

# Improve mining safety and control Torque limiting couplings



**DRIVE**

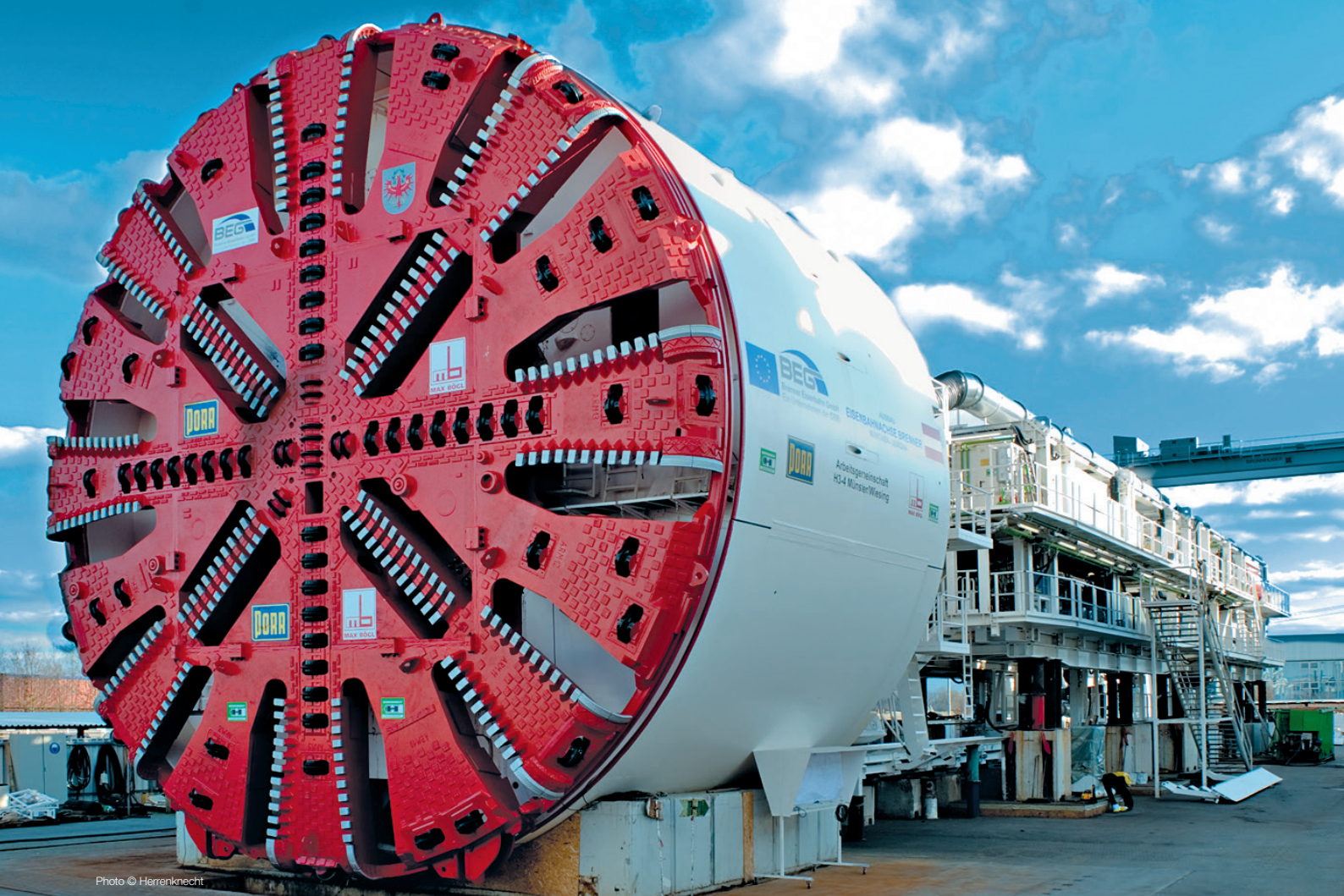


Photo © Herrenknecht

# Control your production with torque control

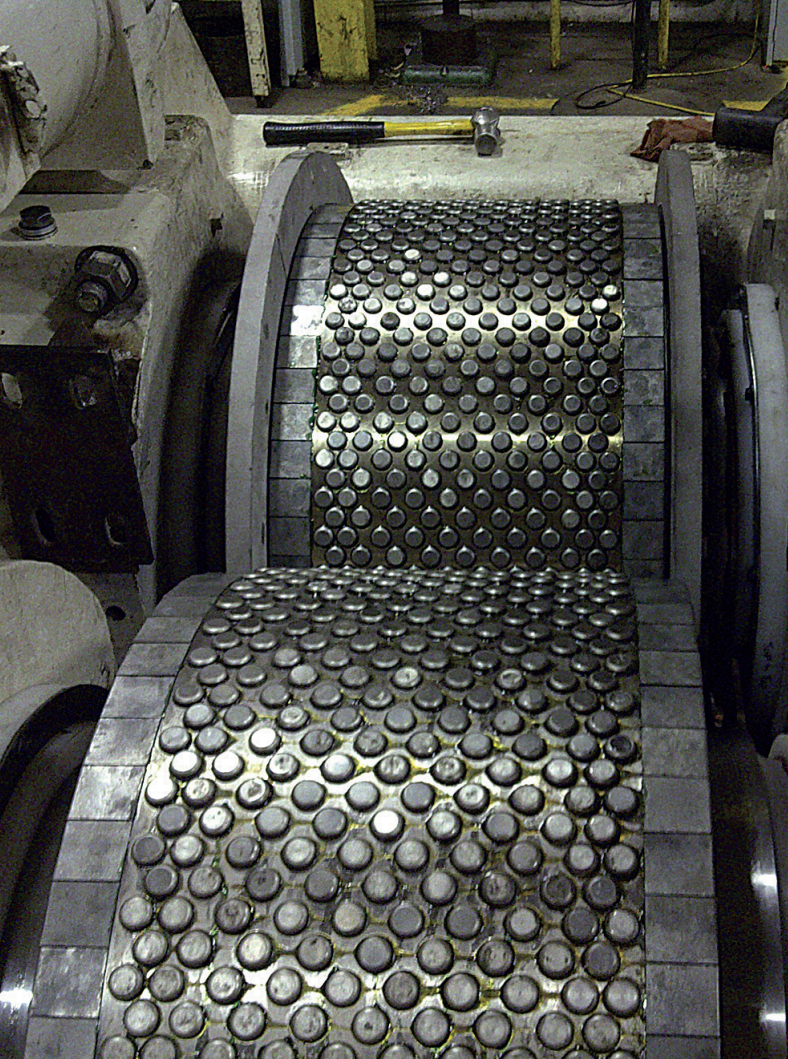
**Torque makes the world go around. It is necessary to transmit torque and limit it to optimize production in every industry. We specialize in torque control that suits your application.**

