

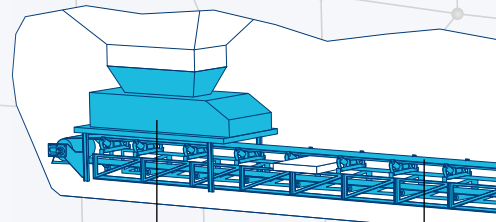
Key components for shaft hoisting TurboHoist portfolio



Leveraging a century of engineering excellence in mining conveyance

With more than 100 years of experience in underground coal mining, we offer tailor-made systems for shaft hoisting and customized solutions for mining conveyor technology.

Voith works with you to provide integral shaft hoisting systems for dependable and safe product transport as well as material transport from underground to above ground and vice versa. Discover our solutions for greater efficiency through optimized speeds, maximum safety and exceptional reliability.

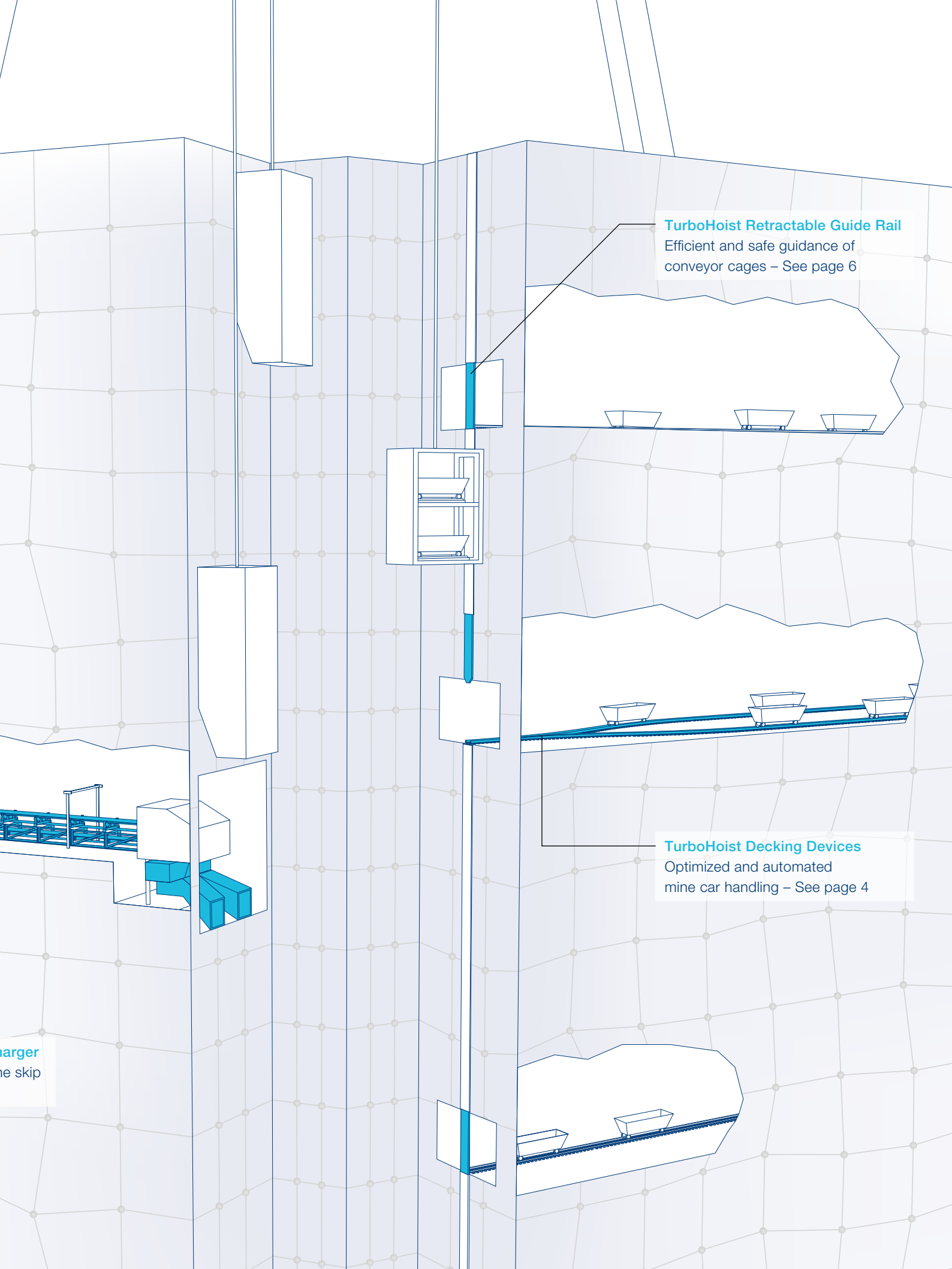


TurboHoist Hopper Discharger

Controlled withdrawal for smooth material transport – See page 9

TurboHoist Skip Ch

Reliable loading of th
– See page 8



TurboHoist Retractable Guide Rail

Efficient and safe guidance of conveyor cages – See page 6

TurboHoist Decking Devices

Optimized and automated mine car handling – See page 4

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e skip

Process-optimized mine car loading Voith TurboHoist Decking Devices

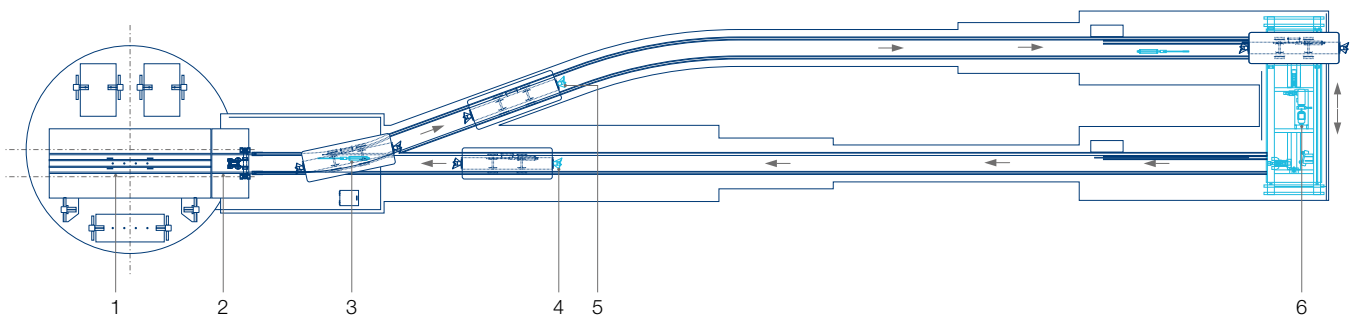
In underground mining, rail-guided mine car systems are a safe and space-efficient transportation method. Mine cars transport products as well as materials in the shaft. Voith TurboHoist Decking Devices permit a secured and effective operation using automated processes.

Rail-guided mine car systems handle the mine cars in the shaft area, managing the loading and unloading of the cage. The double-sided inset ensures fast loading and unloading of the cage. As an alternative, making use of the switchback inset drastically reduces your excavation costs. It handles both loaded and empty mine cars on two rails on one side of the shaft and saves space and material costs for the bypass next to the shaft. The parallel rails are connected by means of a switch, resulting in one rail leading to the cage. A pull-off device

withdraws the incoming mine car out of the cage, handing the car over to a turn pusher that pulls it over the switch on the one rail. The push-on device from the other rail subsequently moves the mine car that waited in front of the shaft into the cage.

Voith is your experienced project partner from the very start. Besides engineering, manufacturing and delivering the main components of your system such as tilting platform, push-on and pull-off devices and barriers, we develop full solutions best-suited to your requirements and demands. Individual additions such as integration of the control in the shaft signal system, design of the complete system in ATEX-quality, or integration of a switching platform for easy moving the mine cars among the different rails are separately assessed and incorporated.

