Torsional vibrations under control
Highly Flexible Couplings
Manufacturers and operators always have big expectations regarding the productivity of their vehicles and systems. They should have high reliability and short downtimes together with low Total Cost of Ownership (TCO).

The highly flexible couplings from Voith were specifically developed for these requirements: They extend the lifetime and availability of all connected drive components and in this way increase the productivity of the vehicle or system.

More than 40 years experience in perfecting drive systems that are subjected to torsional vibrations are the foundation on which the relationship with our customers is built.

Our portfolio includes the following:

- Simulation of drivelines for torsional vibrations
- Customer-specific design and delivery of highly flexible couplings
- Measurement of loads actually occurring in a driveline subject to torsional vibration
- Service Excellence for our customers throughout the entire lifetime of their drive

Experts for a reliable connection
The individual components of a driveline are made of elastic materials (e.g. steel) and have a mass. Accordingly, they represent a system susceptible to torsional vibration. If this system is excited, for example, by a running internal combustion engine, then vibrations result. If these vibrations are not damped, the driveline is subjected to permanent stress. The result is usually fracturing of the drive shaft and, in the worst cases, damage to the engine and transmission. This leads to repair costs and downtimes.

Highly flexible couplings from Voith dampen the critical torsional vibration amplitudes and shock loads that are created in a diesel engine driveline. At the same time, they shift the resonance frequencies below idle speed. As a result, the availability and lifetime of all connected drive components is increased. A useful operational strength and unit lifetime is often achieved only after a highly flexible coupling has been installed in the driveline.

Power from serenity

In systems where a diesel engine acts as prime mover, the highly flexible coupling has mainly two functions: shifting the natural frequency and damping any occurring vibration peaks. This prevents damage to the driveline and substantially reduces unplanned downtimes.

Customer benefits

- Increased availability of all driveline components due to damping of torsional vibrations and shock loads in the driveline
- Decreased life cycle costs due to increases lifetime of all driveline components
- Increased comfort due to less vibration and noise
Versatile and reliable in use

Our specialists will find the right solution for your application – regardless of size and special requirements.

Typical applications

- Rail Vehicles: Railcars, locomotives and special purpose vehicles
- Construction Vehicles: Wheel loaders, dump trucks, mobile cranes
- Test Rigs: Research and development test rigs, End-of-line test rigs
- Heavy Industry: Shredders, rolling mills, roller conveyors
- Power Generation: Generators, fans, pumps
- Oil & Gas Industry: Pumps, compressors
- Other drives subject to torsional vibrations

The picture on the right shows a K coupling with a diameter of 1.5 m and a weight of 3.5 metric tons. It has been installed in a shredder system in Russia (picture below) and is designed for a maximum torque of 400 kNm.
1 Compressor systems in the USA
2 Engine test rig for global application
3 Diesel-hydraulic inspection vehicle for overhead contact lines in China
4 Wheel loader for global use
5 Roller conveyor drive in a steel plant
6 Generator system
In Expert Hands, Right from the Start

We supply not only products, but ideas too. Benefit from our long-established expertise in managing driveline projects:

Our torsional vibration analysis permits the loads occurring in a driveline caused from torsional vibration and resonances to be assessed. Alternating torques, power losses, angular accelerations etc. are taken into account and their influence on the lifetime of the drive components is assessed.

You effectively prevent high lifecycle costs (LCC) for your vehicle or plant.

The critical resonance frequencies are in the operating speed range. The driveline is subjected to such loading that components may be destroyed.

1. Shift the natural frequency of the vibrating driveline into an uncritical range
2. Sufficiently damp any occurring vibration amplitudes

By using the highly flexible coupling, the vibrations created are reduced significantly. This takes the load off the entire driveline for the long-term.
Torsional vibration measurement (TVM)

Torsional vibration measurement records the loads occurring in a drive system caused by torsional vibration. Knowledge of these loads enables predictions to be made about the lifetime of the drive components. It helps you decide what measures are required to reduce vibrations.