Within mining applications, torque limiting couplings protect big, expensive, and heavy machinery by releasing or slipping at an exact set torque. Connection couplings transmit torque, often in conveying and excavating.

We invite you to contact us to ensure the best torque coupling solution, considering your operation and production process.

## **Quick summary:**

- Prevent damage to the machinery
- Ensure production uptime and avoid costly downtime in case of a severe breakdown
- Lengthen the life span of the machinery by avoiding overload cases increase profit
- Provide a backlash-free connection

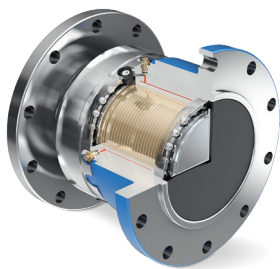


Application	Challenge	Solution
<b>Chain conveyors</b>	Falling stones or metal parts that get stuck in the chain may result in a chain break that leads to an inoperational conveyor. Repair, in this instance extremely time-consuming.	Our torque limiting coupling control the slip; this saves the chain driveline from catastrophic failure without interrupting production.
<b>Crushers and roller presses</b>	When uncrushable objects, machine parts, or unbreakable or bulky material gets stuck in the crusher.	The coupling facilitates an instant slip and release that protects the driveline from catastrophic failure.
<b>Ball mills</b>	Solving electrical problems, such as short circuits or malsynchronization of a multiple motor drive system and everyday operational challenges, such as when massive frozen material gets stuck.	Voith torque limiting couplings protect drivelines from torque peaks caused by synchronization problems or frozen material.
<b>Tunnel boring machines (TBM)</b>	Hardened rock layers or high drilling speeds can result in extreme torque peaks.	Instantaneous slip and release are ensured when the torque limiting couplings are installed, alleviating torque peaks, thereby protecting the driveline.

# Overview of basic functions

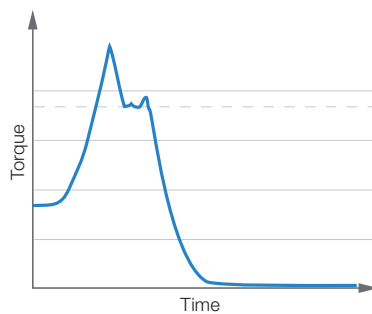
Our torque control couplings prevent machine damage, ensure continuous production, and limit costly breakdowns by acting as a mechanical fuse that slips and releases when the driveline experiences high torque peaks.

## Coupling and function



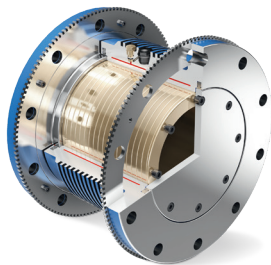
SafeSet

## Release curve

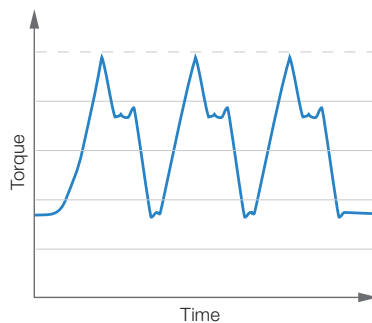


## Benefits

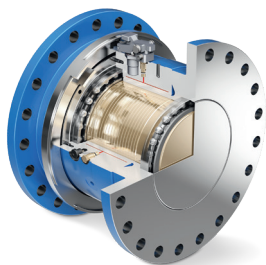
- + Maximum driveline protection
- + Accurate and constant release
- + Adjustable release torque



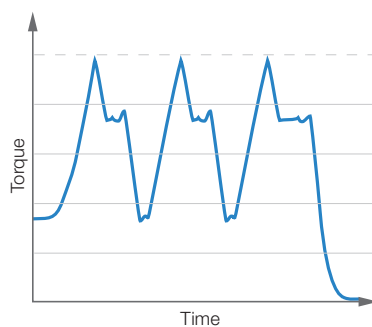
SlipSet



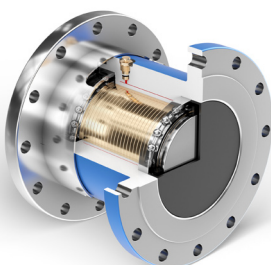
- + Maximum driveline protection
- + Process improving coupling with controlled slip for continuous production
- + Ability to slip without releasing to reduce short duration and dynamic peak torques
- + Adjustable slip torque



