WIND POWER

DIRECT DRIVE
MEDIUM SPEED
HIGH SPEED

GEISLINGER®
COUPLINGS AND DAMPERS. BUILT TO LAST.

GEISLINGER.
LEADERS IN ENGINEERING.

For more than 60 years Geislinger has been driven by its inventive spirit to develop innovative, individually customized coupling, damper, and shaft solutions for large engines and all kinds of drivetrains.

Geislinger is not only the expert in torsional vibration solutions, but also has more than 25 years of experience in manufacturing products made from fibre composites. The Gesilco® product group underlines the innovative spirit of the company.

Reliable wind turbine drive systems demand sophisticated solutions. Geislinger offers tailor-made coupling and shaft solutions for your drivetrain system. The Geislinger Compowind® Coupling is ideally suited for medium- and high-speed wind turbines as well as for direct-drive technologies. Low reaction forces virtually eliminate non-torque loads and lead to a significant improvement in the dynamic drivetrain behavior.

Wind drivetrains at onshore sites not only need to be reliable but also silent. With increasing rotor diameters, reduced rotational speeds, growing structures of drivetrains and particularly the reduction of the masking energy of future onshore wind turbines, new and more sophisticated solutions need to be put into consideration. Geislinger products such as the Geislinger coupling or the Geislinger torsional spring type damper have been used successfully for many years in gear drives to reduce structure borne noise. Moreover, Compowind® bears the potential to reduce wind turbine noise by attenuating the sound path from the gearbox to the rotor blades and to the tower.

The intense collaboration and exchange between the Geislinger R&D department, the production team, and our focus on tailor-made solutions gives Geislinger products a unique advantage.

At Geislinger, we believe that the secret to creating the best product solution for our customers is to precisely design and craft every key element. With more than 60 years of experience in manufacturing tailor-made product solutions, we have learned how to get it exactly right.

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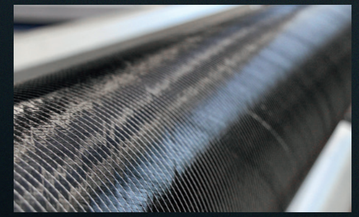
CUSTOMIZED SOLUTIONS.
BY GEISLINGER.

- In-house Design, Torsional Vibration Calculation (TVC), FEM, Whirling Calculation and Production
- State-of-the-art manufacturing methods with advanced composite materials
- The tight integration between R&D and production enables customized solutions for your specific needs

The compact and lightweight Gesilco® design paves the way for great opportunities.

The design, size, function and fibre angles of our Gesilco® products can be adapted to the specific requirements of your application. Acoustically optimized product solutions are possible as well.

MANUFACTURING, DESIGN AND CALCULATION BY GEISLINGER



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GEISLINGER COMPOWIND®

The Geislinger Compowind® coupling is based on more than 25 years of experience in developing fatigue resistant, maintenance-free and weight-saving couplings and shaft lines.

Installed between the rotor and the gearbox, the low speed shaft coupling is made from advanced fibre composites which enable the gearbox to be mounted rigidly onto the main frame. Additionally, the Compowind® Coupling facilitates highly integrated next-generation drivetrain architectures. Thanks to its low and almost linear restoring forces, virtually all occurring non-torque loads are effectively absorbed by the composite membranes.

Compowind® protects the gearbox and the whole drivetrain by significantly reducing non-torque loads. It allows the gearbox to be rigidly attached to the main frame for which reason drivetrain bending Eigenmodes are virtually eliminated and the dynamic behavior is improved beyond comparison. This is not only important under severe load conditions and after the occurrence of special events, but also helps to achieve tonality free wind turbines: The comparatively low stiffness and the good damping properties of the Geislinger Compowind® reduce the sound transfer from the gearbox to the rotor blades, while the attenuation of Eigenmodes helps to reduce sound propagation within the drivetrain in general. For this reason, the noise radiation from the rotor blades, the gearbox housing, the gearbox supports, and the tower is effectively reduced. This poses an additional customer value and a clear competitive advantage for onshore applications.