Switchback inset with mine car circuit

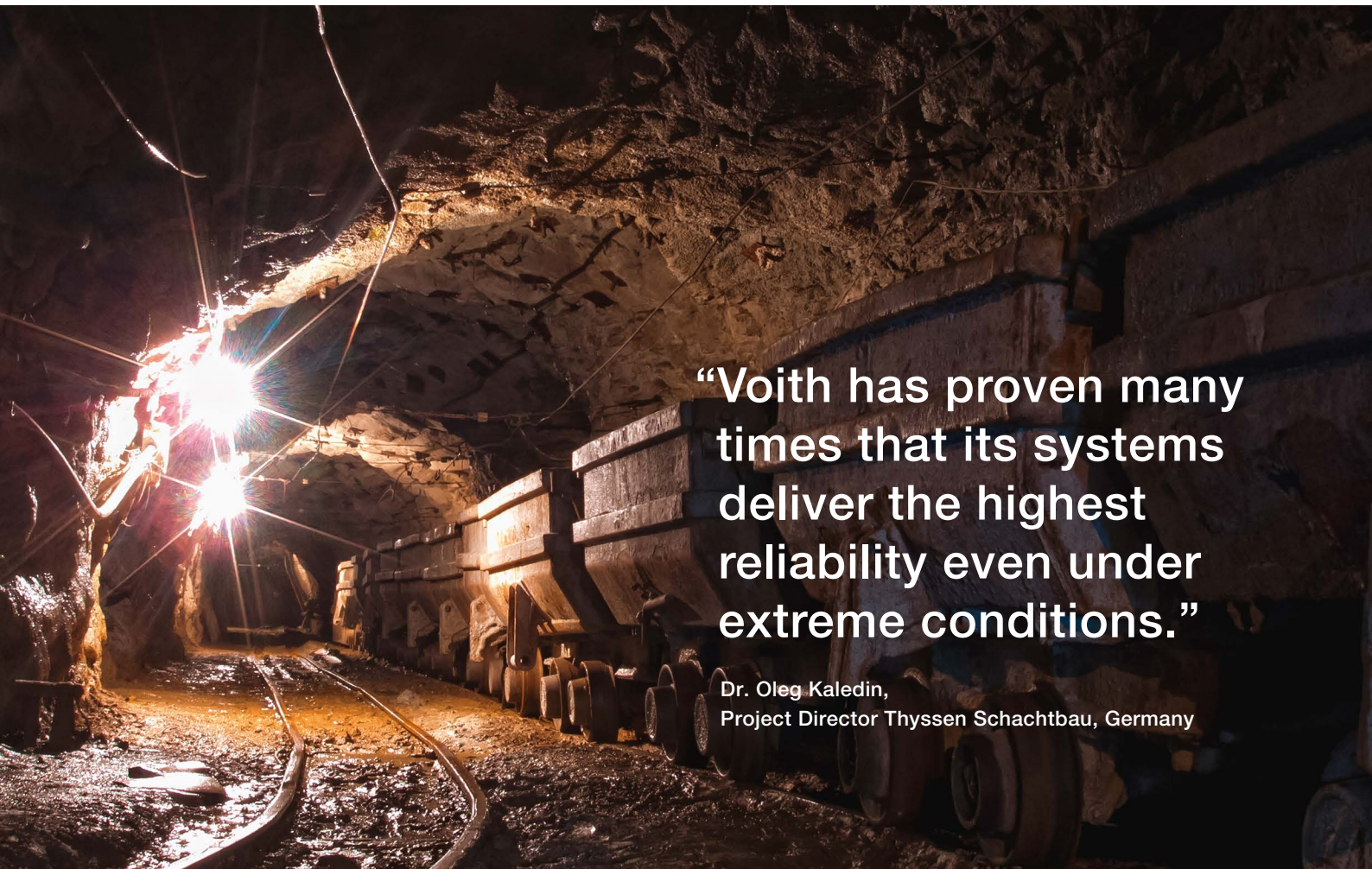


- | | |
|--------------------|-------------------------------|
| 1 Cage | 4 Push-on and pull-off device |
| 2 Tilting platform | 5 Turn pusher |
| 3 Switch | 6 Switching platform |

With Voith TurboHoist Decking Devices, high safety standards prevail in mine car operation thanks to guided and pre-defined movements of the mine cars, controlled and limited speed, and safety devices prior to accessing the shaft area. Our products allow moving the wagons in a safe, reliable and precise way in the area of the shaft as well as onto and off the hoist. Furthermore, the system permits safe passage for mine personnel onto and off the hoist.