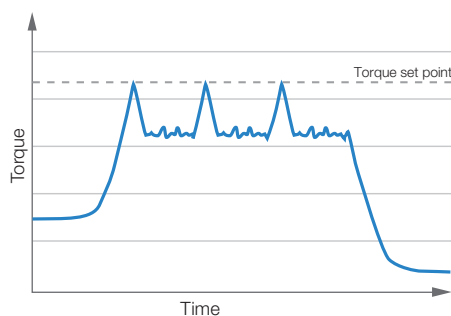
SmartSet



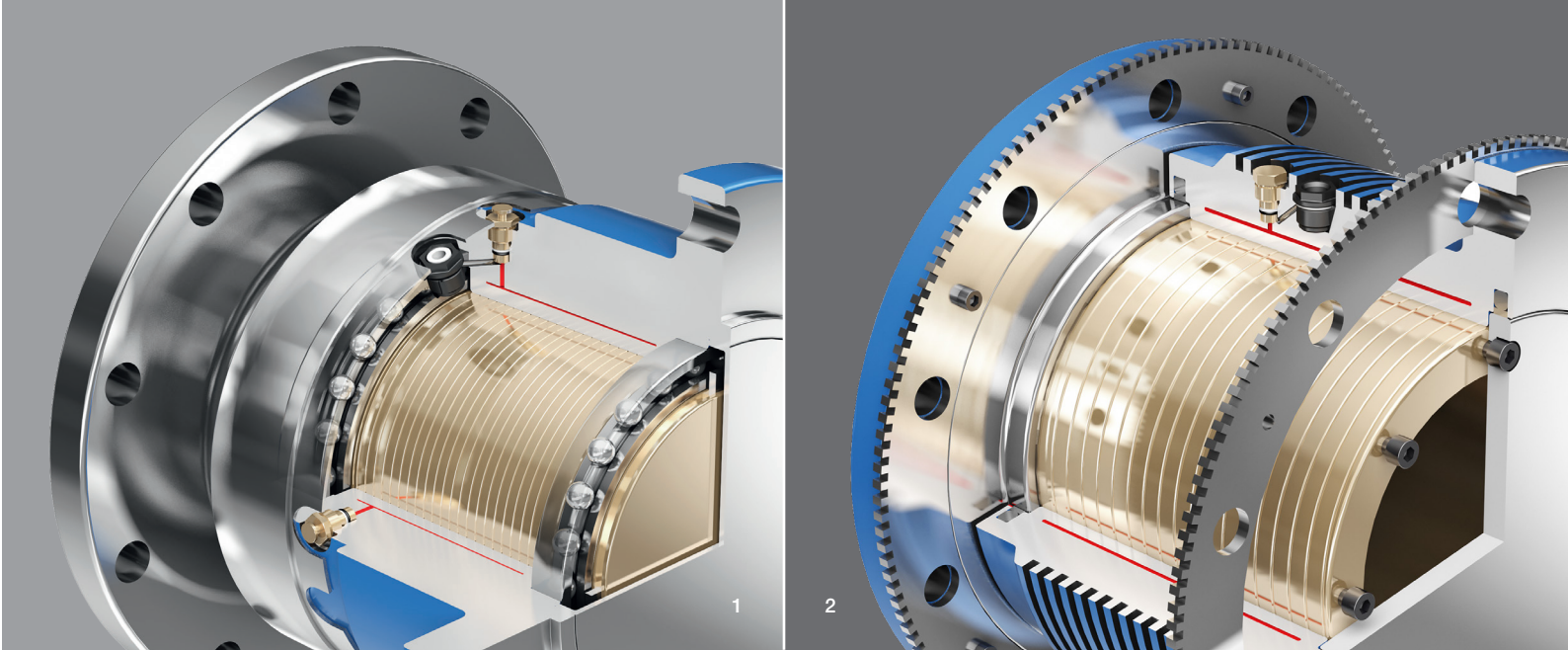
- + Maximum driveline protection
- + Process improving coupling with controlled slip
- + Ability to slip without releasing to reduce short duration and dynamic peak torques.
- + Accurate and constant release
- + Adjustable release torque



SafeSet EZi



- + Maximum driveline protection
- + Accurate and constant release
- + Adjustable release torque



1 SafeSet  
2 SafeSet Ezi extended slot in shear ring

# SafeSet and SafeSet Ezi – instant driveline protection

The SafeSet principle is simple: friction and flexibility, no material fatigue, full torque transmission, and adaptability. We develop solutions for the most demanding application requirements.

SafeSet releases instantly if the torque exceeds the set level in an overload peak torque situation. New to the product portfolio, SafeSet Ezi has an additional function and can withstand short torque peaks without disengaging. This peak-shaving function facilitates protection during quick transient loads without releasing – the coupling releases exactly as the SafeSet in a more prolonged overload situation.

