



# ROBBINS

## CROSSOVER SERIES

### XRE (EPB/ROCK HYBRID)

#### ABOUT

Whether the geology of your project includes sections of hard rock, soft ground, boulders, or a little bit of everything, Robbins has a solution for you.

Not all projects fit within the parameters of specific TBM types, and at Robbins we believe that your machine should be custom-engineered for your unique project requirements. That's where the Crossover Series of TBMs comes in.

The Robbins XRE TBM employs design elements from both EPB and hard rock Single Shield machines, and is built to excavate ground conditions that may vary widely, from abrasive basalt to watery clays and everything in between.

#### BEST TBM DESIGN FOR

- Mixed geology
- Mixed face tunneling
- Versatile tunneling
- Time constraints

#### DESIGN FEATURES & OPTIONS

- High-pressure man lock for cutterhead inspection and changes
- Pressurized and non-pressurized modes
- Multi-speed gearboxes to enable the machine to advance through blocky, fractured, or mixed ground at high torque and low speed
- Optimized towards hard rock or soft ground excavation
- Ultra-high emergency thrust system
- Mini grippers on the rear shield to bore 400 to 600 mm forward
- Abrasion-resistant wear plating and wear detection on cutterhead
- Abrasion-resistant wear plating on screw conveyor and casing
- Automatic guidance system
- Cutter wear monitoring systems
- Advance radar system for ground monitoring to detect obstructions
- Disc cutters can be removed and replaced with soft ground tooling
- Grout drills for pre-excitation and ground consolidation
- Single-part or two-part (A+B) liquid back-filling for limitation of settlement
- High-capacity main bearing and seal system

#### HOW THEY WORK

From heavy duty screw conveyors that handle rock to interchangeable cutting tools, Robbins XRE TBMs are optimized for swift in-tunnel conversion.

When a change of ground is encountered, the XRE TBM is equipped with special features that enable it to switch between a pressurized EPB with screw conveyor to a non-pressurized rock machine with belt conveyor (and vice versa). Crews are able to switch out the method of muck removal within a few days, while also modifying the cutterhead for the different ground condition.

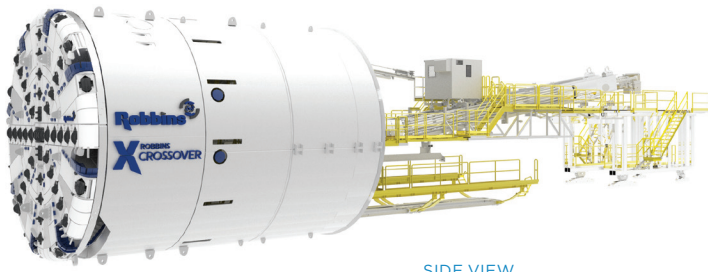
The cutterhead features an interchangeable design that allows for tungsten carbide cutter bits to be switched out with disc cutters for hard rock.



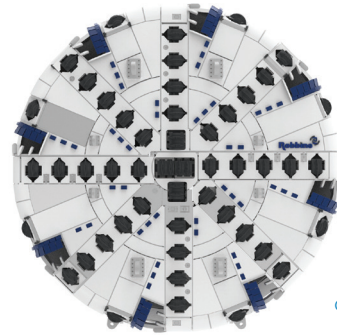
Grosvenor Decline TBM assembly, Australia



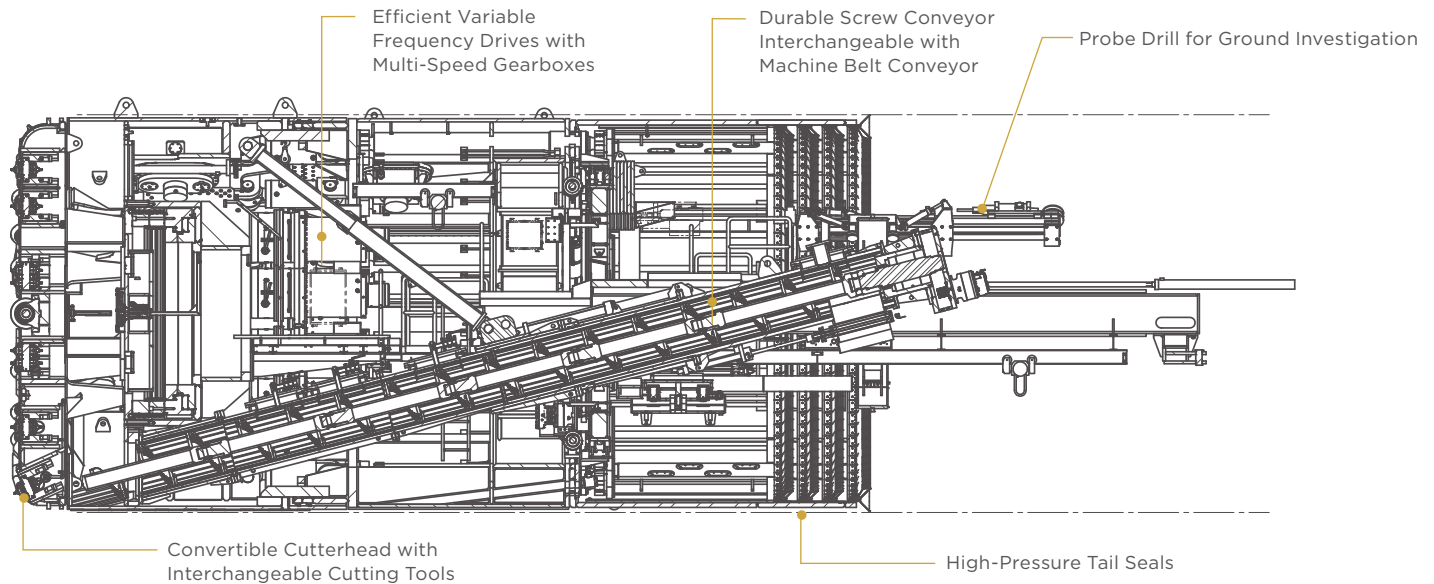
Large diameter XRE TBM with cutterhead set up for rock conditions



SIDE VIEW



CUTTERHEAD FOR ROCK



## MAIN FEATURES: ROBBINS XRE TBM

- Uniquely designed and optimized towards hard rock or soft ground based on the project geology
- High-capacity main bearing and seal system
- Smooth-flow cutterhead with removable planting
- High-pressure seals to prevent water inflow
- High-speed rotary segment erector

### FOR MACHINE DIAMETERS UNDER 12M

- Interchangeable machine belt conveyor or screw conveyor installed, based on geology

### FOR MACHINE DIAMETERS OVER 12M

- Machine belt conveyor and screw conveyor concurrently installed Hydraulicmuck ring for swift in-tunnel conversations

## PROVEN IN THE FIELD

- Engineers can optimize your machine's design based on a unique scenario. For example if the tunnel is 80% soft ground and 20% hard rock, Robbins engineers will optimize the overall machine design towards favorable EPB operation.
- Customized machines can be built using Onsite First Time Assembly (OFTA) in order to fit within a tight project schedule.
- Crossover Machines have the potential to lower risk and make difficult excavations possible, as long as accurate geological information is available.
- Mixed conditions require cutterheads capable of a wide spectrum of possibilities. In most XRE machines, abrasion-resistant wear plates and wear indicators help contractors monitor and minimize tool wear in complex ground.
- Machines can be designed for extreme conditions, such as high water inflows and fault zones. The XRE TBM can be designed with closure gates to contain water and breakout torque to bore through squeezing ground or faults.



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