Improved Productivity in Mining.
Torque Limiting Couplings.
Make the Torque Work for You

Torque makes the world go round. In every industry there is a need to transmit torque as well as limit it. To be effective you need to be able to control the torque. Voith couplings make the torque work for you.

Voith manufactures and develops the world leading torque limiting and connection couplings used in many different industries worldwide. In mining applications, torque limiting couplings protect big and heavy machinery by releasing or slipping at a very precise set torque. Connection couplings are used for torque transmitting, often in conveying and excavating.

Voith torque limiting couplings:
• Prevent damage of the machinery.
• Ensure production uptime and avoid costly downtime in case of a serious breakdown.
• Lengthen the life span of the machinery by avoiding overload cases increases profit.
• Provide a backlash free connection.

Torque limiting couplings from Voith not only avoid machinery damage caused by overload, they also improve processes and increase production and profit. All couplings are specifically adapted for the application intended, to ensure best possible use.
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<th>Application</th>
<th>Challenge</th>
<th>Solution</th>
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<td>Chain Conveyors</td>
<td>Falling stones or metal parts which get stuck might lead to a chain break, due to blockage of the conveyor. A chain break requires a very time-consuming repair.</td>
<td>Voith torque limiting couplings with controlled slip saves the chain drive line from catastrophic failure without interrupt the production.</td>
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<td>Crushers</td>
<td>Uncrushable objects – machine parts, too hard materials or too big pieces – getting stuck in the crusher.</td>
<td>Voith torque limiting coupling will instantly slip and release to protect the drive line from catastrophic failure.</td>
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<td>Ball Mills</td>
<td>Electrical problems as short circuit or mal-synchronization of a multiple motor drive system. Frozen material of large size get stucked in the mill.</td>
<td>Voith torque limiting coupling ensures protection from torque peaks and caused by synchronization problem or frozen material.</td>
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<tr>
<td>Roller Presses</td>
<td>Uncrushable objects – machine parts, too hard materials or too big pieces – getting stuck in the press.</td>
<td>Voith torque limiting coupling will instantly slip and release to protect the drive line from catastrophic failure.</td>
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<tr>
<td>TBM’s</td>
<td>Hard rock layers, or too high drilling speed cause torque peaks.</td>
<td>Voith torque limiting couplings will instantly slip and release for protection of the driveline under excessive torque levels.</td>
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Overview
Basic functions

Voith torque limiting couplings prevent machine damage in high value rotating equipment. It works like a mechanical fuse in the driveline by protecting the system from costly breakdowns.

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<th>Coupling and function</th>
<th>Release curve</th>
<th>Benefits</th>
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| SafeSet               | ![Release curve](image1) | + Maximum driveline protection  
+ Accurate and constant release  
+ Adjustable release torque |
| SlipSet               | ![Release curve](image2) | + 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              | ![Release curve](image3) | + 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 torque limiting couplings prevent machine damage in high value rotating equipment. It works like a mechanical fuse in the driveline by protecting the system from costly breakdowns.

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

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

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. In an overload situation the coupling slips and the shear tube shears off. Oil pressure drops and the frictional surfaces separate. The coupling rotates on the bearings without transmitting any torque.

Benefits
+ Maximum driveline protection — damaging inertia disengage at once
+ Set torque remains constant over time
+ Quick resetting for maximum uptime
+ Custom made to suit individual requirements

1 SafeSet
2 SafeSets in different sizes
SlipSet ensures continuous production and is designed to slip in the event of an overload situation. By acting as a chock absorber in drives with frequent torque peaks, the SlipSet prevent time consuming downtime due to repair work.

**Operation**
In the event of a temporary torque overload, the SlipSet coupling slips to limit the torque peaks and enable continuous production. If the blockage persists, the SlipSet coupling slips until the drive can be stopped to enable the blockage to be cleared.

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

SlipSet is based on the same technology as 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 drive line.

**Benefits**
- Ensures continuous production due to torque limitation without disengagement
- Minimized installation cost thanks to compact design
- Less maintenance cost due to instant overload protection that protects your driveline from premature wear
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 short duration and dynamic torque peaks.

Operation
The SmartSet coupling has the ability to slip up to 120° without releasing, to limit short peaks. If the torque peak is of long duration in an overload situation, the SmartSet coupling will fully release and subsequently save the drive line from serious 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
• Sechanical slip and release mechanism

SmartSet is based on the same technology as the SafeSet coupling, but it is equipped with a SmartSet device that gives the coupling the additional slip feature. This centrifugal device is activated by the rotational speed of the driveline. This enables the coupling to slip during high transient torques, that are an inherent part of many applications. The SmartSet device will reset itself at zero rpm and the full slip angle is regained.

Benefits
+ Ability to slip without release to reduce short duration and dynamic peak torques
+ Accurate and constant slip and release torque
+ Adjustable slip and release torque
+ Maximum driveline protection
+ Release during blockage
CMS 310
Coupling Monitoring System

The CMS 310 is a new generation of Voith Coupling Monitoring System, built on a PLC based platform. This makes it possible to integrate the status signal from the coupling into an existing supervision system.