## Design features:

- Torque release between 1 and 20 000 kNm
- Adjustable torque settings to suit all applications
- Immediate protection and release at a preset torque in the event of a torque overload

## Adding digital intelligence

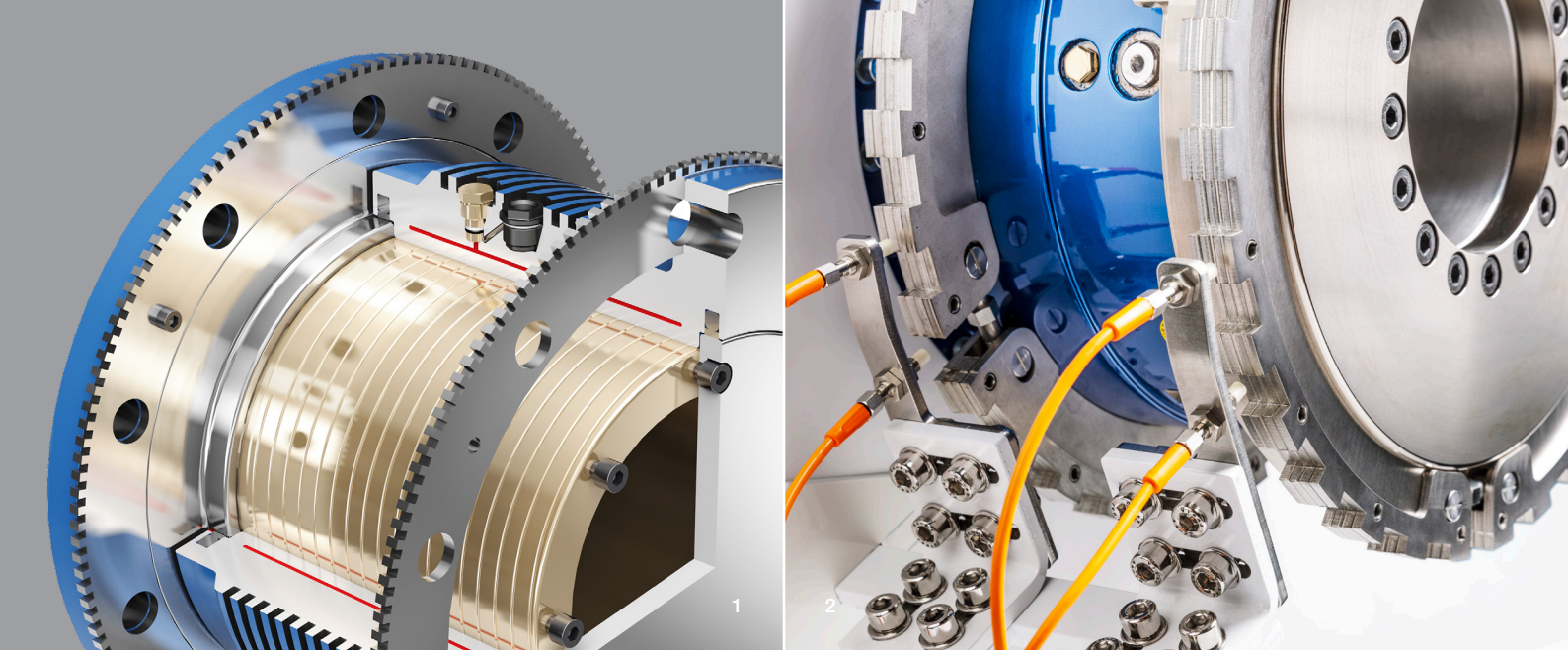
Additionally, monitoring the status of your coupling is simple with Voith Dtect. This fully compatible optional system provides:

- Peak load slippage measurement
- Speed
- Disconnection indication and event logging
- Service indicators

The SafeSet includes a twin-walled hollow sleeve. Friction is produced upon expansion by pressurized hydraulic oil. The integrated shear tube holds pressure to ensure a constant but easily adaptable torque transmission. The coupling slips and the shear tube shears off in an overload situation. Oil pressure drops, and the frictional surfaces separate. The coupling rotates on the bearings without transmitting any torque.

## Benefits:

- + Maximum driveline protection – damaging inertia disengages at once
- + Set torque remains constant over time
- + Quick resetting for maximum uptime
- + SafeSet is custom-made to suit individual requirements
- + SafeSet Ezi, our next-generation torque limiting coupling has further technical improvements like its peak shaving function



- 1 SlipSet
- 2 SlipSet with Dtect coupling monitoring system

## SlipSet – controlled slip

SlipSet ensures continuous production and is designed to slip in an overload situation. By acting as a shock absorber in drives with frequent torque peaks, the SlipSet prevents time-consuming downtime due to repair work.

### Operation

When a temporary torque overload occurs, the SlipSet coupling slips to limit the torque peaks, enabling continuous production. If the oversupply of torque persists, the coupling monitoring system, Dtect, detects the slippage and informs the operator that the driveline power needs to be adjusted.

### Design features:

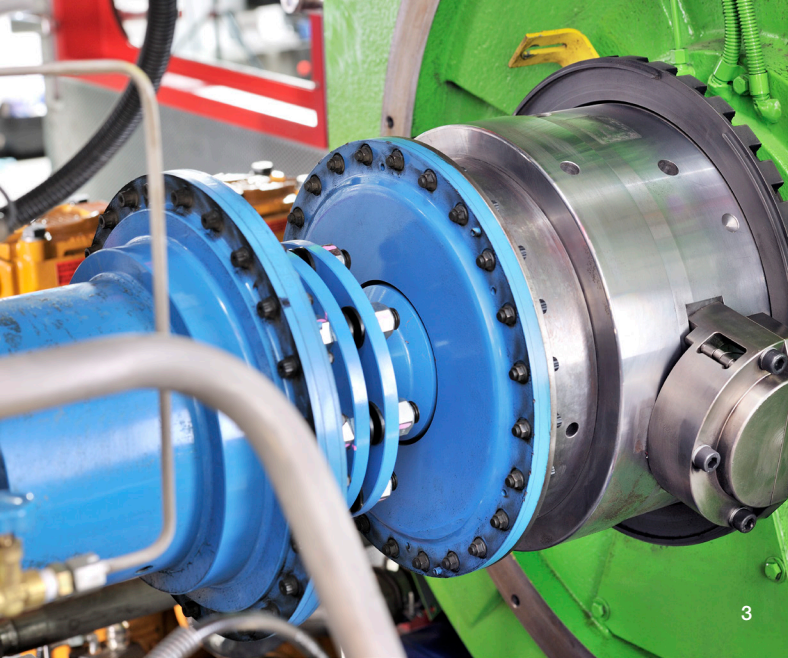
- Torque release between 1 and 20 000 kNm
- Adjustable torque settings from 50 to 100 % of max torque designed setting
- Slip at a preset torque
- Immediate slip in the event of a torque overload

The SlipSet torque limiting coupling is perfectly suitable in applications where there is a need to handle short-peak loads.