Compowind® is resistant to heat, frost, saltwater and oil and offers electrical insulation as an option. The use of advanced materials and our state-of-the-art manufacturing methods give wind turbine producers a competitive lead in the race for weight, enhancement of reliability and reduction of operational cost (OPEX). Every Compowind® is customized to each application.

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DESCRIPTION

Dynamic loads, rotor overhung, and drivetrain weight cause non-torque loads, which – independent of the concept – are present on three-point and four-point suspensions, integrated drivetrains and gearboxes. Non-torque loads can significantly affect the reliability of the gearbox. It can be expected that the reduction of non-torque loads and the enhancement of the dynamic system behavior will reduce premature gearbox failures, resulting in reduced gearbox exchange cost and increased energy production. The reduction of operational expenditure (OPEX) over the entire wind turbine life will have a positive impact on the levelized cost of energy (LCOE). A dynamic load study as well as a commercial study done by the CWD (Center for Wind Power Drives, RWTH Aachen) is available on demand.

TECHNICAL DATA

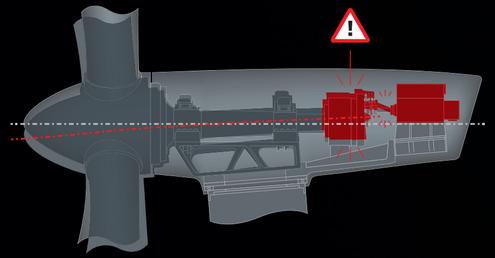
- Torque & Misalignment: Customized to your requirements
- Ambient temperature: -45°C to 100°C

ADVANTAGES

- Fatigue resistant
- Maintenance-free
- Low restoring forces
- Sound insulation
- Weight saving design
- Electric insulation (optional)
- No aging, no wear, resistant to heat, frost, saltwater and oil
- Geislinger monitoring system GMS is available

Geislinger Compowind® coupling containing four membranes and an intermediate tube.

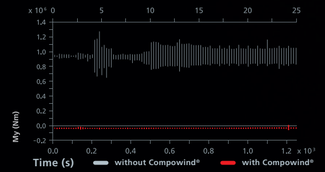
FUNCTIONALITY
OF THE COUPLING

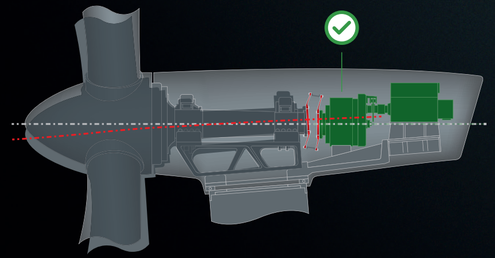


Conventional drivetrain
with the gearbox elastically mounted and hydraulic torque supports

Static and dynamic deflections transmit bending moments from the rotor to the gearbox and its components. These non-torque loads cause excessive, uneven and unpredictable loads to the drivetrain components and affect the reliability and uptime of wind turbines significantly. The elastically mounted gearbox produces Eigenmodes (mainly drivetrain bending modes), resulting in an unfavorable dynamic system behavior and increased fatigue load (see example of dynamic load study).

Pitch moment (My)
on the input shaft of the gearbox

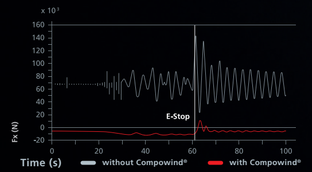




Drivetrain with Geislinger Compowind®
and the gearbox rigidly mounted

The Geislinger Compowind® is the first coupling of its kind to enhance the reliability of your wind turbine's drivetrain. The coupling protects the drivetrain through a significant reduction of non-torque loads and a clear enhancement of the dynamic system behaviour. Thanks to the low restoring forces of the low-speed coupling, gearbox loads are independent from the wind turbine conditions (see example of dynamic load study).

