MAPEI UTT PRODUCTS
FOR SLURRY TBMS

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The Underground Technology Team (UTT) is the division of Mapei dedicated to underground works, comprised of specialized technicians, with global experience, who are available to provide technical support throughout the duration of your project.

When undertaking a project with a slurry TBM, ranging from a small-scale pipe jacking operation, to a large scale segmentally lined tunnel, the performance of the slurry throughout the operation is key to the success of the project. The slurry system is most commonly supported by bentonite, but options are also available to include polymers and other additives, depending on the ground conditions.

The main purposes of the slurry for mechanized tunnelling are:

- **for the TBM excavation**: it guarantees the counter-pressure at the tunnel face and transports the soil out from the tunnel.

- **for the treatment plant** (Slurry Treatment Plant) for final separation between soil particles, water, and bentonite/polymers.

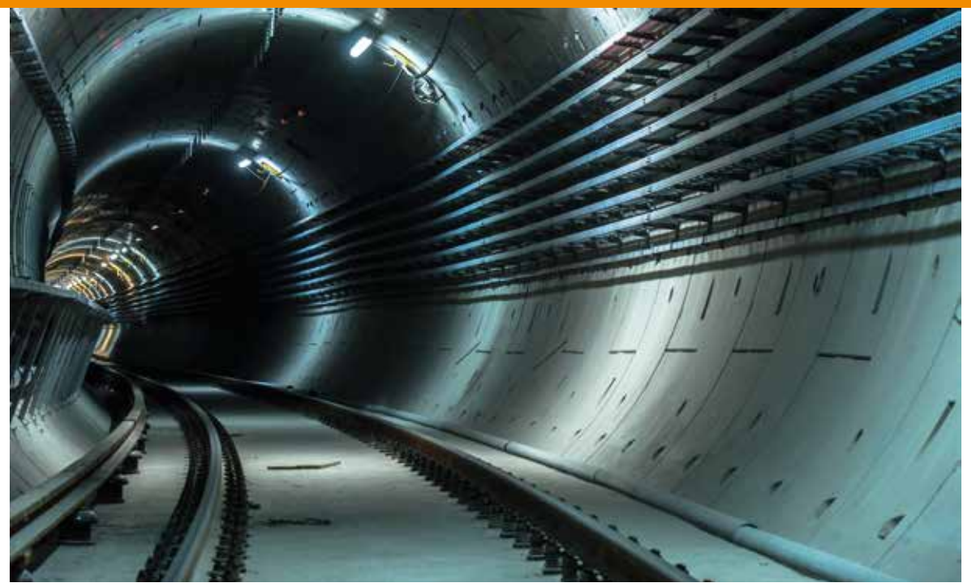
Mapei offers a range of products that can be used for any slurry support system to maintain and obtain optimum slurry performance in all ground conditions:

1. **MAPEBENT API bentonite range: high performance sodic bentonite for fresh slurry preparation**
2. **MAPEDRILL polymers range: polymer for the preparation of a drilling fluid**
3. **MAPEDRILL and MAPEDISP polymers ranges: to improve the slurry technical performance for chemical treatment of the slurry or for the make-up water**
4. **MAPECOG, MAPEFLOCK and DEFOAMER ranges: for the Slurry Treatment Plant**

In addition to supplying the highest quality products and materials, Mapei has a strong focus on technical support.

MAPEI UTT technical services readily available from the beginning to the end of your project

Mud slurry design, including dosage rates for various additives	Help for KPI's establishment and monitoring	Training contractor personnel for slurry testing	Advise for the required STP capacity based on anticipated TBM flow rates	Help set up QA testing and procedures



MAPEBENT API RANGE: SELECTED BENTONITES COMPLYING WITH API STANDARD

Bentonite supported slurry systems are the most common fluid for slurry TBMs. Slurry made by MAPEBENT API bentonite forms a seal, or filter cake, by clogging the space between soil particles. Once a seal has formed, pressure on the excavation face is stabilised and slurry loss from the excavation is kept to a minimum.

