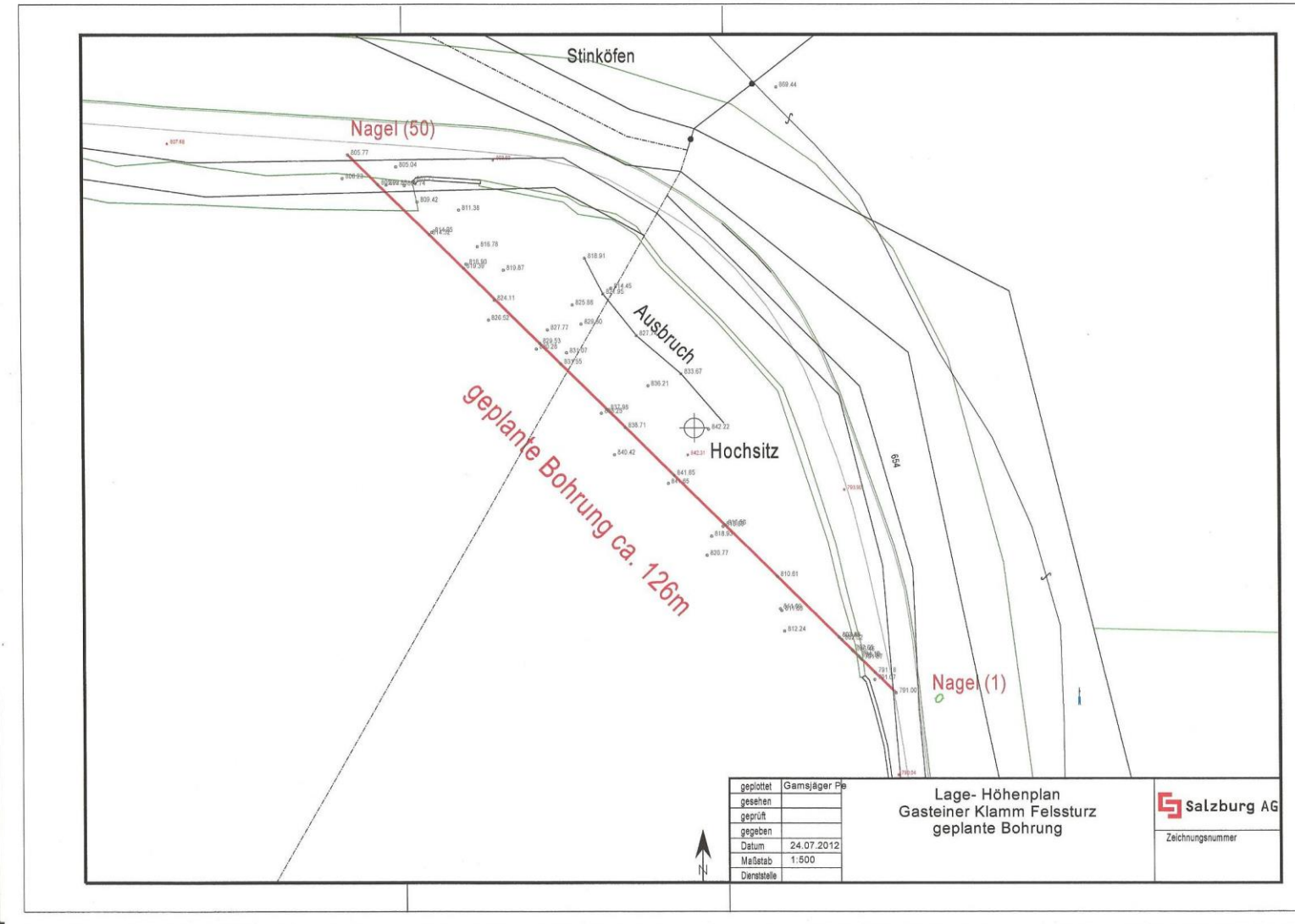
**Cross
section**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Rock drilling in
the silificated
Klammkalk
(Tauern
Mountains,
Austrian Alps)**

HDD drilling in hard and hardest rock in Europe – examples of job sites



Drilling path in the inner side of the mountain for shortening the rock fall area above a deep gorge

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**Arrival of the
Drillhead with
Mudmotor**

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Lake Crossing with Grundodrill 18ACS, near Suonenjoki in Finland