SlipSet has similar technology to the SafeSet coupling but with the ability to instantly slip instead of release in the event of a torque overload. The SlipSet units are very compact and can be installed in areas with a minimum of space to ensure the most optimal position in a driveline.

### Benefits:

- + Ensures continuous production due to torque limitation without disengagement
- + Minimized installation cost thanks to a compact design
- + Less maintenance cost due to instant overload protection that protects your driveline from premature wear



3 SmartSet

4 SmartSet device

# SmartSet – controlled slip and release

SmartSet is a torque limiting coupling with controlled slip based on the same technology as SafeSet, with the additional ability to also slip without releasing, to reduce the short duration and dynamic torque peaks.

## Operation

The SmartSet coupling can slip up to 120° without releasing to limit short torque peaks. If the torque peak is of longer duration in an overload situation, the SmartSet coupling will fully release and save the driveline from severe damage.

## Design features:

- Ability to slip up to 120° during a torque peak
- Torque release between 1 and 20 000 kNm
- Adjustable torque settings from 50 to 100 % of max torque setting
- Mechanical slip and release mechanism

Based on the same technology as the SafeSet coupling, SmartSet has an additional slip feature integrated via a SmartSet device. The rotational speed of the driveline activates this centrifugal device, enabling the coupling to slip during high transient torques inherent in many applications. The SmartSet device will reset itself at zero rpm.

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## Benefits:

- + Ability to slip without release to reduce the short duration and dynamic peak torques
  - + Ensuring accurate and constant slip, as well as torque release
  - + Adjustable slip and release torque
  - + Maximum driveline protection
  - + Release during blockage
-

# Dtect – adding digital intelligence to couplings

**Voith Dtect adds digital intelligence to your torque limiting couplings to get real-time monitoring of the driveline performance, productivity, and status. The system is designed to communicate coupling status and support better decision-making to predict potential problems, protect the driveline, and prevent costly downtime. This will increase productivity and reduce maintenance.**

Voith Dtect makes it easy to supervise and monitor your torque limiting couplings. The system is built on a PLC-based platform using industrial communication standards for easy integration in your existing process monitoring systems.

Dtect detects coupling slippage and/or release caused by high torque peaks in a driveline. By monitoring slippage, it is possible to adjust the load of the driveline or to perform a controlled shutdown instead of releasing a coupling. This saves production time, maintenance time, and spare parts costs. When non-slip couplings are in operation, the release detection instantly informs the operator that the drive has been disconnected. This information can be used to maximize production efficiency.

Data collected from Dtect can also tell if your driveline is running at its best. By monitoring slippage, it is possible to adjust the driveline load or perform a controlled shutdown instead of releasing a coupling. Productivity improvements are possible by analyzing data collected from the installation of Dtect.

## Multi-monitoring

Monitoring one or more couplings within one system and acquiring real-time status information is now possible with Dtect. Monitoring one or more couplings within one system and acquiring real-time status information is now possible with Dtect. Dtect monitors each coupling individually and communicates the different parameters through one common interface.

## Integrated HMI touch panel

Dtect can be fitted with an integrated touchpanel, and the HMI touch panel provides the current onsite status providing a clear overview of operations and control.

## System integration

Dtect is supplied with Modbus TCP/IP for easy integration into the existing process information network. Thanks to its flexibility, it can be adapted for other communication standards depending on your needs.

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### Benefits:

