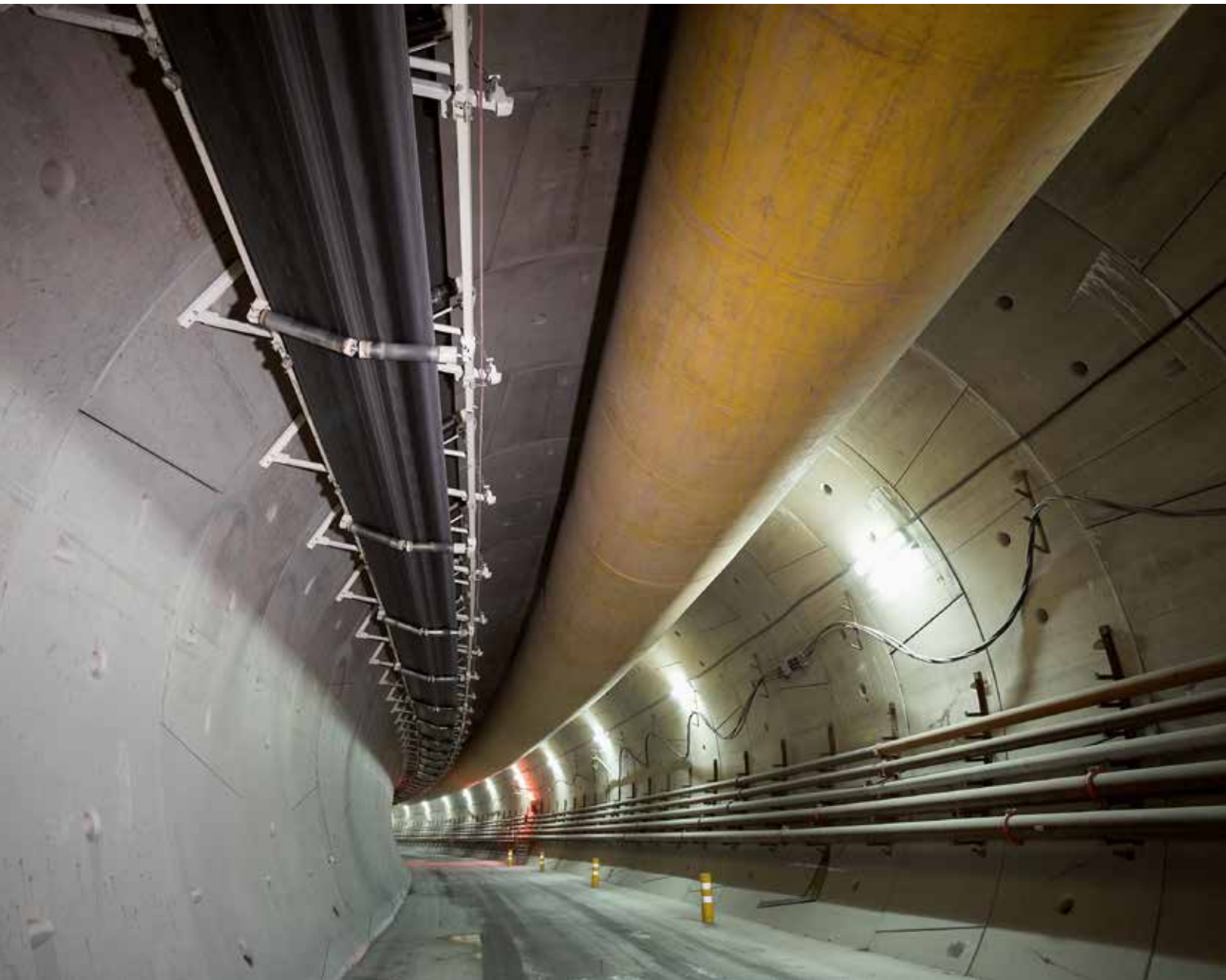


# KOMATSU



## Tunnelling Conveyor Systems







## Muck and spoil handling experience to count on

Komatsu has been designing and supplying materials handling equipment for mining and industrial applications for decades.

