

# EUROHINCA

Europea de Hincas Teledirigidas, S.A.



Experts in tunneling with  
Tunnel Boring Machines



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**TERRATEST**

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# EUROHINCA

Europea de Hincas Teledirigidas, S.A., EUROHINCA, was incorporated in 1996 for the execution of pipelines using the pipe jacking technique with tunnel boring machines. Since then, Eurohinca succeeded in more than 120 projects completing more than 40 kilometers of tunnels. EUROHINCA is the Spanish microtunneling market leader and one of the better equipped tunneling contractors in Europe.

EUROHINCA employs highly specialized personnel and owns 8 Tunnel Boring Machines (7 made by the German manufacturer Herrenknecht) with different diameter and operating principles to be able to complete a large variety of underground applications. EUROHINCA has gained a wide experience in the execution of tunnels in difficult ground conditions, operating its TBM's and rental equipment.



## SEA & DAM OUTFALLS



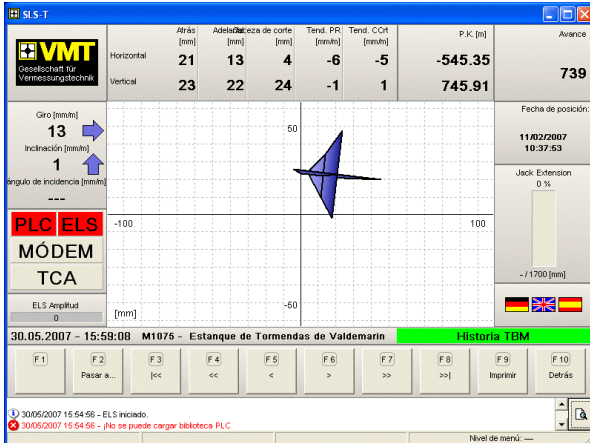
# ADVANTAGES OF TRENCHLES TECHNOLOGY

## TUNNELS + TRENCH

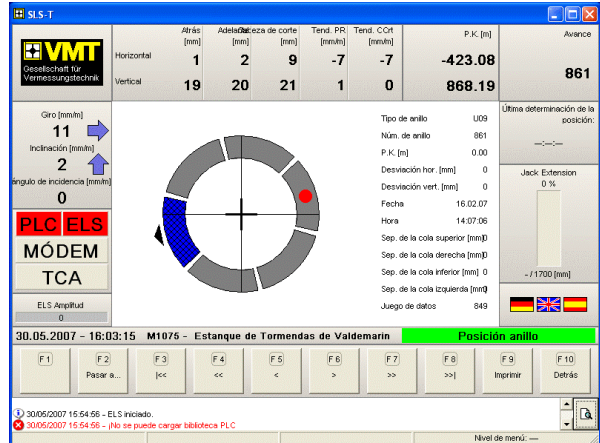
- Less effect on existing services.
- Lower environmental impact.
- Minimizes spoil and waste generated.
- Compact installation.

## TBM + MINING

- Increased security for workers. (Works inside a shield)
- Less risk of surface settlements. Excavation Front is supported).
- Higher outputs. Minor delays.
- Reduced impact on ground water level.



Guidance System. Position and tendencies of the T.B.M.



Guidance System. Selection ring program

# TYPICAL APPLICATIONS

- SEWER AND WATER SUPPLY NETWORKS. COLLECTORS.
- CROSSINGS UNDER EXISTING SERVICES (roads, streets, railways, rivers, airport runways, golf courses, etc. )
- SEA OUTFALLS. WATER RELEASE OR INTAKE.
- TUNNELS WITH TUNNEL BORING MACHINES.
- UNDERGROUND CORRIDORS.
- GAS AND OIL PIPELINES. DRAINAGE AND EVACUATION SYSTEMS.
- PIPE ARCHING FOR ROAD OR RAILWAY CROSSINGS.
- STEEL PRESSURE PIPES.
- WATER INTAKE AND RELEASE FOR FISH FARM OR DESALINATION PLANTS.
- WATER WASTE PIPE AND INTAKES IN RESERVOIR DAM.