- + **Realtime monitoring of the driveline status**
  - + **Possibility to optimize driveline performance**
  - + **Integration with existing process monitoring systems enables platform independent supervision of data**
  - + **Prevent costly downtime with proactive maintenance of a coupling**
  - + **Visual warning indicators can be used for making decisions and actions**
  - + **Increase productivity of the driveline**
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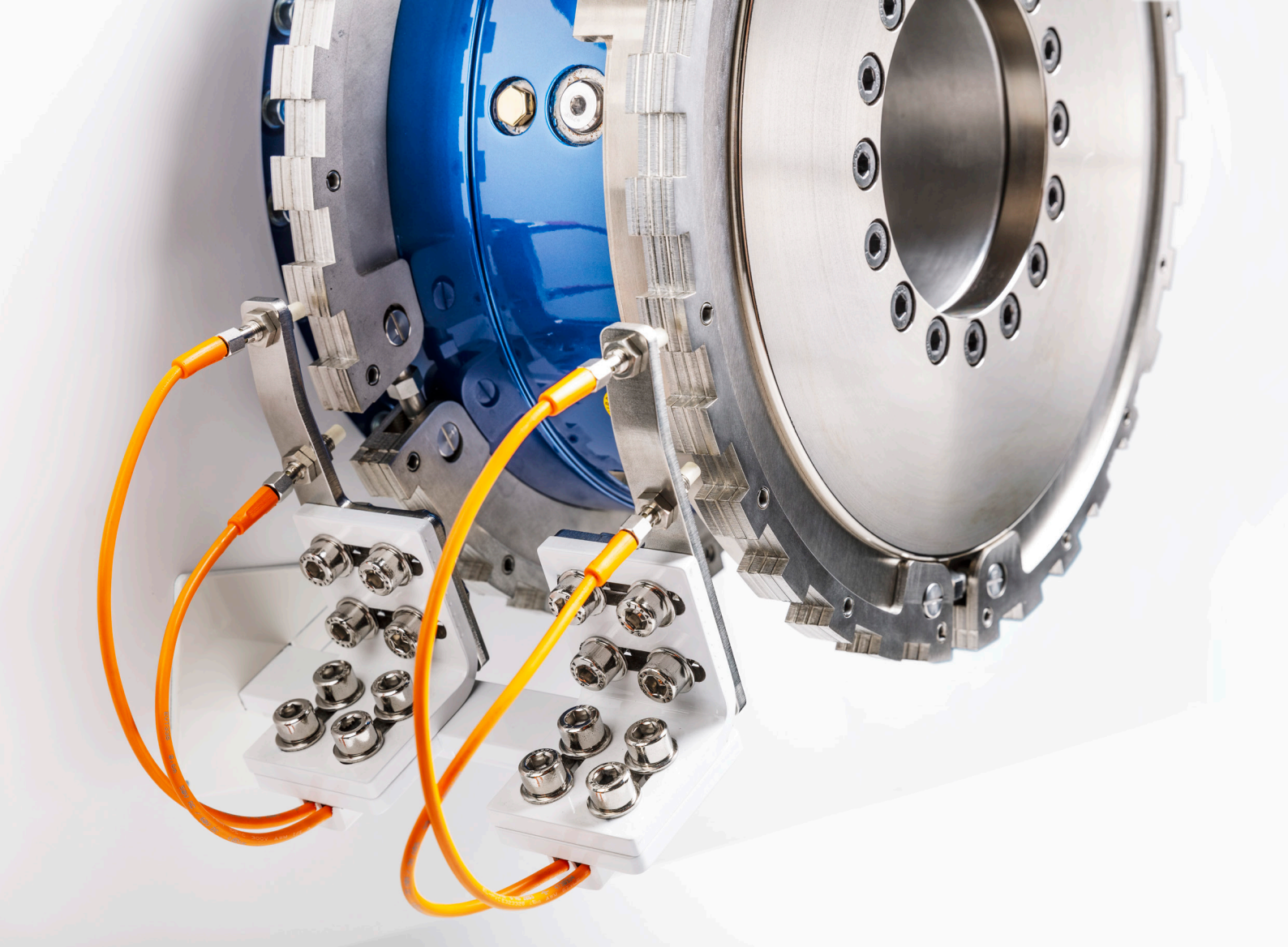
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### Technical data:

<b>Power supply</b>	24VDC, 1,5A minimum
<b>Working temperature range</b>	-30° to +45°C
<b>Relay output, max</b>	30 VDC, 2A, 30W
<b>Enclosure material</b>	Steel cabinet, IP66ww
<b>Enclosure dimensions</b>	380 x 300 x 170 mm
<b>Sensor cable length, max</b>	25 m

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## System overview

## Features

Slip monitoring system	Release detection	Speed detection	Slip monitoring	Condition monitoring	History log	Extended sensor range	Dual couplings	User defined limits
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### Type

Dtect.Slip 320.2	•	•	•	•	•		•	•
Dtect.Slip 320.1	•	•	•	•	•			•

## Release detection system

### Type

Dtect.Release 221.1	•	•		•	•	•		•
Dtect.Release 220.2	•	•		•	•		•	•
Dtect.Release 220.1	•	•		•	•			•



# Chain conveyors

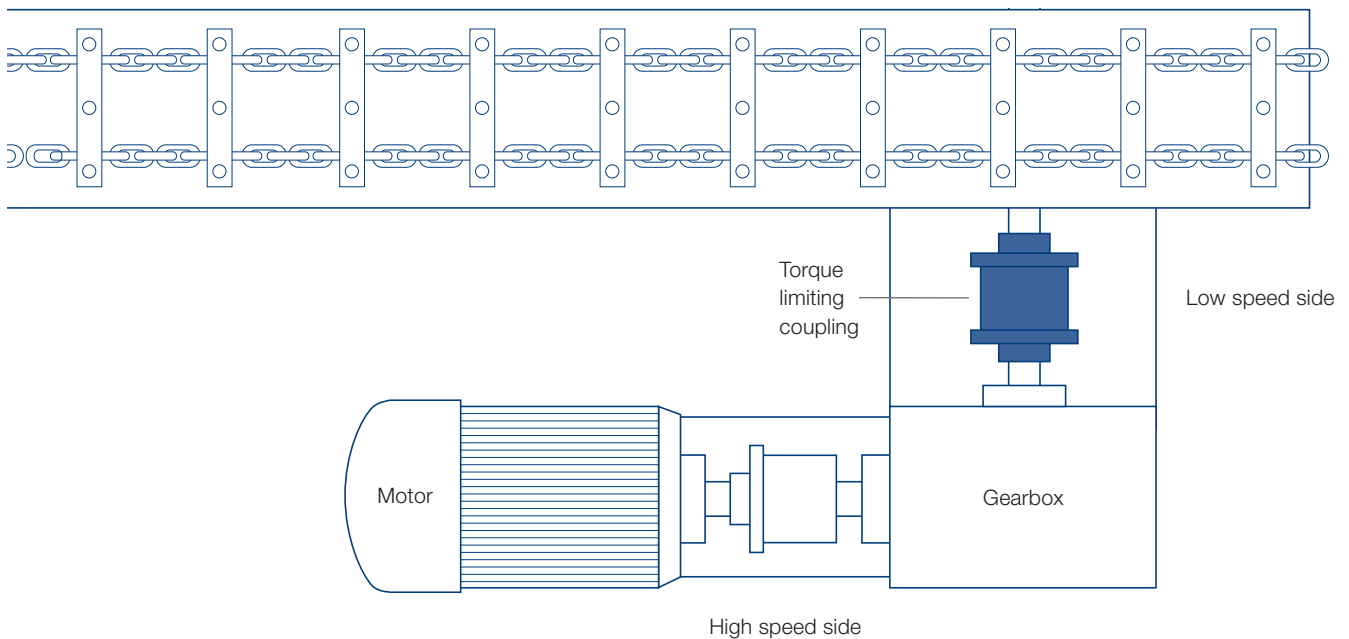
Chain conveyors can suffer unwanted downtime due to conveyor chain breakage or driveline failure, often resulting from torque overloads caused by material getting stuck.