Benefits and uses

- + Individual and customized design
 - + Safe and reliable operation
 - + Turn-key solutions
 - + On-site service and spare-part supply
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“Voith has proven many times that its systems deliver the highest reliability even under extreme conditions.”

Dr. Oleg Kaledin,
Project Director Thyssen Schachtbau, Germany

More cost-effective and safer shaft transport

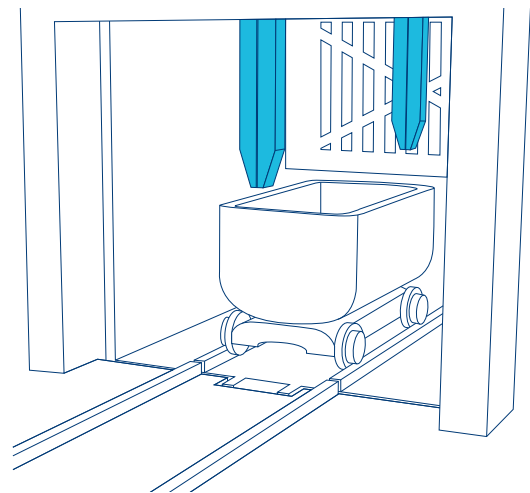
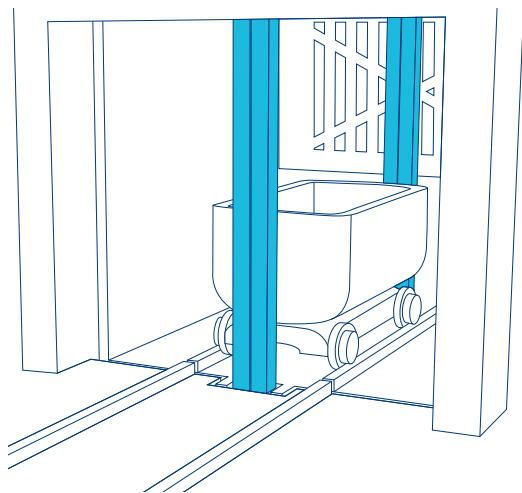
Voith TurboHoist Retractable Guide Rail

In mines with several floor levels, the Voith TurboHoist Retractable Guide Rail enables fast thoroughfare of the conveyor cage along the floor level. The unique Voith solution also greatly increases safety as there is no need to switch over to a different guiding system in the floor area.

The Voith TurboHoist Retractable Guide Rail was specifically developed for guiding conveyor cages in mine shafts in a reliable, efficient and safe way. While it is only possible to move the conveyor cages when the guide rail is closed, the shaft signal system provides additional control and a high degree of safety by also monitoring the closed state of the

system. Compared to classic corner guiding systems, the Voith TurboHoist Retractable Guide Rail forms a continuous guide without any obstacles, resulting in movement along the floor levels at conveyor cage speeds of up to 16 m/s. For floor level thoroughfares no braking is required, allowing hoist operation at constant speed in the entire shaft. Using a special bracing technique, our technology makes it possible to load and unload the conveyor cage across the entire opening. This way, our technology helps you achieving a capacity increase of up to 5 % per floor level, representing a significant productivity increase.