Thrust force (Fx)
on the input shaft of the gearbox – E-Stop



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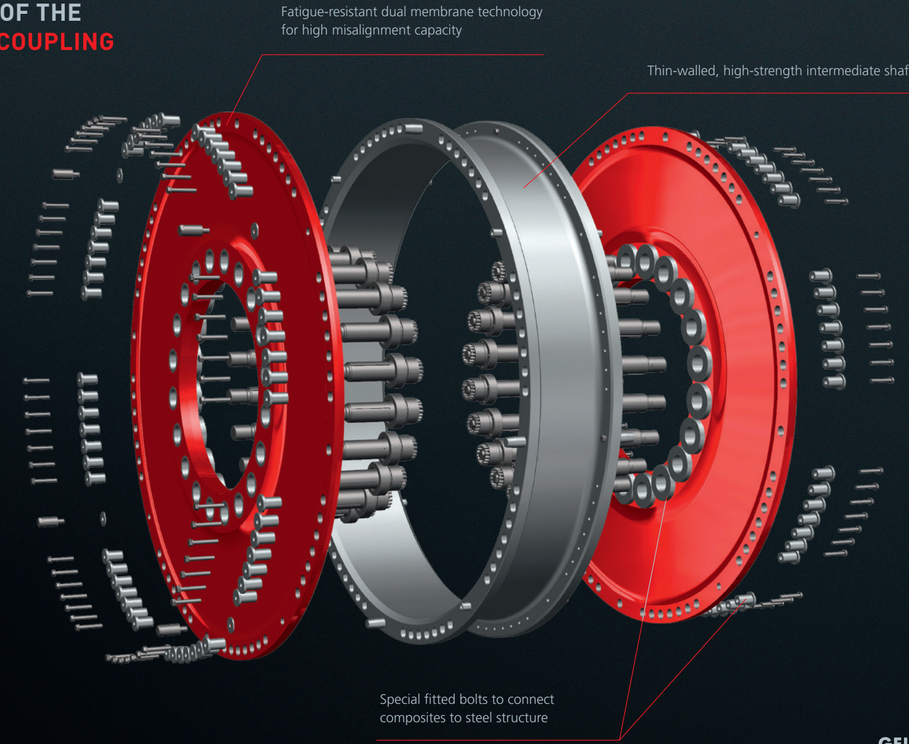
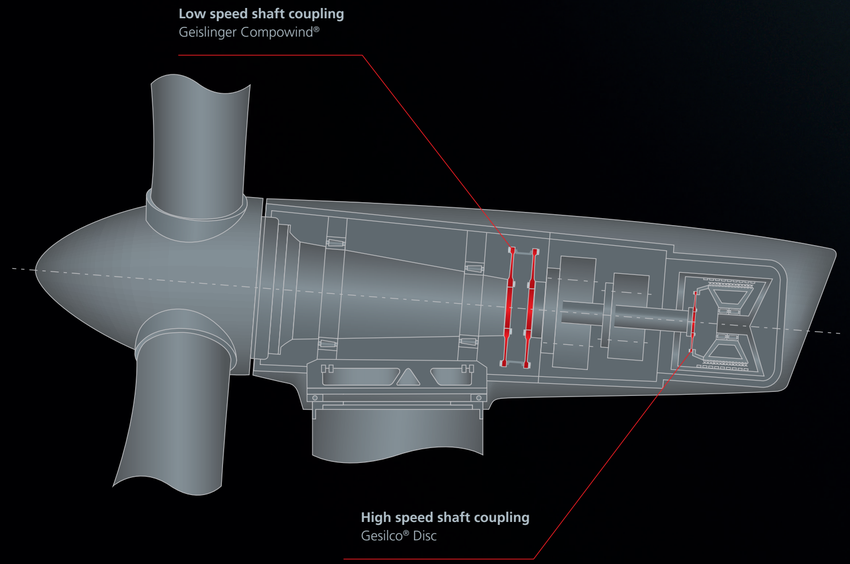
COMPONENTS OF THE
COMPOWIND® COUPLING