Launch shaft in pipe jacking outfall. A Coruña

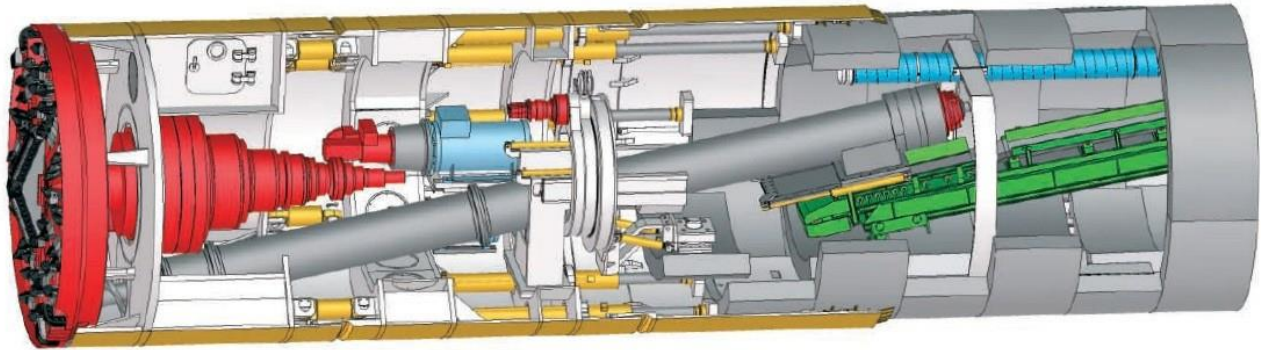


Road crossing with pipe jacking

# CLOSE FACE TUNNEL BORING MACHINES



## EPB SHIELDS



The EPB Shields (Earth Pressure Balance) are TBM machines that support the tunnel face with the pressure applied by the excavated soil located inside the excavation chamber; the controlled extraction of the soil from the excavation chamber by means of a variable speed auger allows the adjustment of the pressure applied to the tunnel face.

The excavated material is transported to the launching shaft by conveyor belts or muck wagons.

The EPB Shields were initially designed to bore soft, cohesive ground, (mainly clay), but with the use of foam and polymers it is possible to bore other type of soils as sand or even rock.



EPB control panel



Back up of EPB

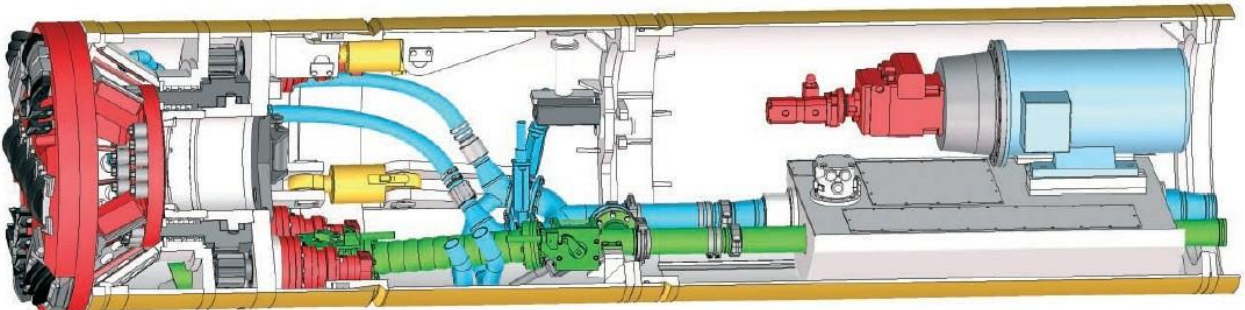


Assembling an EPB machine in the launching shaft

# CLOSE FACE TUNNEL BORING MACHINES



## HIDROSHIELDS



The TBM mix shield, or hydro shield, supports the tunnel face by the pressure of the bentonite suspensions injected in the excavating chamber and mixed with the excavated material.

This mixture is crushed in the excavation chamber and is evacuated by hydraulic pumps to the launch shaft where a separation plant separates the excavated material from the bentonite suspension.

The Hydro shield TBM can be used in almost all type of grounds, and performs well in sand, rock, under ground water level (Sea outfalls) and it is specially indicated for small diameters.