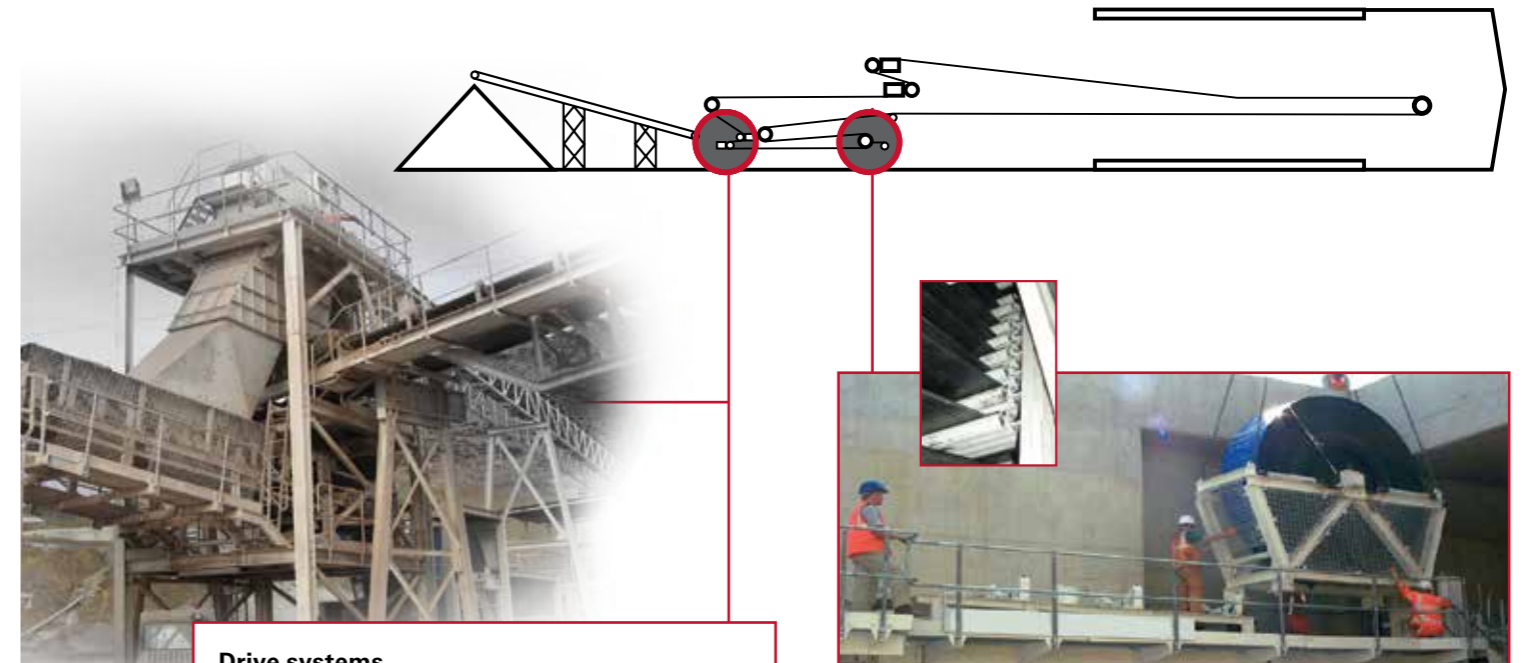


Conveyor systems provide an efficient, reliable, cost-effective and lower-risk method of removing muck and spoil from tunnelling excavation sites. Since the late 1980s, when the benefits of using conveyor systems in tunnelling projects first became apparent, we have been a leader in conveyor equipment designed and built to withstand the harsh conditions associated with tunnel construction. Our tunnelling project reference list, which is available upon request, shows the depth and breadth of our experience in providing conveyor solutions for tunnelling excavation.

Our facilities, people, know-how and on-going investment in our business, allow us to offer our customers engineered conveyor solutions for some of the most challenging tunnelling projects. The integration of logistics and service support personnel into our worldwide network of service teams further enhances our ability to make our tunnel conveying systems available on a global basis.

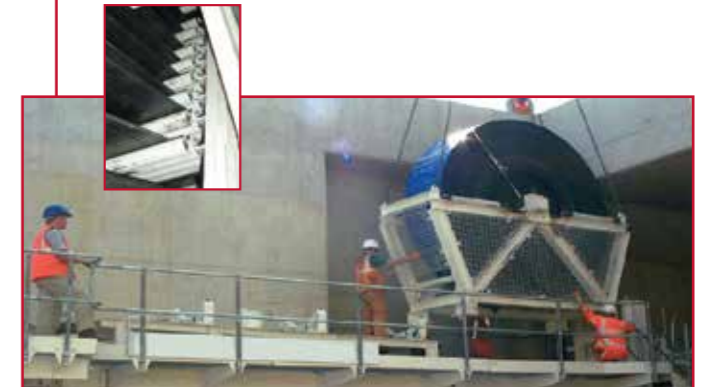
We provide a wide range of conveyor-based material handling equipment necessary for removing muck and spoil from tunnel excavation sites. This equipment is designed to smoothly handle the transport of materials from the tunnel excavation site to the surface and beyond.

