



MICRO TUNNEL BORING MACHINE (MTBM) CSM Bessac

The MTBM is an economical and reliable solution for constructing small diameter underground networks by trenchless method.



Equipment is compact and the working space needed is therefore reduced, making it possible to carry out projects in city centres or in narrow or obstructed sites with minimized impact on local residents, businesses and road traffic.

- Sewage
- Drinking water networks
- Communication and energy supply networks

▪ Diameters and lengths



The range of micro tunnel boring machines available today enables service main networks to be constructed whose working diameters vary from 500 mm to 2500 mm.

The maximum distances covered in one single drive by a micro tunnel boring machine vary from 100 lm for a 500 mm diameter machine to several hundred metres for a 2000 mm diameter machine

Examples : Mantes-La-Jolie : Ø 1.80 m→700 m
Bogota : Ø 2.20 m→1300 m
Les Sables d'Olonne (submarine outfall) : Ø 1.40 m→624m
Lyon : Ø 2 m→1000 m
Rabat (submarine outfall) : Ø 2 m→800 m

▪ **Geology**



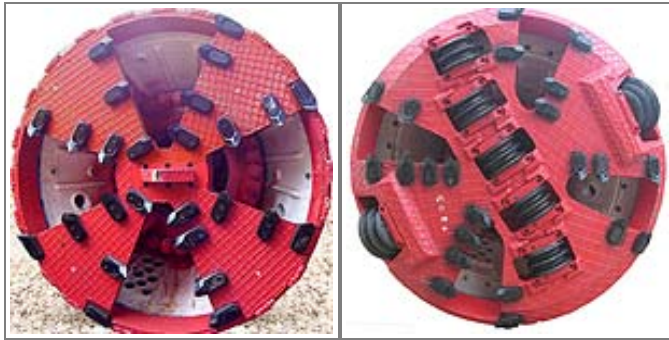
MTBM's are suitable for constructing service main systems in various types of geological environments – rock, sand, marl, alluvium – including under the water table and avoiding the necessity of dewatering liable to cause surface subsidence.

▪ **Alignment and curves**



For diameters less than 1000 mm, Alignments are straight.
Above 1200 mm, alignments may have curves ($R > 500$ m).
MTBM alignments are very precise thanks to sophisticated guidance systems.

- **Cutting wheels**



The micro tunnel boring machine is equipped with tools which enable excavation of cutting. The cutting wheels are differently designed according to the grounds. For loose grounds, wheels fitted with scrapers are used. For rocky grounds, cutting wheels with disc cutters are used.

- **Micro tunnel boring machine guidance system**



For straight alignments, the machine uses a laser guidance system, whose active target, located in the head of the machine is tracked in real time from the control deck. For curved alignments, the guidance system is made of gyroscope. The alignment is corrected as necessary using steering cylinders, enabling the head of the micro tunnel boring machine to be oriented.

- **Removal and spoil treatment**



Spoil is evacuated and transported between the micro tunnel boring machine and the surface by a hydraulic removal system, by a closed circuit of drilling slurry in a network of conduits. Spoil is collected in the skips which are regularly taken to the landfill site.

- **Pipe-jacking process**



The MTBM and the pipes advance thanks to the thrust supplied by the jacking frame in the thrust pit. (PIPE JACKING).

The stress passes through the pipes as they are laid according to the progression of the MTBM. The pipes have a working length of 2.00 lm or 3.00 lm. For great lengths, there are intermediate thrust stations approximately every 100m in order to spread the jacking.

- **Lining**



Jacking pipes are constructed in reinforced concrete or in GRP (glass reinforced) or in clay pipes.

Overall diagram