Hydro shield machine in port after an outfall drive



Breakthrough of Hydro shield in reception shaft



Hydro shield control panel mounted in launch shaft



Separation plant on launch shaft

# OPEN FACE TUNNEL BORING MACHINES



## OPEN SHIELDS-ROADHEADSOREXCAVATORS

Open face shields allow a visual contact with tunnel face. The front is excavated by powerful road headers or excavators. The extraction of the excavated material is made by muck wagons pushed by locomotives or winches.

It is an economic and optimal solution for non urban areas with cohesive soils and above ground water level.



Road header in open shield



Front face in an excavator open shield

## TBM CHOICE

A detailed and comprehensive geotechnical study (including ground investigation, ground water level, type of soil, resistance to simple compression, rock abrasiveness, etc. ..) is the basis for the selection of the appropriate TBM equipment and tunnel excavation method.

With complete information it is possible to define the most suitable TBM, cutter head configuration and tools, characteristics of the lining, the alignment of the tunnel, and also, if necessary, preventive measures to be taken, monitoring systems, etc..

TIPO DE TUNELADORA	GEOLOGÍA	BAJO NIVEL FREÁTICO	ARENAS	ARCILLAS	ROCA
HIDROESCUDO		○	○	○	○
EPB		◐	◐	○	◐
ESCUDO ABIERTO			◐	○	◐
		Bajo freático, en arenas y roca			
		Ideal para terrenos arcillosos			
		Terrenos cohesivos.			

Range of ground per TBM



Rock tunnel face

# TUNNEL LINING

Two types of lining are typically employed in micro tunneling:



## SEGMENTALLINING

Precast concrete elements that are installed inside the tail skin shield of the TBM, building a complete ring that constitutes the final tunnel lining.

The thrust of the machine is made on the last ring installed: this allows to excavate great lengths and curved tunnels alignment.



Segments in the Back up of the T.B.M.



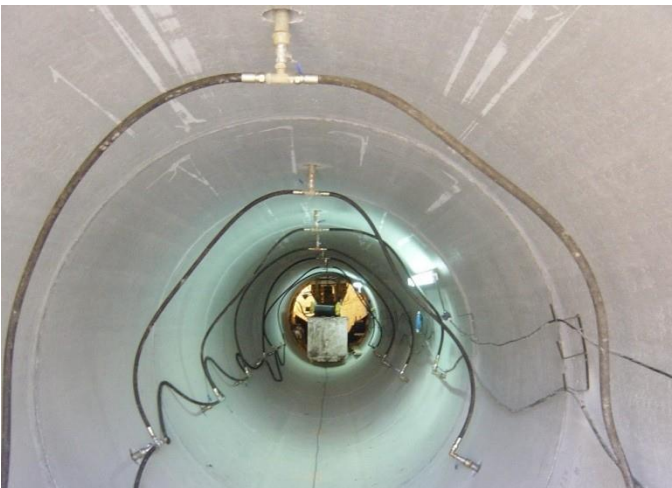
Last lining ring in the reception shaft



## PIPEJACKING

Prefabricated pipes (concrete, steel, etc..) that form the lining of the tunnel and are installed and pushed from the launch shaft pushing forward the TBM to the ending shaft.

To reduce the friction between the pipe and the ground during the jacking phase bentonite is injected in the overcut. Intermediate jacking stations are necessary for long distances.



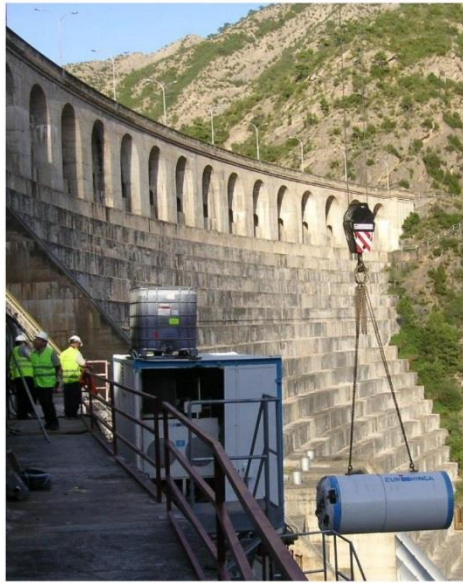
Bentonite injection points in a pipe jacking tunnel



Jacking frame in launching Shaft



Downloading a jacking pipe



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