## Drive systems, belt storage and belt tensioning



### Drive systems

We provide a broad range of drive units, designed to be modular in construction for ease of maintenance and adaptability for re-use from project to project.



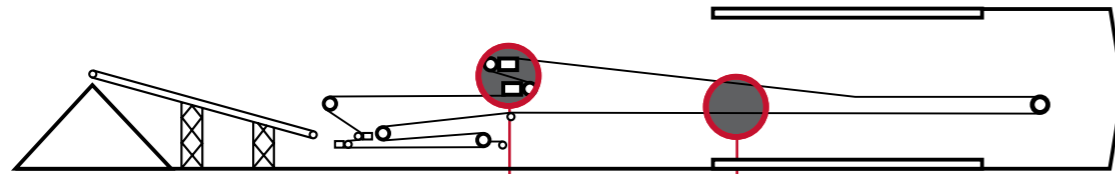
### Tensioning and storage systems

Large capacity belt storage systems giving typically 400 - 800m of storage, facilitating 200 - 400m of tunnel advance without interruption are available. In order to reduce the stoppage time associated with belt storage replenishment, the ability to complete two belt splices at the same time can, if space permits, be designed into the conveyor system. We also offer belt reeling equipment to ease handling and re-reeling operations when belting must be provided in cassette form due to road transportation limitations. Specially-designed belt support systems offer better belt control and optimise tensioning requirements. These belt support systems are coupled with the highly efficient Joy Hydraulic Tension Master System, which provides controlled belt release and drive tension management. Both are essential for maximising speed of tunnel advance.





## Conveyor structure and booster drive systems



### Conveyor structure

Main runs of conveyor structure, incorporating Joy standard components, are designed to suit the client's specific muck/spoil extraction and tunnel mounting parameters. This structure offers ease of assembly and the option of utilising either roof, wall or floor mounting. Systems have been developed for segment lined, shotcreted or unlined tunnel configurations.

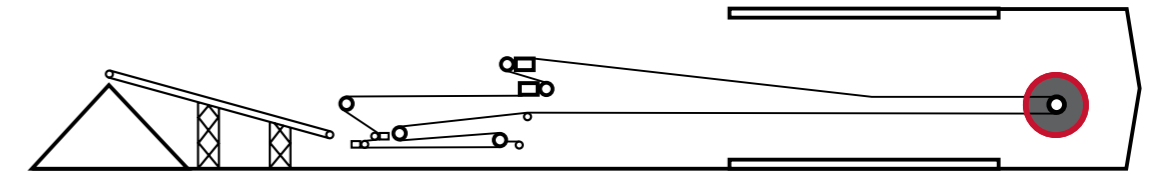


### Booster drive systems

We employ control technology to facilitate long distance belt conveying using a tripper booster drive configuration. The tripper power units are installed primarily within the top belt arrangement, but occasionally can be used to add power to the bottom return belt when needed depending on the requirements of the customer's system. Booster drives in long distance, continuous conveying allow the use of lower-strength belt types and reduce overall belt tension within the conveyor system. The ability to reduce and control tension improves belt security when negotiating tight horizontal curves. Booster drive systems also provide greater flexibility in situations in which final tunnel length could vary. The use of standard or common size power units throughout the conveyor system increases the potential to re-use main components on future projects.