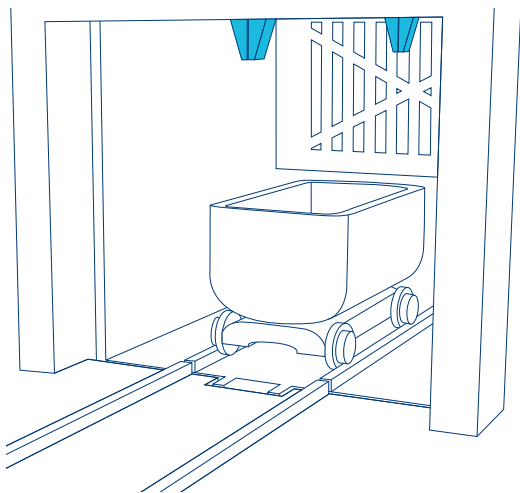
Voith TurboHoist Retractable Guide Rail



Operating principle

The retractable guide rail consists of a fixed and a retractable guide-rail section. A hydraulic cylinder moves the retractable section (moving in and out).

The retractable section has external dimensions identical to the fixed guide rail when fully extended. As a result, it forms a continuous guide without any interruptions. A locking device secures both the opened and closed state. To prevent uncontrolled retraction of the moving guide rail section, the electrical control system is equipped with all the required links to the shaft signal system.



Benefits and uses

- + High efficiency by conveying up to 4–5 % more on each floor level thanks to the high speed
 - + Greater safety due to the continuous guide without interruption
 - + Replaces standard slow-speed corner guiding
 - + Exceptional safety when guiding the cage on the floor level
-

16 Conveyor stage speeds of up to m/s

Higher efficiency of up to 5%

Quick and accurate skip loading

Voith TurboHoist Skip Charger

In underground mining, products are vertically transported in the shaft using a skip. With our extensive experience in conveyor technology, we can offer systems with maximum productivity. We make sure that the skip is filled quickly and precisely.

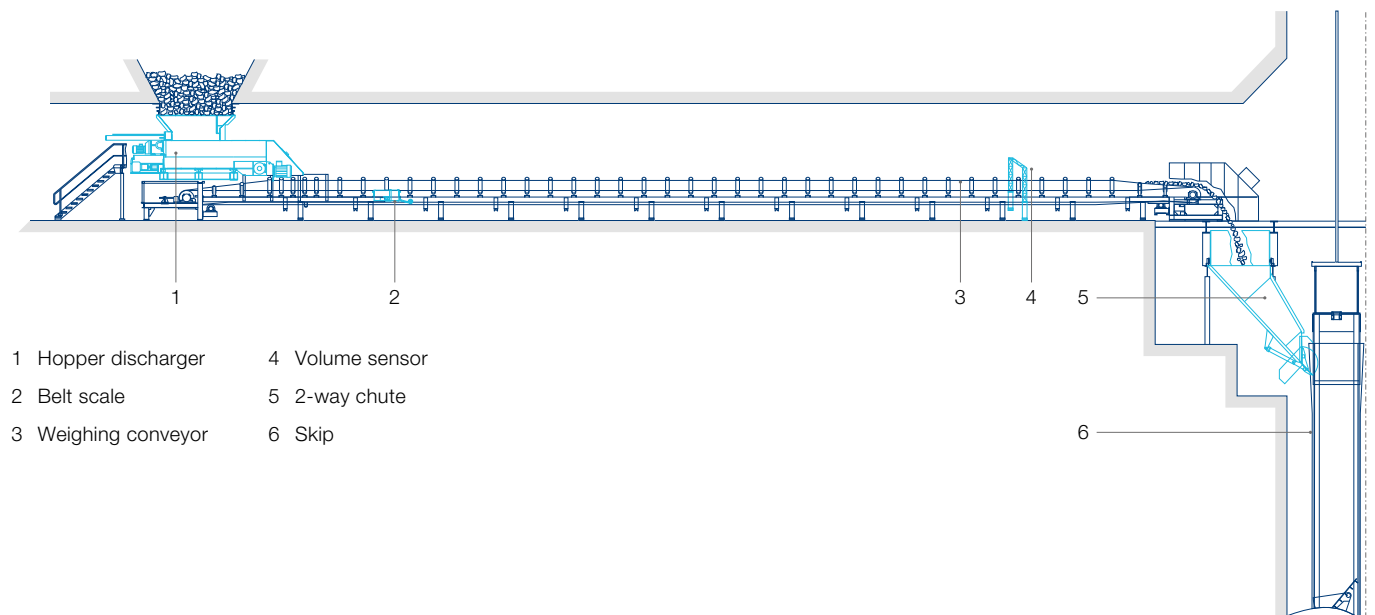
The Voith TurboHoist Skip Charger is used for the controlled and reliable loading of the skip. This encompasses planning, design and production of the entire system – from the hopper using the Voith TurboHoist Hopper Discharger to the weighing conveyor with the transfer chute and gap reconciliation all the way into the skip. The exact timing of the different loading cycles is of utmost importance.