Operation
The monitoring is realized by calculation of the torque limiting coupling input and output rotational positions. The positions are measured by two inductive sensors which senses the pulse frequency given by the teeth wheels mounted on each part of the torque limiting coupling.

Design features:
• Profinet standard
• Slip angle measurement
• Speed measurement
• Service indicator
• Web interface
• Ethernet connection

Optional features (on request)
• GSM module
• HMI touch panel

The CMS 310 makes it possible to supervise, monitor and control a torque limiting coupling over a web interface or HMI panel. The system uses Profinet communication standard for easy integration in existing industrial process monitoring systems. The slip angle is continuously calculated to measure how much the coupling has slipped. The status information can then be used to quickly identify any need for action.

Benefits
+ Increased uptime of a complete driveline
+ Integration with existing process monitoring systems enables platform independent supervision of data
+ Possibility to optimize driveline performance
+ Torque peaks limited without disrupting operation
+ Quicker resetting to minimize downtime
+ Easy to plan for proactive maintenance of a coupling
+ Visual and audio warning indicators can be used for making decisions and actions
Voith is a reliable partner for the entire service life of your driveline, offering a wide range of service 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 also gives you the peace of mind that it has been correctly built in. Voith trains your personnel on how to operate the coupling, which optimizes performance and maintains constant reliability.

Regular health checks provide a high quality operation at a low expense and minimize costly production downtimes. Proactive maintenance of torque limiting couplings increases the service life, improves performance and reduces lifecycle costs, to ensure maximum return on your investment.

Voith has regional service centers worldwide. We are here to support you 24 hours a day, seven days a week. Thanks to our global network, we are always nearby.

Long Term Partnership and Support
Chain Conveyors

Chain Conveyors can suffer unwanted downtime due to conveyor chain breakage or driveline failure. This is often a result of torque overloads caused by material getting stuck.

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

Voith torque limiting couplings protect the conveyor chain by limiting the torque peaks. By having a coupling that can dampen or release the torque peaks, it is possible to maximize uptime of the equipment.

Suitable couplings:
• SlipSet
• SafeSet
• SmartSet

Armored face conveyor driveline
Cone Crushers

When crushing mined rock and materials, uncrushable objects can become stuck in the crushing chamber, causing it to stop. As the momentum of the driveline and motor continue to deliver torque, there is an essential risk of severe damage or overheating. This will result in unwanted downtime in production which can cause a negative effect to the financial figures.

Replace belt drives with a direct drive. Installing a Voith torque limiting coupling deals with torque overloads safely and quickly. This ensures all parts of the driveline are protected to ensure uptime.

Suitable couplings:
• SafeSet
• SmartSet
In tunneling the varying hardness of soil and rock layers mean that torque peaks are hard to predict. Excessive torque levels can occur particularly during start-up and commissioning.

If the large 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.

Installation of SafeSet torque limiting couplings either on the back of the motors between the hollow shaft and the torque shaft, or in line with the drive units.

**Suitable couplings:**
- SafeSet
- SmartSet

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**TBM and EPB**

**Torque limiting couplings in a tunnel boring machine**
Ball and SAG Mills

In the grinding process, the dual pinion drives can sometimes come 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 startup.

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 couplings:
• SafeSet
• SmartSet

Torque limiting couplings in a ball mill
Roller Presses/Roller Crushers

The rollers can easily become blocked by uncrushables, however the inertia in the driveline continues to produce torque. This can result in major damage to the driveline and motor and cause production downtime.

When the rollers are jammed, the overload continues until the driveline or motor breaks down, causing major damage and production downtime. Voith torque limiting couplings control the torque and absorb shock loading, protecting the drive-shaft and motor. SafeSet instantly disconnect the inertia from the crusher.

**Suitable couplings:**
- SafeSet
- SmartSet

**Roller crusher**
Voith – Engineered Reliability

Voith sets standards in the energy, oil & gas, paper, raw materials and transportation & automotive markets. Founded in 1867, Voith employs more than 43,000 people, generates €5.7 billion in sales, operates in over 50 countries around the world and is today one of the largest family-owned companies in Europe.

Voith Turbo, a Group Division of Voith GmbH, is a specialist for intelligent drive solutions and systems. Customers from highly diverse industries such as oil & gas, energy, mining & mechanical engineering, ship technology, rail & commercial vehicles rely on advanced technologies from Voith Turbo.

Voith Turbo Safeset are the experts in developing and manufacturing torque limiting, process improving and connection couplings within Voith.

The company in Sweden supplies customers worldwide with the most reliable systems available. With over 30 years of experience, Voith Turbo Safeset has unique knowledge in their field. Combining engineering skills, innovative strength and a solid base, Voith Turbo SafeSet is a partner to rely on for generations to come.