GEISLINGER

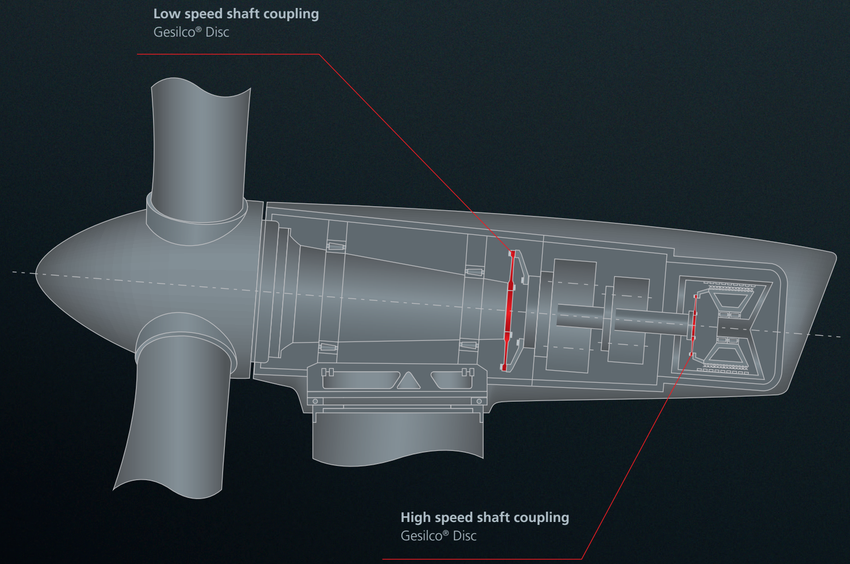
01

INTEGRATED MEDIUM SPEED DRIVETRAIN



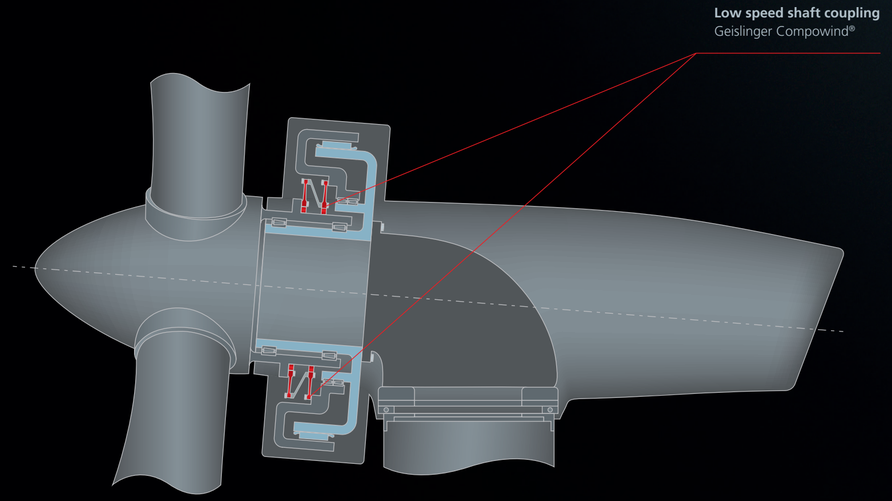
02

INTEGRATED MEDIUM SPEED DRIVETRAIN



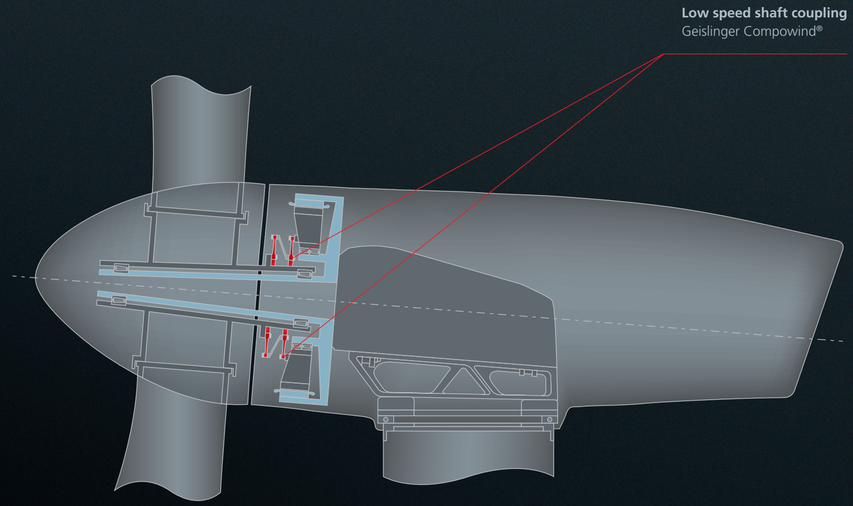
03

DIRECT DRIVE WIND TURBINE
OUTER ROTOR



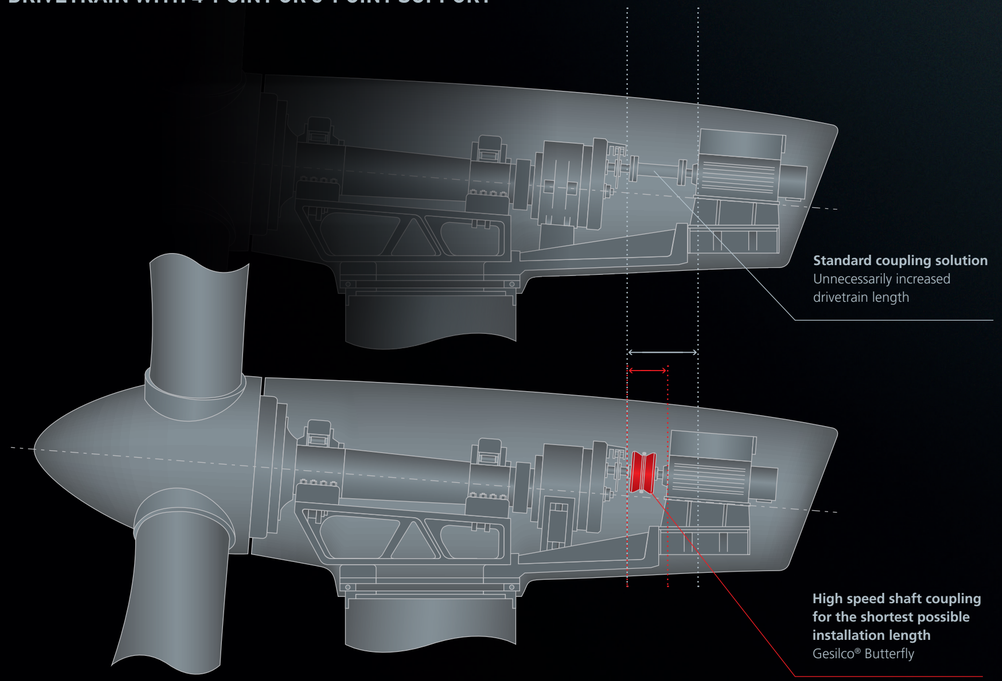
04

DIRECT DRIVE WIND TURBINE
INNER ROTOR



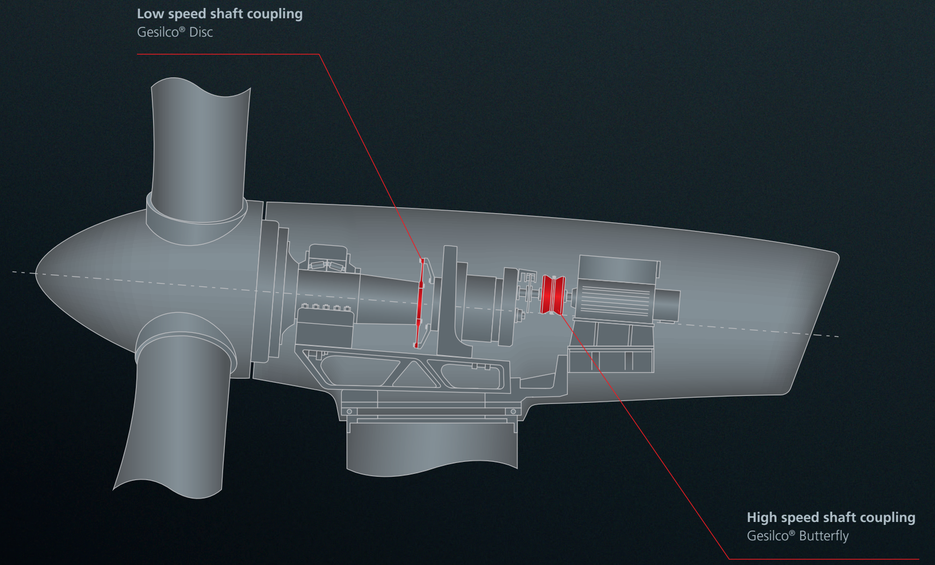
05

DRIVETRAIN WITH 4-POINT OR 3-POINT SUPPORT



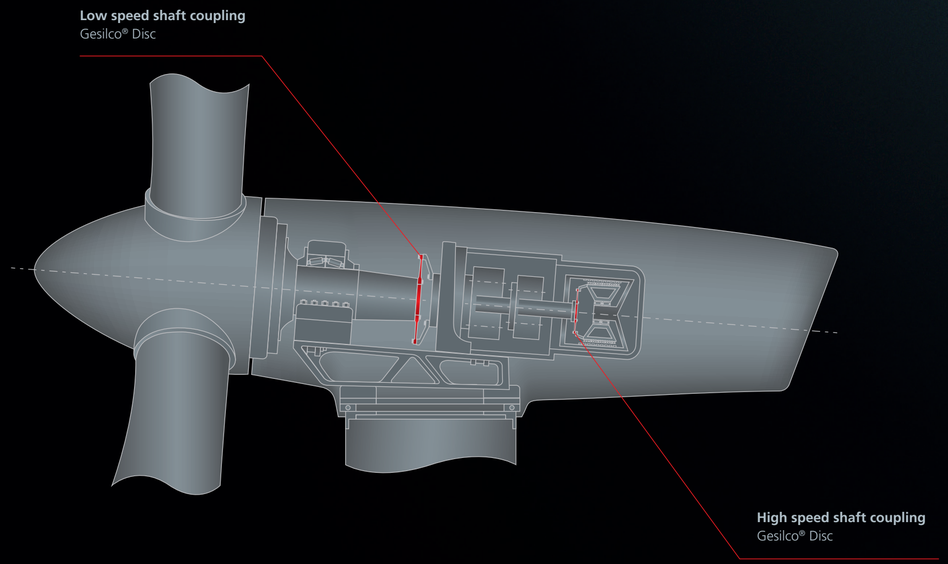
06

DRIVETRAIN WITH 3-POINT SUPPORT



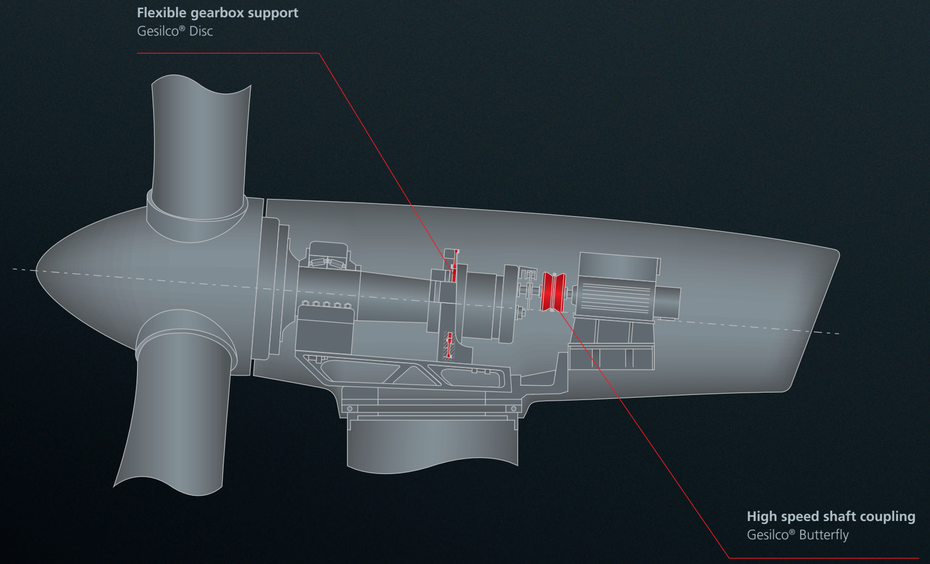
07

INTEGRATED DRIVETRAIN WITH 3-POINT SUPPORT



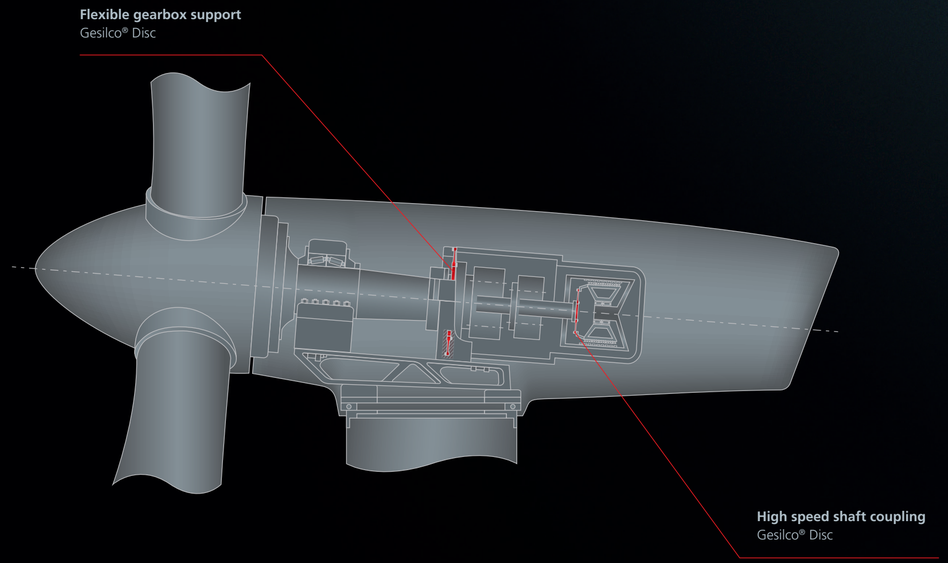
08

DRIVETRAIN WITH 3-POINT SUPPORT



09

INTEGRATED DRIVETRAIN WITH 3-POINT SUPPORT



GEISLINGER.
