

# NEW GROUND SUPPORT ADVANCES

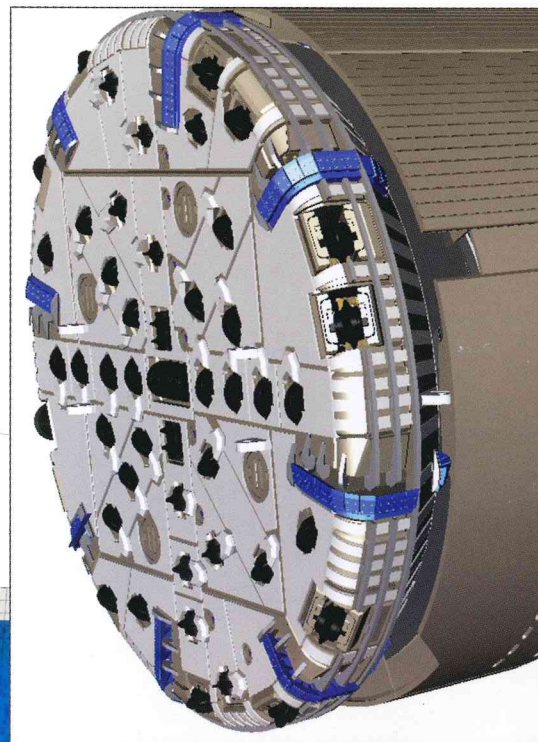
## IMPROVED GROUND SUPPORT SYSTEMS

on five new Main Beam TBMs are based on worldwide field observations. The TBMs, destined for a project in China, feature adaptable systems for changing conditions.

"We are building heavy duty machines for hard rock, and it is satisfying to see all we have learned from past projects being put to use. The cutterheads are reinforced and fully equipped with wear-resistant material, and the TBMs are designed with much more sophisticated ground support than we have ever provided before," said Lok Home, Robbins President.

The ground support system offers maximum flexibility, allowing the contractor to choose between the McNally System--consisting of steel slats extruded from pockets in the roof shield--or ring beams, rock bolts, and wire mesh.

On each of the 8 m (26 ft) diameter TBMs the ring beam erector and roof drill system are mounted on the same rail system, but are capable of independent movement. The rotating ring beam erector includes an indexer—a loading tray—at the bottom of the erector. Six pieces are loaded into the indexer and then pinned before they are expanded against the wall to make a ring. Transport of materials takes place in the tunnel invert.



The record-setting Robbins Main Beam for the Indianapolis Deep Rock Tunnel Connector was built in 1976, and is owned by the Shea/Kiewit Joint Venture,

## SPEEDY WORLD RECORD TBM RACES THROUGH ROCK

### RECORD ADVANCE IN 24 HOURS

is just one of many triumphs for a 6.2 m (20.2 ft) Robbins Main Beam TBM operating at the Indianapolis Deep Rock Tunnel Connector in Indiana, USA. The machine was originally built in 1976 and used most recently on the Second Avenue Subway Project in New York City,

The contractor-owned machine was refurbished and redesigned in Cleveland,

The TBM achieved a world record for machines in the 6 to 7 m diameter range: 124.7 m (409 ft) in 24 hours.

Ohio and Mt. Pleasant, Pennsylvania. Its latest rebuild included a fitting with variable frequency drive motors and new components including a back-loading cutterhead with 19 inch disc cutters and rescue chamber.

The TBM was launched in early 2013 from a deep shaft and began its excavation in limestone and dolomite rock. Muck removal is being achieved with a Robbins continuous conveyor system including both horizontal and vertical belts.

The record rate occurred on June 12, 2013 when the machine achieved 124.7 m (409 ft) of advance in 24 hours--a milestone for TBMs in the 6 to 7 m (20 to 23 ft) diameter range.

Once complete, the tunnel will be lined with unreinforced concrete, making the finished diameter 5.5 m (18 ft). Cleaner water is the ultimate goal of the city's new DRTC, which will include in its scope four shorter tunnels that will be added on afterwards.

The DRTC will convey up to 2.1 million m<sup>3</sup> (550 million gal) of combined sewer overflows daily to the Southport Advanced Water Treatment Plant. By 2025 the network of five tunnels will total over 40 km (25 miles), and will reduce wastewater overflow into the White River, Fall Creek, Pogues Run and Pleasant Run waterways by 95% or more.