Fatigue analysis (FA)

In many sectors, fatigue analyses have become an established part of the development process. They optimize the lifecycle costs (LCC) and help with the planning of preventive maintenance measures.

The fatigue analysis for your Voith coupling is usually based on data obtained from a torsional vibration measurement during the prototype phase.

We calculate the expected lifetime of wearing and fatigue parts, including elastomers.

Certification

At Voith, our top priority is to ensure the affordability, reliability, environmental compatibility and safety of our products and services. In order to maintain these principles in the future just as we do today, Voith Turbo has a firmly established integrated management system for quality, the environment, and occupational health and safety.

For our customers, this means that they are purchasing high-quality capital goods that are manufactured and can be used in safe surroundings and with minimal environmental impact.
# The right solution for every application

<table>
<thead>
<tr>
<th>Coupling Types</th>
<th>Features</th>
<th>Advantages and Benefits</th>
</tr>
</thead>
</table>
| **K Coupling** | • Modular design  
• Shifts resonance speeds into non-critical speed ranges  
• Damping of torsional vibration peaks  
• High torque capacity | • Flexible and simple integration into the driveline  
→ Customized and cost-effective solution  
• Damping vibrations and noises  
→ Smoother running and increased comfort  
• The operational stability is increased  
→ Productivity and availability rise  
• The load on the drive and the entire driveline is reduced  
→ The lifetimes of your system or your vehicle are increased and the life cycle costs (LCC) are reduced  
• High torque capacity  
→ Even when installation space is limited, high torques are transmitted safely and reliably |
| **D Coupling** | • Specially developed for 1 – 3 cylinder engines  
• High torsional flexibility  
• Misalignment capacity between the engine and the driven machine using a spherical joint  
• Modular design | • Reproduce test cycles more precisely and achieve particularly precise test results  
• High-speed engines can usually be tested up to their maximum speed  
• Flexible and simple integration into the driveline  
→ Customized and cost-effective solution  
• The load on the drive and all connected components is reduced  
→ The lifetime and availability of your test rig are increased and life cycle costs (LCC) are reduced |
| **CT Coupling** | • Fail-safe design  
• Very low maintenance, does not require lubricants, very easy to exchange the elastomer elements  
• Shifts resonance speeds into non-critical speed ranges | • No sudden downtimes  
→ The availability of your plant increases  
• Downtimes are reduced and the associated costs avoided  
→ Lower maintenance and repair costs optimize your life cycle costs (LCC)  
• Damping vibrations and noises  
→ Smoother running and increased comfort  
• The load on the drive and the entire driveline is reduced  
→ The lifetimes of your system or your vehicle are increased and life cycle costs (LCC) are reduced |
| **H Coupling** | • Shifts resonance speeds into non-critical speed ranges  
• Compression springs made of steel generate high damping values and operate virtually wear-free  
• Optimum damping behaviour across the entire nominal speed range, because the damping effect increases proportionally to the coupling’s angle of twist  
• Completely maintenance-free and resistant to all types of contamination | • Designed especially for “bell-house” applications  
→ Dirt and temperature have no effect on the damping behavior of the coupling  
• Damping of vibrations and noises  
→ Smoother running and increased comfort  
• The load on the drive and the entire driveline is reduced  
→ The lifetime and availability of your vehicle are increased and the life cycle costs (LCC) are reduced  
• Very high uptime  
→ This keeps your service and repair costs low |
### Coupling Types

