

ROBBINS

EPB TBMs

Earth Pressure Balance Machines



HOW THEY WORK

Robbins has integrated over 60 years of TBM design and jobsite experience into our innovative Earth Pressure Balance (EPB) TBMs.

Robbins EPBs are engineered with the same rugged structure and time-tested designs of our hard rock TBMs, but their function is purely for soft and mixed ground. They operate by maintaining a constant balance between the pressure inside the cutterhead chamber and the pressure at the front of the machine, and can excavate in earth pressures up to 7 bar. EPBs are shielded machines outfitted with soft or mixed ground cutting tools, depending on the ground conditions.

They are powered by high-efficiency Variable Frequency Drives (VFDs) that provide the high torque and low thrust desired in soft ground conditions.

Muck is removed from the face via large openings in the unique “Smooth Flow” cutterhead, then flows into a screw conveyor, and is removed via muck cars, continuous conveyor, or muck pump.

High-pressure seals on the cutterhead drive prevent water seepage into the machine's interior, which is kept at atmospheric pressure. A tunnel lining is erected sequentially after each push using a high-speed rotary segment erector.

BEST TBM DESIGN FOR

- Soft ground
- Mixed ground conditions such as clay with weak rock and boulders
- Tunnels with up to 7 bar water pressure
- Tunnels that require segmental lining
- Tunnels in urban locations where settlement is a concern
- “Closed mode”, “semi-closed mode” and “open mode” excavation

DESIGN OPTIONS

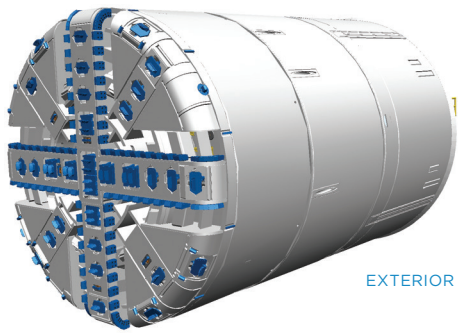
- Customized cutterhead design and cutting tools
- Abrasion-resistant wear plating
- Active articulation for tunneling through curves
- Single-part or two-part (A+B) liquid back-filling for limitation of settlement
- Automatic guidance system comparing actual vs. expected tunnel alignment
- High-capacity main bearing and sealing system
- High-pressure seals to prevent water inflow
- Cutter wear detection systems
- Advance radar system for ground monitoring to detect obstructions
- Grout/probe drills for pre-excavation and ground consolidation



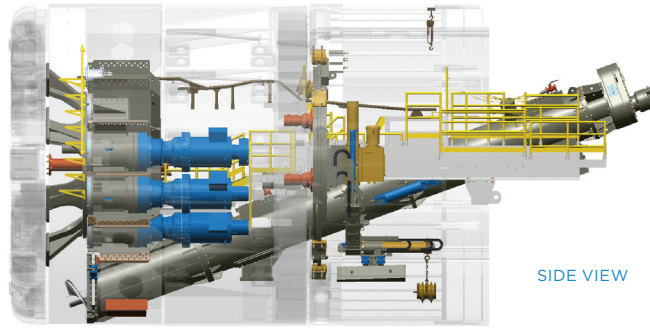
A mixed ground EPB for the Singapore Downtown Line



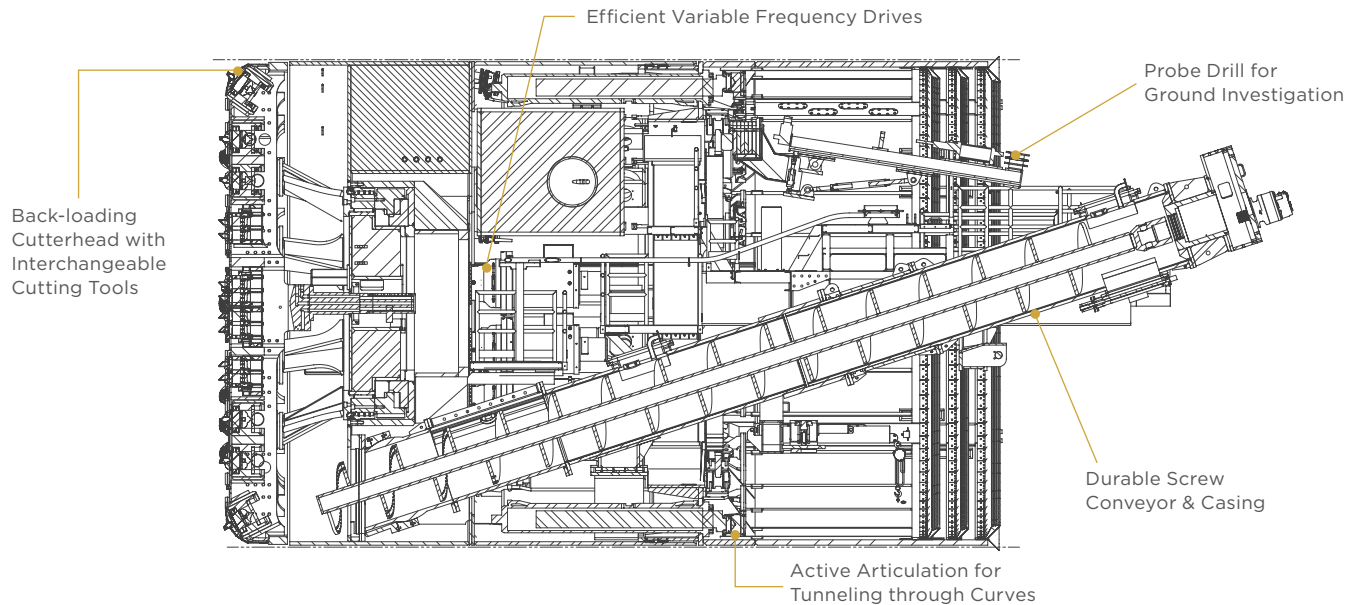
San Francisco Central Subway breakthrough



EXTERIOR VIEW



SIDE VIEW



SPECIFICATIONS: ROBBINS EPB TBM

EPB DESIGN SERIES

4.5 m TO 6.0 m SERIES 0

6.0 m TO 7.5 m SERIES 1

7.5 m TO 9.5 m SERIES 2

9.0 m TO 11.2 m SERIES 3

11.5 m TO 13.0 m SERIES 4

13.0 m TO 15.0 m SERIES 5

15.0 m TO +17.5 m SERIES 6

PROVEN IN THE FIELD

- Both soft and mixed ground cutterhead designs are thicker and a full 33% heavier than competitors' designs.
- Robbins EPBs are built for 10,000 hours of operational life, and are often refurbished for multiple projects.
- Active articulation on Robbins EPBs prevents segment deformation in curves and allows for turns through small radii. Robbins EPBs have been used on radii as small as 137 m.
- Robbins screw conveyors are designed to reduce required torque and wear. Specialized screw conveyor casing better eliminates gaps and prevents excessive wear that could otherwise slow down the tunneling operation.
- Robbins includes multiple mixing bars in the cutterhead chamber, which are round in cross section for better mixing.
- Robbins EPB back-ups are custom designed to integrate with continuous conveyor muck removal systems.



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