ONE CENTER. SEVEN BENEFITS.

TAILOR-MADE SOLUTION

Geislinger offers innovative, individually customized coupling, damper, and shaft solutions for your drive system. The design, size, function, and fibre orientation of your Gesilco® products are adapted to the specific requirements of your application.

MAINTENANCE-FREE

Our Gesilco® product range is maintenance-free and: "built to last". The use of advanced materials and our state-of-the-art manufacturing methods give customers a competitive edge and lead to the lowest cost of ownership (TCO).

LIGHTWEIGHT AND COMPACT DESIGN

Gesilco® products are characterized by their lightweight and compact design. This results in a weight reduction of up to 90% compared to standard solutions and leads to a significant improvement in the dynamic drivetrain behavior.

EXTREME ROBUST PRODUCT PROPERTIES

Even under extreme conditions, the highest shock resistance of our products is a great benefit. Additionally, Gesilco® products are resistant in hot and cold ambient temperatures.

LOWEST, ALMOST LINEAR RESTORING FORCES

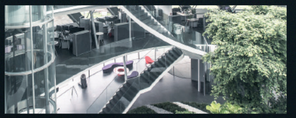
Wind drive systems benefit from low, almost linear restoring forces as well as from the highest torque transmission with best dynamic behavior.

OPTIMIZED ACOUSTIC ATTENUATION

Acoustically optimized product solutions are possible as well. The acoustic competence of Geislinger is underlined by its worldwide unique Geislinger Acoustic Test Bed.

ELECTRICAL INSULATION

Gesilco® products offer electrical insulation as an option.



FURTHER GEISLINGER PRODUCTS FOR WIND POWER APPLICATIONS:

Geislinger Compowind®

Lightweight, maintenance-free coupling for double digit MNm class

The Compowind® is based on an innovative concept of lightweight and maintenance-free fibre composite membranes. Installed between the rotor hub and the gearbox, the low-speed misalignment coupling protects the gearbox and the whole drivetrain by significantly reducing non-torque loads. The coupling allows the gearbox to be mounted rigidly onto the main frame, without elastomerhydraulic mounts. As a result, bending modes and dynamic effects are virtually eliminated. The reliability of the drivetrain increases noticeably, resulting in reduced operational costs.