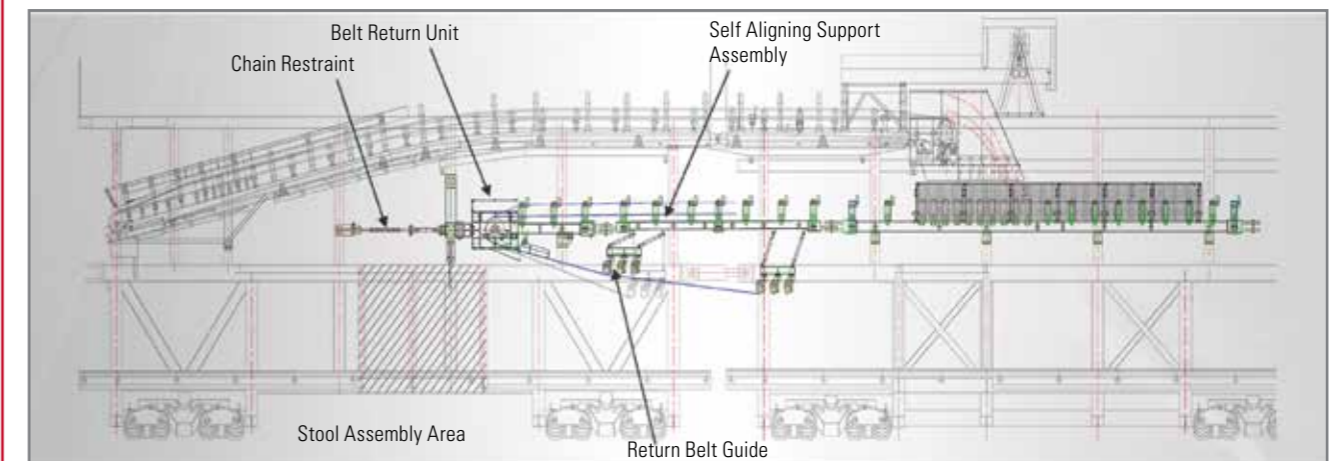


## TBM back-up interface and electrical control systems



### TBM interface with conveyor structure

We have worked with many of the major leading tunnel boring machine (TBM) manufacturers, road heading, and drill and blast contractors. The interface between the TBM and the conveyor structure is paramount to successful tunnel excavation advance. Material loading points and belt return configurations are designed specifically for each installation. Tunnel conveyor structure installation is designed to facilitate conveyor mounting during TBM operation, thus enabling uninterrupted tunnel advance.



### Electrical drive and control

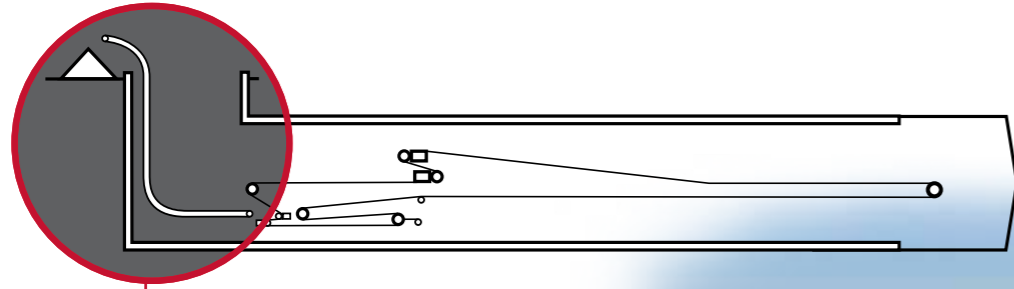
We provide complete electrical packages for tunnel conveyor systems from the interface to the TBM. These electrical packages include variable frequency drive systems. Belt drive control is achieved by the use of PLC-controlled VFD systems to give total control of starting and stopping. This is particularly important in long conveyor systems.

The PLC VFD combination is essential in the control of tripper booster systems. We utilize conveyor modelling software to achieve precise power input and belt tension control. We can provide a concise data information package encompassing system control logic and complete monitoring of drive systems.



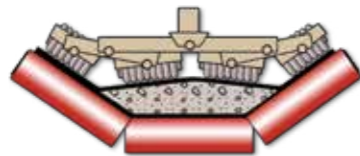


## HAC systems



The Joy high angle conveyor is a proven option for a variety of steep angle applications. In addition to tunnelling, the HAC system has the ability to handle coal, gravel, ores, excavated silts, sand, clay, refuse, municipal sludge and much more.

HAC systems in place around the world have demonstrated high availability and low maintenance costs.



HAC system technology has solved many high capacity, steep angle conveying problems, up to and including vertical lifts. The HAC system employs standard conveyor idlers and rollers and a proven sandwich-belt principle that overcomes the limitations typically encountered with many traditional methods of conveying.



## The conveyor alternative

### Safety

Conveyors are considered a lower risk as they are located close to the tunnel wall or roof area. No dangerous switching of muck cars is necessary, which reduces the likelihood of rail traffic accidents.

### Continuous Operation

By their nature, muck cars are intermittent. Conveyors allow the tunnel excavation process to proceed in a more reliable and, with the exception of belt storage replenishment, almost continuous manner.

### Flexibility

Roof or wall-mounted tunnel conveyors provide a dedicated muck removal system that does not interfere with the transport of segments and other supplies to the TBM.

### Productivity

Large belt storage capacity increases TBM utilisation, reduces construction time and results in lower costs. The near continuous handling of higher tonnages of muck and spoil is a visible, real-time benefit.

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