- Geology: Amphibolite (Hornblendefels) and Granite;
- Compressive strenght over 300 MPa
- Lenght 294m
- Depth 10m
- Roller cones 637 (837 later), Diameter 6-1/2"
- 1 PE-HD-Pipe 200mm
- Enlargement with Hole Opener 12"



HDD drilling in hard and hardest rock in Europe – examples of job sites



**Lake crossing
with
Grundodrill
18ACS,
Near
Suonenjoki in
Finland**

**Preparation of the
job site at start pit
area**

HDD drilling in hard and hardest rock in Europe – examples of job sites



Lake crossing with Grundodrill 18ACS, Near Suonenjoki in Finland

**For a better detection of the
drillhead from a boat, a rope
was installed over the lake**

**The lake is a natural reserve
for wilde salmons**

HDD drilling in hard and hardest rock in Europe – examples of job sites

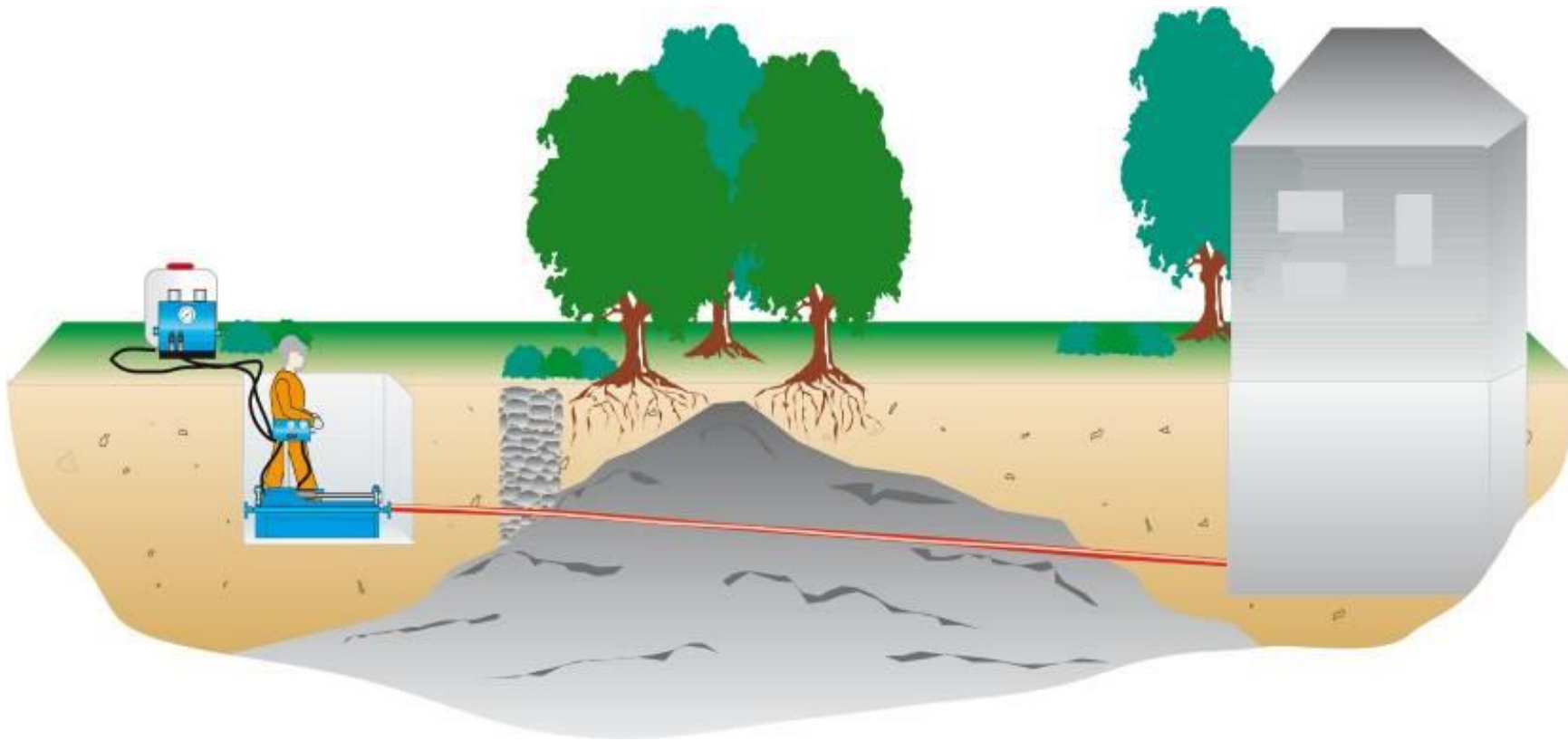


**Lake crossing with
Grundodrill 18ACS,
Near Suonenjoki in
Finland**

**Protection pipe for bearing
a cable, laying on the aim
side**

HDD drilling in hard and hardest rock in Europe – examples of job sites

Hard rock drilling for short connections



**A typical job
for Grundopit
with hammer
bore head**

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**House
connection in
Black Forest
mountains
through rock
of 230 MPa!**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Hammer drill
head for
installing
house
connections in
rocky ground**