#### Features Advantages and Benefits

<table>
<thead>
<tr>
<th>Areas of application</th>
<th>Technical data</th>
<th>Damping media and stiffness characteristics</th>
</tr>
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<tbody>
<tr>
<td>Rail vehicles: Locomotives, Electric railcars and special vehicles</td>
<td>Nominal torque: up to 140 000 Nm</td>
<td>Linear stiffness characteristic of a rubber element coupling stressed to shearing</td>
</tr>
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<td>Construction equipment of all types, e.g., wheel loaders, dump trucks, graders</td>
<td>Speed: up to 13 000 rpm</td>
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<td>Gensets</td>
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<tr>
<td>Test rigs of all types such as engine development test rigs, end-of-line test rigs</td>
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<td>Test rigs: Engine test rigs with low excitation orders</td>
<td>Nominal torque: up to 780 Nm</td>
<td>Linear stiffness characteristic of a rubber element coupling stressed to shearing</td>
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<td>Speed: up to 10 000 rpm</td>
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<td>Steel industry: roller conveyor drives</td>
<td>Nominal torque: up to 200 000 Nm</td>
<td>Progressive stiffness characteristic of a rubber element coupling stressed with pressure</td>
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<td>Recycling: primary drives for crushers and shredders</td>
<td>Speed: up to 7 200 rpm</td>
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<td>Unit construction: high-performance generators, pump systems</td>
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<td>Oil and gas industry: compressors</td>
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<td>Mechanical engineering: crane drives, drill drives, paper making</td>
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<td>Construction equipment of all types, e.g., wheel loaders, dump trucks, graders</td>
<td>Nominal torque: up to 3 700 Nm</td>
<td>Two-stage stiffness characteristic of a steel spring coupling stressed with pressure</td>
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<td>Speed: up to 3 200 rpm</td>
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### Graphs

- Linear stiffness characteristic of a rubber element coupling stressed to shearing
- Progressive stiffness characteristic of a rubber element coupling stressed with pressure
- Two-stage stiffness characteristic of a steel spring coupling stressed with pressure
Service Excellence
for our customers

We see Service Excellence as a level of service quality that exceeds the expectations of our customers. We will support you — anywhere in the world throughout your drive’s lifetime. You can count on us from the planning and commissioning phase through to maintenance and repair.

We offer you not only high-grade, durable products but are also the partner at your side providing support at all times.
Maintenance, Repair and Overhaul on Site / Installation and Commissioning

Proper installation of the drive system provides the basis for trouble-free commissioning. A systematic commissioning procedure with extensive operational testing is an important factor in achieving reliable and long-lasting operation of all drive system components.

Even with the best preventative maintenance, unplanned downtime and malfunctions are still possible. The priority then is to repair the vehicle and plant as quickly as possible. As the manufacturer, we not only have a wealth of knowledge about highly flexible couplings, but also possess the necessary technical expertise, experience and tools to ensure professional repairs. Our service technicians are able to assess damage in the minimum amount of time and ensure a swift repair.

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Genuine Voith Spare Parts

Avoid risks by using exclusively genuine spare and wearing parts. Only these are manufactured with Voith expertise and guarantee reliable and safe operation of your Voith products. We guarantee fast availability of genuine Voith spare and wearing parts.

Service Excellence

Technical Services & Engineering

Trainings

Highly trained employees in technology and maintenance lay the foundations for the efficient operation of your vehicles or systems. Our training programs provide specific technical knowledge about our products. We bring your team up to speed with the latest Voith technology – in theory and in practice.

Operational Testing/Inspection

An operational test tells you more about the condition of your drive system. If necessary, you can take preventative maintenance action. This will allow you to avoid down-times and expensive production outages. Regular operational testing by our service technicians reduces the risk of breakdowns. In addition, we offer Torsional Vibration Measurement and Fatigue Analysis for a higher availability of the driveline.

Exchange Programs

Associated measures can be extensively planned and vehicle and plant shut downs can be coordinated with requirements. Replacing your used highly flexible coupling with a refurbished one guarantees that your drive system remains available.

Spare Units

We provide a holistic assessment of the drive in your system and create a forecast for your spare parts requirement. We then liaise with you to create a spare parts package, and define a supply concept to guarantee the spare parts availability you need. That way, you avoid unnecessary downtimes, whilst still optimizing your warehousing costs.

1 Maintenance, Repair and Overhaul on Site / Installation and Commissioning

2 Technical Services & Engineering

3 Genuine Voith Spare Parts

4 Spare Units

5 Exchange Programs

6 Maintenance, Repair and Overhaul @ Voith