An overload can cause both damage to the drive chain and extensive operational downtime, as the conveyor needs to be cleared of built-up rock or coal.

## Discover our torque limiting range of solutions:

- SlipSet
- SafeSet
- SmartSet
- AutoSet

### Armored face conveyor driveline





# Gyratory and cone crushers

Uncrushable objects can become stuck in the crushing chamber when mined rock and materials are processed. As the momentum of the driveline and motor continues to deliver torque, there is an essential risk of severe damage to the crusher causing production stoppage.

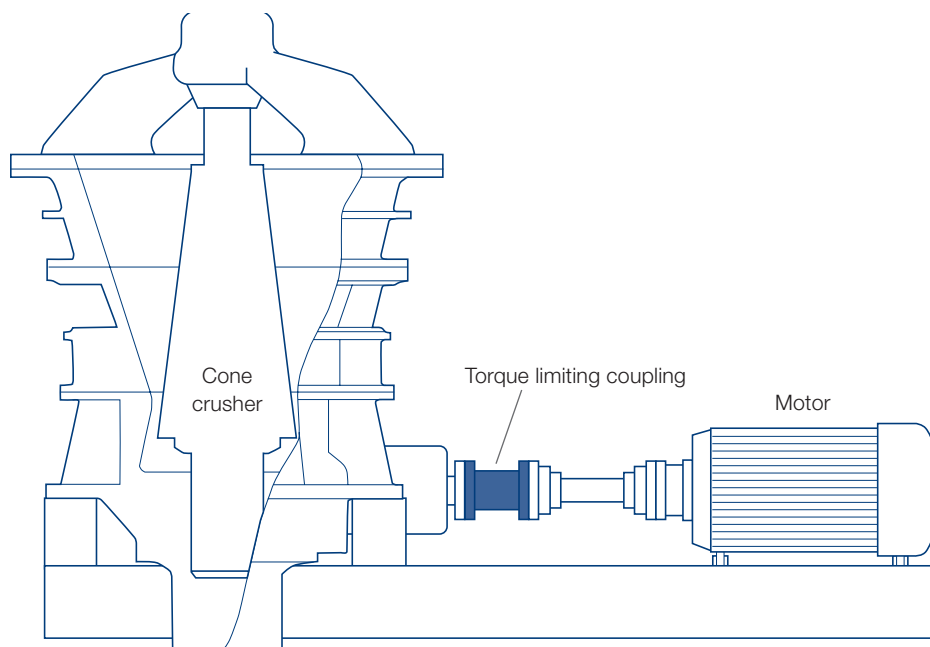
Installing a torque limiting coupling and replacing a belt drive with a direct drive ensures all driveline parts are protected to ensure maximum production potential.

### Suitable torque limiting couplings:

- SafeSet
- SmartSet

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## Cone crusher





# Tunnel boring machinery (TBM) and earth pressure balance (EPB)

In tunneling, the varying hardness of soil and rock layers means that torque peaks are hard to predict. Excessive torque levels can occur, particularly during start-up and commissioning.

If the sizeable pinion-shaped cutter is blocked, vital parts of the transmission and the driveline components are at risk of being destroyed, leading to machine stoppage and costly downtime.

SafeSet or SmartSet torque limiting couplings, installed either on the back of the motors between the hollow shaft and the torque shaft or in line with the drive units, will protect the driveline, ensuring continuous production.

Furthermore, the torque limiting coupling can be integrated in the electrical motor to reduce the built-in space and the weight.