Aufweitköpfe zum Felsbohrlochvergrößern (Hole Opener):



HDD drilling in hard and hardest rock in Europe – examples of job sites

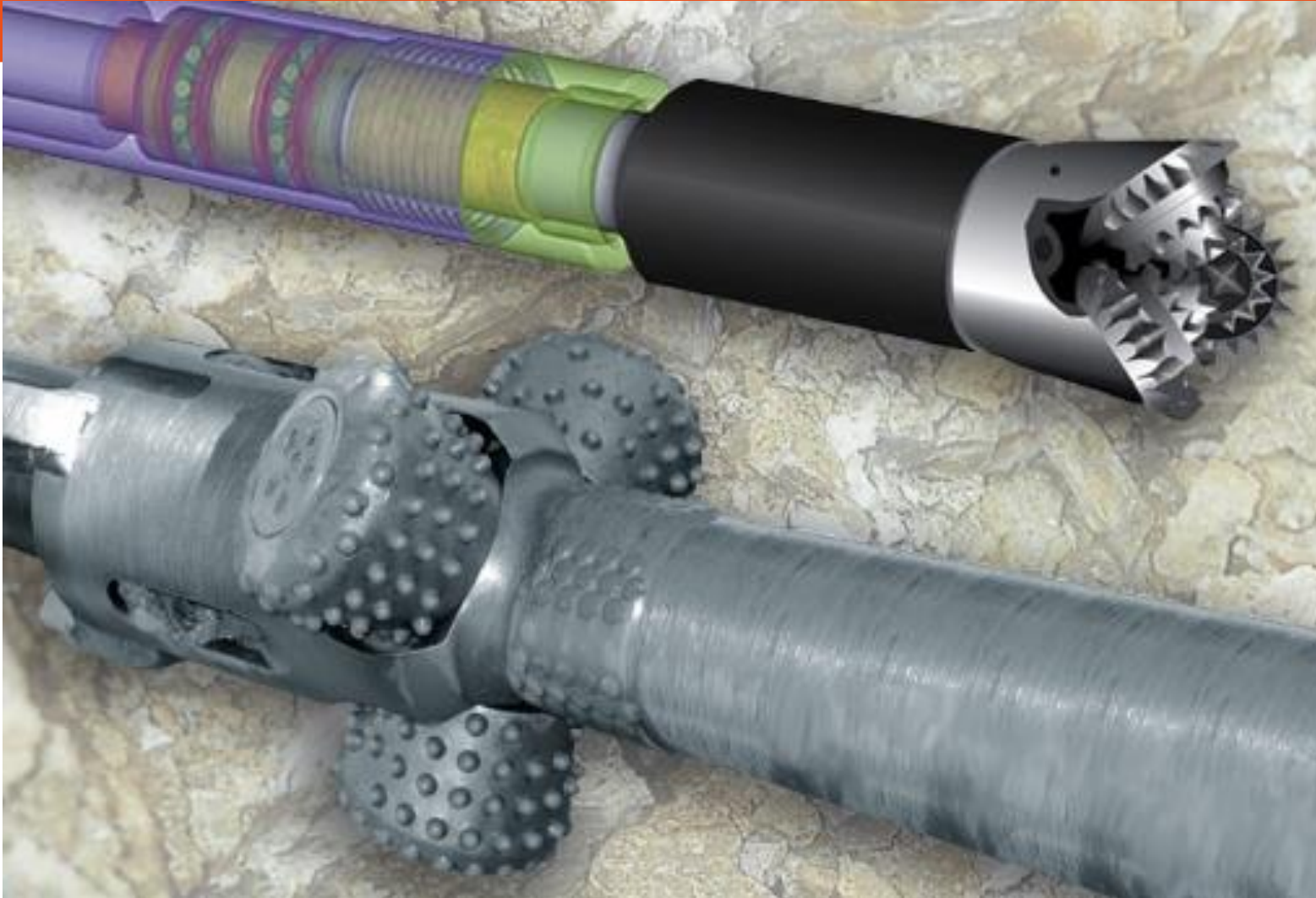


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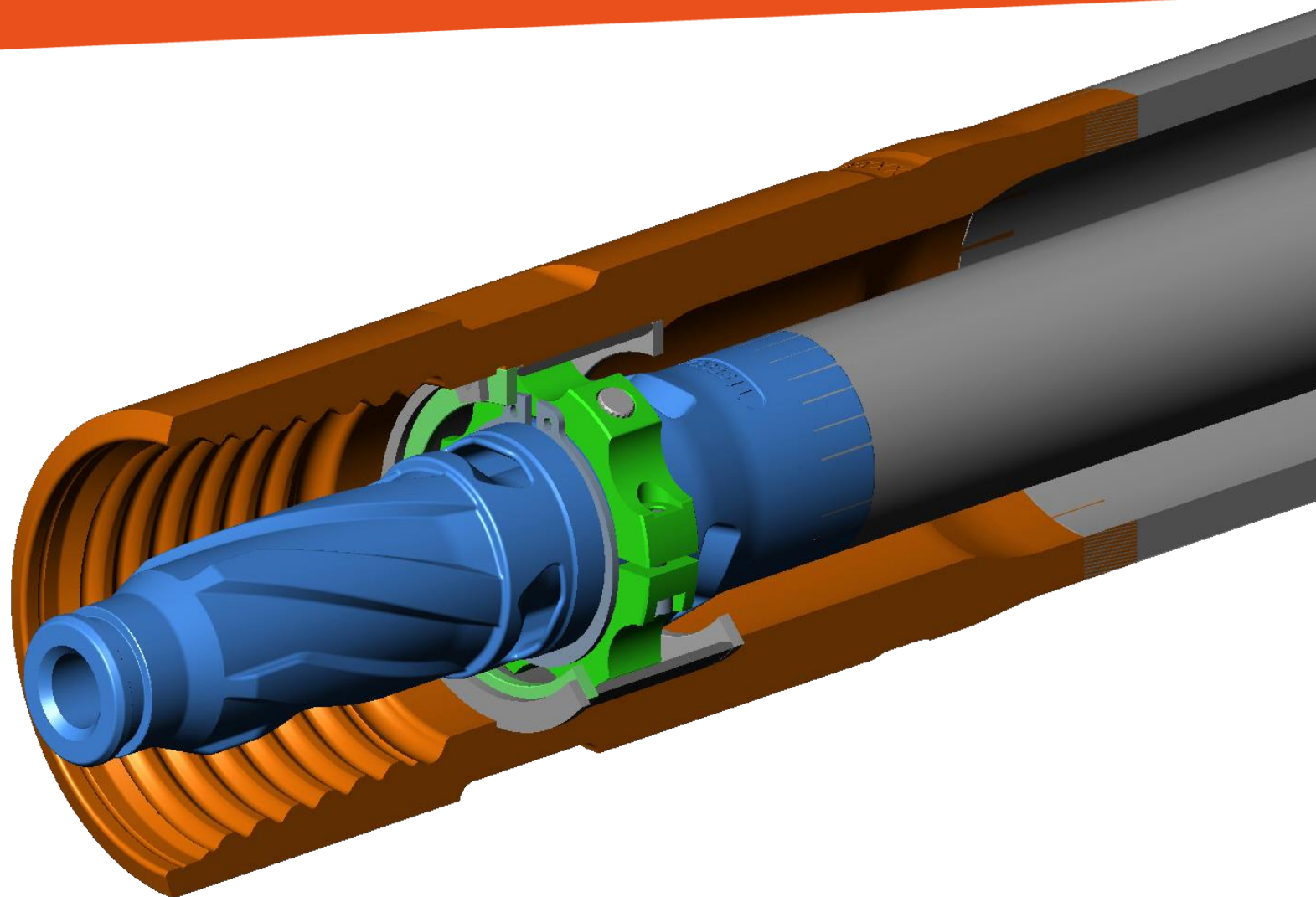
**Hammer drill
head for rock
bores**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Low flow
mud motor,
type
Grundorock**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**HDD -
twin rod
system of
TRACTO-
TECHNIK**

HDD drilling in hard and hardest rock in Europe – examples of job sites



**Working
continuously
with solid
equipment
– even in
hard and
hardest
rocks**

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Thank You for Your Interest and Your Attention