The system is adapted to the entire operation and designed in accordance with the material flow (charging and discharging of the system) so that all processes are optimally matched to one another. Making use of the Voith TurboHoist Skip Charger not only ensures a reliable and efficient operation designed by an experienced partner but also increases productivity and minimizes operating costs by avoiding shutdowns and start-ups of your system.

Benefits and uses

- + Optimal matching to the environment
 - + Increase of productivity as all processes are perfectly coordinated
 - + Planning, engineering and manufacturing of complete systems from hopper to skip
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Voith TurboHoist Skip Charger



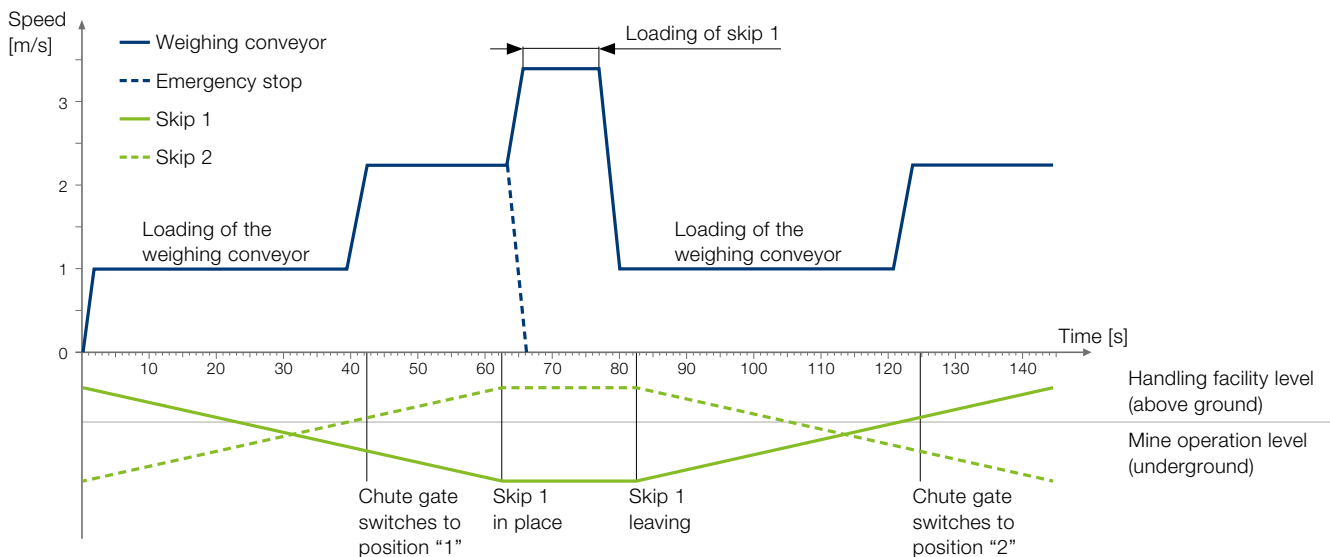
Operating principle – high availability and smooth material transport starting with the Voith TurboHoist Hopper Discharger

Hoppers are used to store coal and other bulk materials. The Voith TurboHoist Hopper Discharger permits controlled withdrawal of the material from the hopper in order to charge the subsequent conveyor with a constant volume of material. This ensures smooth material transport and high productivity for your system.

