

ROBBINS

CONTINUOUS CONVEYORS



HOW THEY WORK

Modern contractors demand ever faster tunneling machines to insure they stay on schedule, and Robbins TBMs are delivering the speed to get the job done on time. With high speed tunneling, removing muck from the excavation heading has become more of a challenge than ever. Muck trains must have high speed and high capacity to keep up with modern TBM production. Even with the best trains available, the logistics of keeping a high speed, multiple train system up and running and on time is a complex management task.

Robbins' continuously advancing conveyors are designed to increase

the efficiency of muck removal and vastly simplify tunneling logistics. With a reliable conveyor system constantly removing muck from the tunnel, trains are only required to deliver personnel and materials to the machine.

Robbins Continuous Conveyors have been successfully employed on nearly 100 projects worldwide—more than any other TBM tunnel conveyor manufacturer. Designs are fully customizable and can be used for everything from a short, urban EPB tunnel to a large, multi-machine hard rock project in the remote mountains spanning many kilometers, and everything in between.

ADVANTAGES OVER MUCK CARS

- Logistics are simplified, particularly as tunnel length increases
- Trains can be fewer and smaller
- Track can be more lightweight
- Ventilation requirements are reduced
- Downtime is minimized and advance rates go up—as the tunnel gets longer, there is no time required to wait for muck cars
- Personnel requirements are reduced. Fewer personnel are required to operate and maintain a conveyor as compared to multiple muck trains

DESIGN OPTIONS

- Custom-designed systems for use behind EPB and Crossover TBMs, featuring sealed transfer points, conveyor wash boxes and more
- A variety of belt materials for horizontal components, from steel cable to fabric belting to straight warp belting that minimizes belt maintenance
- Space-saving options for small job sites and urban locations, including vertical belt cassettes and compact J-type vertical belts that take up a smaller footprint in the shaft
- Belt systems may include:
 - Vertical conveyors for muck removal up shafts
 - Horizontal tunnel conveyors, crown-mounted or side-mounted in custom configurations
 - Overland conveyors for muck transfer across roadways or long distances to a storage area
 - Patented self-adjusting curve idlers for efficient muck transfer through tunnel curves
 - Radial or fixed stacker conveyors for efficient muck storage
 - Vertical or horizontal belt cassette to maintain belt tension and serve as storage
 - Belt splice stand to add more belt to the system
 - Advancing tail piece to add idler assemblies to the conveyor system as the machine advances
 - Efficient Variable Frequency Electric Drives (VFDs)



Crew members prepare a belt for vulcanizing



A Robbins conveyor system hauls muck out of a deep shaft in Ohio, USA



Personnel oversee the operation of a stacker conveyor in Indiana, USA

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SAMPLE SPECIFICATIONS: CUSTOM CONTINUOUS CONVEYOR SYSTEM

TUNNEL DIAMETER: 6.14 m

SYSTEM LENGTH: 11,029 m

HORIZONTAL CONVEYOR: Side mounted

BELT WIDTH: 914 mm

NUMBER OF CURVES: 2

CURVE RADIUS: 1000 m

CAPACITY: 544 Metric TPH

VERTICAL CONVEYOR: J-Type

VERTICAL CONVEYOR CAPACITY: 500 Metric TPH

STACKER: Radial

DRIVES: VFD Main Drive and 6 Booster Drives

PROVEN IN THE FIELD

- The Robbins Company has the longest history of continuous conveyor manufacture amongst all TBM suppliers. Robbins was involved in supplying the first conveyor used behind a TBM during Pakistan's Mangla Dam Tunnel Construction in 1963.
- Continuous conveyors contribute to high overall advance rates.
- Robbins conveyors can be designed to haul mega loads—it simply depends on the tunnel space and machine speed. Conveyors up to 1,100 Metric TPH have been provided, with systems of 1,800 Metric TPH or more possible.
- For longer systems, extensive monitoring can be provided to detect potential failures, rips, or fatigue in the belt. An integrated rip detection system combines electronic monitoring with video surveillance of discharge points to pinpoint longitudinal rips, tears, or deformations, and can save significantly on conveyor downtime.
- Robbins vertical conveyors are optimal for deep shafts. Vertical conveyors can be designed for shafts of 650 m depth or more.
- Robbins conveyors are optimal for small urban jobsites and small tunnel diameters. Conveyor systems have been provided for tunnels as small as 3 m in diameter. The smallest site area on which a conveyor was ever provided was 57 square meters.
- Robbins belt structure is more robust than its competitors and up to 33% heavier with heavy duty steel. Belt drives and takeups are also heavy duty, and built to last.



TIME-TESTED COMPONENTS

Robbins conveyor system components offer maximum efficiency, from ultra-powerful variable frequency main drives and booster systems to belt splice stands for quick belt changes and additions.