In addition, bentonites from MAPEBENT API grade also build the slurry viscosity, which makes it an excellent spoil transportation medium that reduces ware on the pumping equipment.

PROJECT:
MTR Tuen Mun-Chek Lap Kok Link (Hong Kong)

DIAMETER:
17.6m The largest TBM ever used in the world

LENGTH:
10km

BENTONITE:
MAPEBENT API The importance of the right type and quality of bentonite

PROJECT:
3R PORT hydraulic tunnel project, FT Wayne (U.S.A.)

DIAMETER:
6.2m

LENGTH:
7.5km

BENTONITE:
MAPEBENT API 5

PROJECT:
Line 15 T2A, Paris (France)

DIAMETER:
two for 9.1m and one for 7.7m

LENGTH:
10km

BENTONITE:
MAPEBENT API 2
Bentonite selected both for slurry and 2k grout

Credits to Yves Chanoit

MAPEDRILL RANGE:
POLYMERS FOR DRILLING FLUID PREPARATION

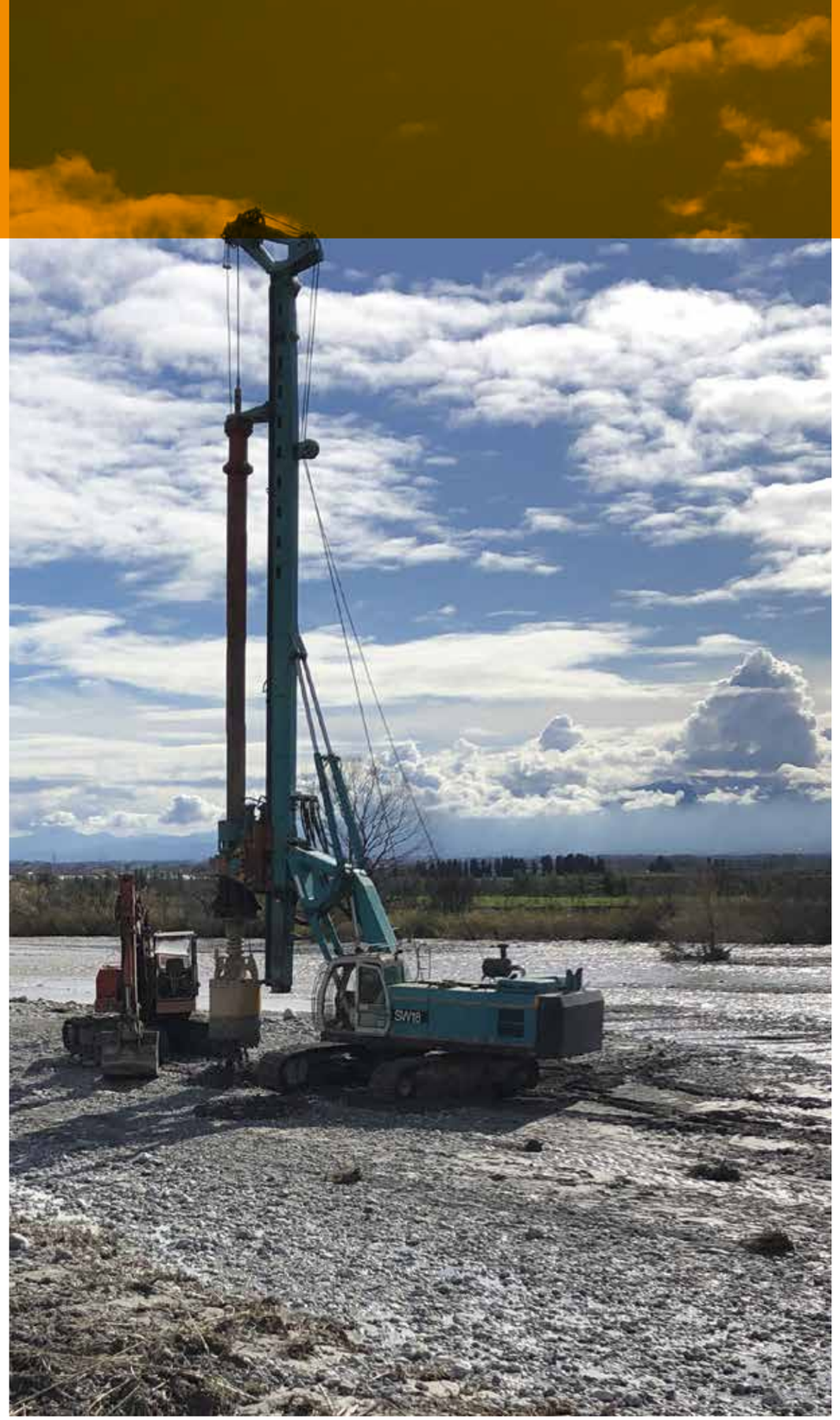
In many small diameter projects (micro tunnelling, pipejacking, HDD, etc.) and drilling activities, slurry support systems made by polymers are often used. MAPEDRILL polymers can be used and their selection is based on the purpose and features that the support system must comply.