The weighing conveyor of the TurboHoist Skip Charger is used to carry, transport and temporarily store the material to be loaded on the skip. In order to guarantee the optimal

charging of the skip without overflow, the weighing conveyor works with two speeds. When no skip is in place, the Voith TurboHoist Hopper Discharger feeds material to the weighing conveyor that moves slowly, allowing a high loading rate of the conveyor belt. This way, a maximum amount of material is stored on a minimum belt length. While the integrated volume sensor is used to additionally monitor the volume of material on the belt, the belt scale can adjust the feeding time according to changes in the material nominal weight on the conveyor in order to ensure the best possible efficiency and productivity of the system. A transfer station, e.g. a two-way chute, finally directs the material from the belt conveyor to the desired skip, optionally making use of a gap reconciliation.

Interaction of Skip Charger key components



Our service – Part of your business

World-class service and support

Whether it is support or system operation, availability is paramount. We ensure that all components are engineered and built right – and we're always there if you need us. Belt conveyor components from Voith have been proven to perform for many years in the most demanding environments with minimal service intervention. In the rare case when service is needed, local teams are available 24/7 to ensure the efficiency, safety and reliability of your system.

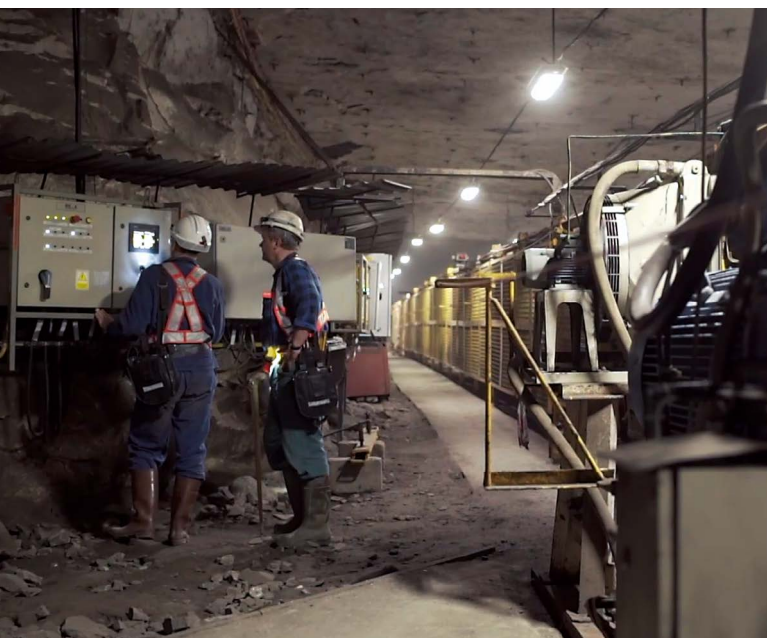
Engineered for excellence, built for performance

Voith engineers have the knowledge and experience to advise you on a total solution – from couplings to complete drives. Everything is checked and rechecked before shipment, ensuring failure-free products of the highest quality. Voith service engineers assemble and inspect fluid couplings on-site and support commissioning of your entire driveline.

New and existing drives can benefit from a range of checks and tests to maximize performance. Beyond our standard warranty, we offer service contracts for the life of your system. If you ever need spare parts, you're guaranteed availability for the system's lifetime. All replacements meet precise Voith specifications and are engineered for your particular system.

Protecting your investment in every possible way

- + Optimized solutions from couplings to full drive packages
 - + Engineering new systems and optimizing existing systems
 - + Drive system modernization and retrofits
 - + System analysis, overhaul and repairs
 - + Commissioning and after-sales service
 - + Lifetime availability of spare parts
 - + Training and service agreements
-



At your disposal

A worldwide expert network

Offices worldwide



With offices in all large mining markets of the world, Voith has an outstanding sales network. Voith has been a partner to the industry and has provided its clients with belt conveyor components for many years.

The products are used for conveying and the transport of raw materials both in underground and open-cast mining. And with our worldwide service center and parts network, whatever you need is always close at hand.

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