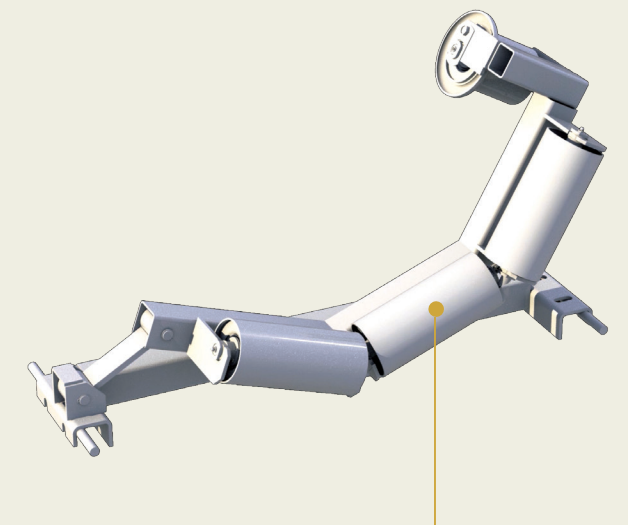
ADVANCING TAIL PIECE

Robbins' standard advancing tail piece provides a protected working window for workers to install carrying idlers.



BELT STORAGE CASSETTES

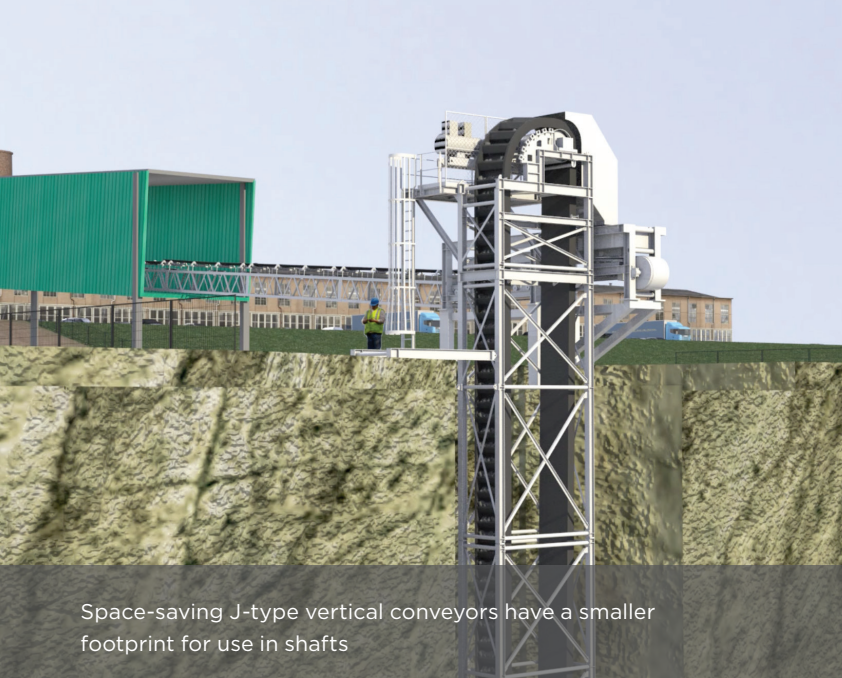
Robbins belt storage cassettes can be located in the tunnel or on the surface, in vertical and horizontal configurations. They can be designed with standard (i.e. 300, 400, 500 m) or custom belt storage capacities.



PATENTED SELF-ADJUSTING CURVE IDLERS

When a tunnel travels through curves it is essential to maintain low belt tension to guide the belt properly.

Robbins' patented, load-sensing curve idlers adjust belt tension as loads change while maintaining maximum muck carrying capacity.



Space-saving J-type vertical conveyors have a smaller footprint for use in shafts



An efficient S-type vertical conveyor operates at New York City's East Side Access Project



Radial stackers can rotate to deposit muck in kidney-shaped piles

VERTICAL CONVEYORS

Robbins' vertical conveyor systems can move high volumes as quickly as a horizontal conveyor system, and can do so from a shaft hundreds of meters deep.

Robbins has two vertical conveyor designs: the traditional "S" type and space-saving "J" type. For a deep shaft application, use a steel cord belt "S" type conveyor. For smaller diameter shafts where space is at a premium, "J" type conveyor may be the perfect economical solution.

ROBBINS "J" TYPE FEATURES AND BENEFITS

- Belt tension is lower so supporting structure is lighter
- A fabric-core belt is used, which is readily available and easy to repair
- Smaller foot print in the shaft, which frees up valuable space
- Lower cost per meter of depth
- Belt path eliminates reverse bends and the need for "edge" rollers so cross-rigid belt is not required

ROBBINS "S" TYPE FEATURES AND BENEFITS

- Industry standard proven design
- Ability to curve up to 90 degrees
- Less spills in the shaft and during loading

STACKER & OVERLAND

Frequently project constraints mean that muck must be transported anywhere from 200 m to 5 km away from the jobsite to a location from where it can be removed. Overland conveyors can be fitted with maintenance walkways or totally enclosed. Also, they can be elevated, with wind guards and protection against rain or freezing.

For superior muck storage, stacker conveyors are key. Robbins supplies a range of stacker conveyor designs, from a simple fixed incline conveyor to a cable-stayed radial stacker with the capacity to store the muck from several days of tunneling production by rotating to deposit material in kidney shaped piles.



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