MAPEDRILL M 1 P	MAPEDRILL SV	MAPEDRILL BHV/R	MAPEDRILL SV + MAPEDRILL BHV/R
Inhibit the clay and shale dissolution and swelling	Build up high viscosity and rheological properties	Build up high lubricating properties	Combination of two polymers to build up even higher viscosity and higher performance

PROJECT:
Civil works for the 3rd lot of “National Road 106 Jonica” in Italy

TBMS:
2500mm diameter pipes

POLYMERS:
MAPEDRILL BHV/R and MAPEDRILL SV



MAPEDRILL AND MAPEDISP POLYMERS RANGES:

Polymers can be used in bentonite supported slurry systems to improve certain types of properties, improving the TBM performance and excavation conditions.

Polymers to improve the slurry technical performance

Where to use Mapei polymers

MAPEI solutions	Granular soils	Cohesive soils	High water pressure
MAPEDRILL M1 P	●●●	●●●●	●●
MAPEDRILL EX 1	●●●●	●●	●●●
MAPEDRILL SV	●●●	●	●●●●
MAPEDISP FLS	●	●●●●	●

Where:
●●●● is maximum
● is minimum

PROJECT:
Bergen Point Waste-Water Treatment Plant (WWTP)
Babylon, NY, USA

DIAMETER:
3.0m

LENGTH:
4.3km

POLYMERS:
MAPEDRILL EX1/P, MAPEDISP FLS, MAPEDRILL SV

Polymers for chemical treatment of the slurry or for the make-up water

Where to use Mapei polymers

Mapei solutions	Reduce PH ↓	Calcium ions (ca+) precipitation	Increase PH ↑
MAPEDRILL PM	●	-	●
MAPEDRILL SAPP	-	●	-

PROJECT:
Line 15 T2A, Paris
(France)

DIAMETER:
two for 9.1m and one for 7.7m

LENGTH:
10km

BENTONITE:
MAPEDRILL PM and DEFOAMER KS

COAGULANTS, FLOCCULANTS AND DEFOAMING AGENTS

MAPECOG, MAPEFLOCK AND DEFOAMER FOR THE SLURRY TREATMENT PLANT

The slurry treatment process for the final separation between soil particles, bentonite and water is used to be carried out by mean of filter press or centrifuge, whose working phase is enhanced by the addition of coagulants and flocculants. In this process, antifoaming agent can also be necessary.

Mapei coagulant	Technical purpose
MAPECOG 10	Enhance the separation of the finest particles thanks to coagulation process

Mapei flocculant		
-	Anionic	Cationic
Liquid	MAPEDRILL M1	Not used
Powder	MAPEDRILL M1 P	MAPEFLOCK 10

Mapei antifoaming agents	Technical purpose
DEFOAMER RANGE	Anti-foam and foam inhibition effect on the slurry/water

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