## Suitable torque limiting couplings:

- SafeSet
- SmartSet

## Torque limiting couplings in a tunnel boring machine

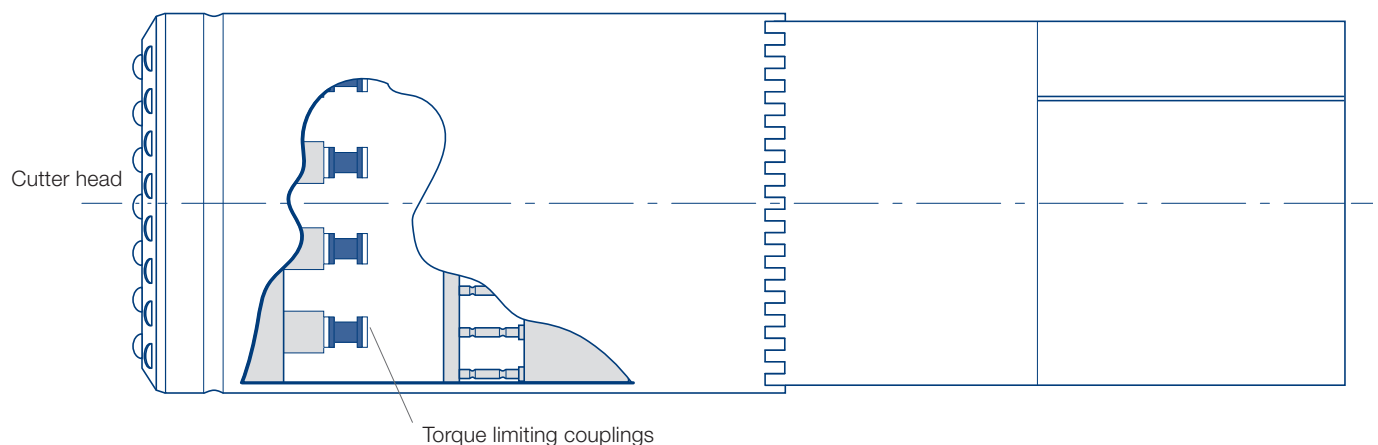




Photo © Turquoise Hill Resource Ltd

# Ball and semi-autogenous grinding (SAG) mills

In the grinding process, the dual pinion drives can fall out of sync due to problems in the motor control system. Frozen or solidified minerals inside the mill might also cause torque peaks when tipping over the center pivot axis during a start-up.

Severe torque overloads can cause serious damage to the mill and the drive, resulting in costly downtime.

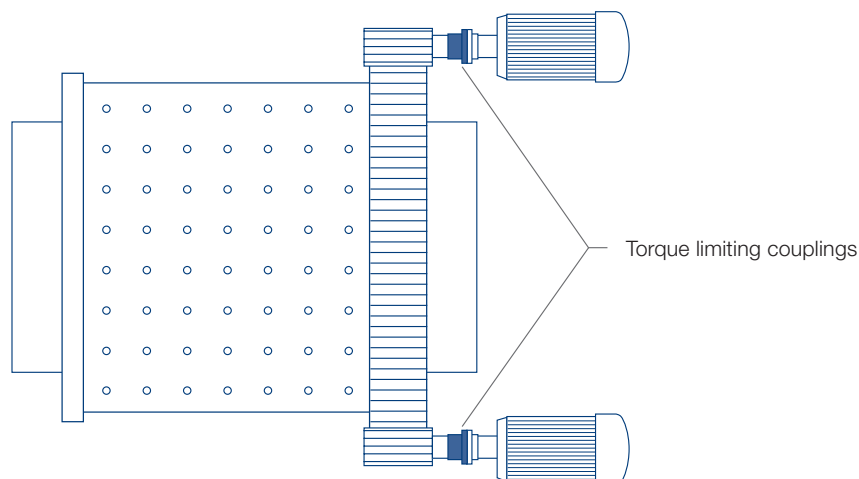
Voith torque limiting couplings protect the driveline from torque peaks when there are synchronization problems or overloads caused by solidified material during start-up.

## Suitable torque limiting couplings:

- SafeSet
- SmartSet

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## Torque limiting couplings in a ball mill





## Roller presses and crushers

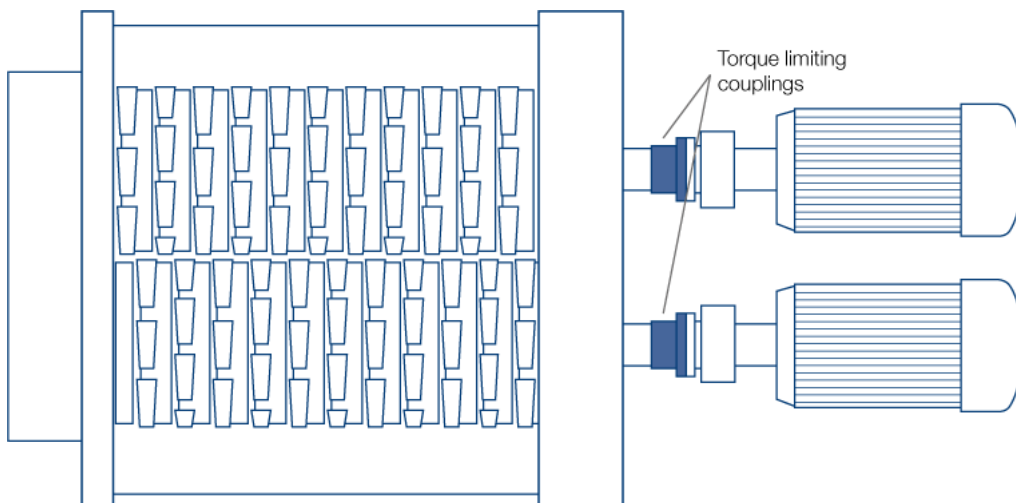
Rollers can quickly become blocked by uncrushable material, and the inertia in the driveline will continue to produce torque. These torque peaks can result in significant driveline damage to the motor and cause production downtime.

Voith torque limiting couplings control the torque and absorb shock loading by disconnecting the inertia from the crusher, thereby protecting the driveshaft and motor.

### Suitable torque limiting couplings:

- SafeSet
- SmartSet

### Roller crusher





# DRIVE

## Voith Service – Part of Your Business

Voith is a reliable partner for the entire service life of your driveline, offering a wide range of services and support when and wherever you need it.

You can rely on us during every part of the process, from installation to initial start-up and final commissioning. Our technicians ensure the trouble-free start-up of your machine, which provides peace of mind that it is correctly installed.

Furthermore, Voith trains your personnel to operate the coupling, which optimizes performance and maintains constant reliability.

Proactive maintenance of torque limiting couplings increases the service life, improves performance, and reduces your torque couplings lifecycle costs to ensure maximum return on your investment.

Contact us today:





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