Benefit: Reduction of wind turbine noise, gearbox load reduction, maintenance-free

Geislinger Gesilco® Shaft

Lightweight, maintenance-free shaft solution

The Gesilco® shaft lines are made of advanced composite material and are characterized by their one-piece manufacturing with an integrated fibre flange connection. The Gesilco® shafts can easily be adapted to your requirements. Geislinger Gesilco® shafts are characterized by outstanding shock capabilities and good acoustic attenuation and can easily be adapted to your requirements. Complete packages with steel adapters, bearings, bulkhead seals and Gesilco® composite misalignment couplings are possible.

Benefit: Weight reduction, maintenance-free

Geislinger Gesilco® Disc

Radially stiff and fatigue-free coupling

The Gesilco® Disc was originally designed for closed coupled generator sets. In wind drivetrains, a Gesilco® Disc is the ideal replacement for a steel coupling used in integrated medium-speed drivetrains to couple the gearbox drive end to the rotor shaft. It is electrically isolating to safeguard the gearbox bearings from tracking current. The flat membrane allows the transmission of high torsional vibratory torques and radial forces at high engine speeds. The Gesilco® Disc is also suitable to bear axial loads of a certain magnitude.

Benefit: Elimination of electrocorrosion in integrated drivetrains, maintenance-free

Geislinger Coupling

Robust torsional elastic, high-damping steel spring coupling

High reliability, long intervals between overhauls, and low operating costs are some of the main features of the coupling. Integrated to a wind gearbox, a Geislinger coupling bears the potential to reduce structure borne noise at its origin: Integrated onto a gearwheel of a high-speed gearbox, the torsional elastic coupling reduces angular accelerations as a result of gear mesh excitations. It is already a validated, proven and widely used solution to reduce structure borne noise in large combustion engines.

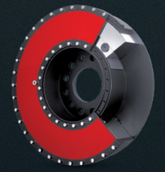
Benefit: Reduction of wind turbine noise

Geislinger Damper

Tuned torsional vibration steel spring damper

Various design options, and hydrodynamic damping, allow the torsional Geislinger spring type damper to be adapted to every single application. The Geislinger Damper not only reduces amplitudes, but also effectively eliminates critical resonances to a frequency beyond operation points. Attached to the planet carrier in the second stage of a medium-speed gearbox, angular accelerations as a result of gear mesh excitations are effectively reduced. Simulation results showed a reduction in double-digit dB values.

Benefit: Reduction of wind turbine noise



Geislinger Vdamp®

Broadband torsional vibration viscous damper

The Geislinger Vdamp® viscous type damper is a broadband torsional damper which can be considered as an alternative to a Geislinger spring type damper in wind gearboxes to reduce structure borne noise. Since a Vdamp® is a closed system without the need of pressurized oil supply and oil return it is ideally suited to reduce structure borne noise in direct-drive wind turbines. A Vdamp® effectively reduces angular accelerations of the second stage planetary carrier over a wide band of frequencies.

Benefit: Reduction of wind turbine noise

Geislinger Gesilco® Butterfly

Lightweight, maintenance-free coupling for short installation lengths

The membranes of the Gesilco® Butterfly coupling are made of lightweight and highly flexible composite materials in order to secure the lowest possible reaction forces, which increases the system's reliability. As a replacement to a state-of-the-art high-speed coupling in 3-point or 4-point supported drivetrains, a Gesilco® Butterfly allows the distance between the gearbox and the generator to be approximately cut in half. Shortening the length of the main frame and nacelle enables valuable weight and cost saving potential.

Benefit: Reduction of the length and the cost of the drivetrain, maintenance-free

Geislinger Silenco®

Lightweight coupling with high additional acoustic sound attenuation

Silenco® is an acoustically optimized misalignment coupling based on our renowned Gesilco® technology. It consists of maintenance-free composite membranes with increased damping properties, a composite connecting shaft and additional acoustic flanges to achieve the best possible sound attenuation of your driveline. The coupling provides resistance to heat, frost, oil and offers electrical insulation as an option. Depending on the acoustical needs and the required torque, different versions of flanges, membranes and shafts are available.

Benefit: Reduction of wind turbine noise, maintenance-free

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OF GEISLINGER

geislinger.com

Geislinger GmbH, Hallwanger Landesstrasse 3, 5300 Hallwang/Salzburg, Austria, Tel. + 43 662 669 99-0, info@geislinger.com