

RENK

WIND ENERGY

Intelligent solutions for
reliable wind turbines.



RENK in the windpower business



Wind power is one of the most important sources of energy for the world of tomorrow. High-quality components, an ever-increasing degree of efficiency and a high level of availability are the deciding factors for competitiveness in the industry. For over 30 years, RENK has offered complete solutions in the form of gearboxes, couplings, slide bearings, test bench technology as well as condition monitoring for wind power. On this basis, RENK consistently continues to develop drive solutions and sets new standards for use in the on- and offshore sector with pioneering slide bearing technology.

/ Innovation

**Pioneering technology
for optimal resource
utilization**

/ Performance

**Impressive high-
performance and
maximum availability**

/ Profitability

**Extended product
service life due to high-
quality slide bearings**



The best conditions for success. Wind turbines with a future.

Focused on success

New standards:
On- and offshore.

Maximum efficiency with solution for an industry on the rise. RENK.

The deciding success factors for sustainable wind turbines are highest product availability, ever increasing power density and excellent product performance. RENK has been offering innovative and reliable solutions for on- and offshore wind turbines for more than 30 years.

Wind power is becoming increasingly important as an alternative to fossil fuels. The energy requirements of society are constantly increasing. The proportion of renewable energy is to rise to 50% in Europe by 2030. At the same time, one fifth of Germany's plants are losing their remuneration for supply electricity to the grid due to aging technologies. While the challenge in the onshore sector is the question of gaining area, in the offshore sector

the challenge is technology development in order to make the wind turbines even more efficient. The power density is constantly increasing thus innovations are the drivers for reliability and efficiency.

RENK's technology defines new standards. The result are complete solutions for main gearboxes, bearings, couplings, condition monitoring and test bench technology. With the innovative slide bearing technology, RENK therefore sets new standards for on- and offshore wind turbine plants in terms of availability and quality and ensures an excellent plant performance as well as the best profitability.





With over 30 years of expertise, RENK products and solutions ensure the efficient transmission of forces in wind power.

RENK provides pioneering work for wind turbine gearboxes.



We are constantly and successfully perfecting technically-challenging products and services in the mega- and multi-megawatt range, both for on- and offshore applications. The results are focused on quality, efficiency and a high level of availability. Due to the experience in mastering extreme forces, RENK has established slide bearings in wind power technology as a sustainable alternative to conventional rolling bearings. The result of this unique development is innovative and low-wear slide bearing systems, which in combination with other innovations, such as an intelligent planetary bearing system, provide perfect results. They form the basis for increasingly compact gearboxes with maximum power density.



RENK slide bearing technology ensures consistently perfect results.

RENK slide bearing technology. Advantages at a glance.

- Maintenance-free
- Space-saving design
- Modular design
- Extremely resilient
- High level of reliability due to less parts
- Maximum availability
- No service life limitation due to the optimal design
- Decades of experience

High level of availability, reliability and low maintenance costs.

Slide bearings make the difference with RENK's unique gearbox design. Our powerful gearboxes are based on the proven slide bearing technology.

Innovative and wear-free sliding layer systems provide an extremely high power density – with the highest operational reliability. RENK combines its unique competences as a gearbox and slide bearing manufacturer to form a perfectly coordinated overall solution, which is customized to the success of the respective system.

Slide bearing technology permanently optimizes the levelized cost of energy.

For decades, RENK has had unique experience in the construction and consistent development of large gearboxes with slide bearings. They form the ideal basis for a perfect and efficiency overall system. The design of slide bearings is simple and safe due to hydrodynamic operation. Systems benefit from maximum availability, an ideal degree of efficiency and ensure maximum energy supply. This is how successful individual customer solutions are created. The sustainable result is an optimal LCoE.

Solutions from RENK. The ideal basis for successful wind turbines.

RENK gearboxes with slide bearings are more than just a component of a wind turbine. Together with a RENK coupling and a RENK condition monitoring system, this creates a complete system that individually contributes to the maximum success of a wind turbine.



Test systems optimize results. From the start.

RENK test benches. Factors for operationally reliable wind turbines.

- Flexibility due to the modular design
- Reproducibility of the test runs due to the automated operation management
- Practical gearbox testing through electrical and mechanical clamping circuits
- Individual development in close cooperation with operators and partners

Quality, control and flexibility – for all components.

The best solution for any situation – even before going into continuous operation. Test systems make the processes of systems and components transparent, thereby ensuring decisive advantages for operators with respect to efficiency and success. This makes operating situations reproducible and they can be simulated as needed.

A high level of flexibility and short setup times qualify test benches both for prototype testing and for the efficient quality testing of entire series, such as through factory acceptance tests (FAT) or testing under extreme climatic conditions.

RENK test systems ensure functionality and yield for manufacturers and operators.

The innovative wind power gearbox test benches are delivered as turnkey complete systems with a CE mark. This eliminates the costly interfaces and technical safety risks for the customers. The modular design provides a high level of flexibility and the safe overall operational setup ensures a very good maintenance accessibility. Nevertheless, the setup times remain low with the optimal layout due to the flexible to use torque supports. The respective test runs are then reproducible to an extremely high degree due to the automated operation management and the RENK automation system (RDDS) documents measured values and logs reliably and securely.

Successful systems through precise analysis.

Our test systems make systems and their relationships transparent – for maximum success in ongoing operation.



/ Profitability

Automated operation ensures reproducible test runs

/ Functionality

Measured values and logs completely document tests



Maximum reliability with optimal development time: Test benches for drives and gondolas.

RENK test benches, in particular for drive train components and entire gondolas, reproduce the ongoing operation under real dynamic movements, including the actual forces and torques of the simulated wind loads.

This makes successful use possible in development, type testing and series testing. RENK test equipment for wind turbines analyzes the components in interaction and verifies the overall system behavior.

RENK test systems for wind turbines.

- Gondola
- Gearbox
- Main rotor bearings
- Rotor blade bearings and azimuth bearings
- Generator

RENK condition monitoring. (RVM Advanced)

Maximum operational reliability

RVM Advanced monitors the gearbox vibrations and the bearing temperatures. Operators can thus respond to irregularities in due time and adjust the system operation strategy.

Intelligently networked: The RVM Advanced surveils wind gearboxes and couplings.

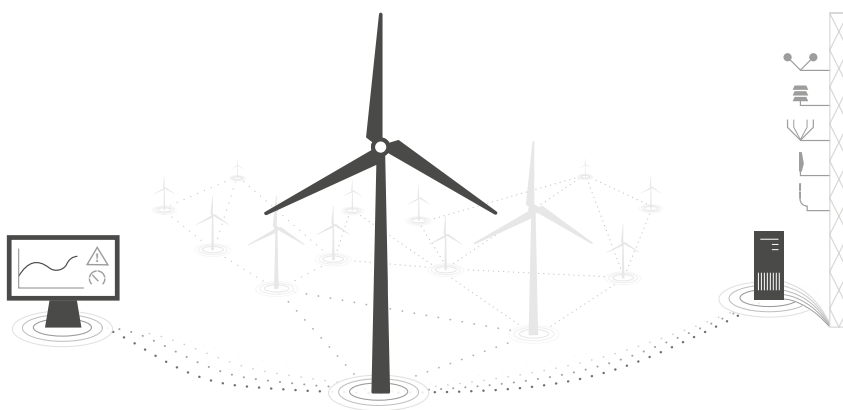
The RVM Advanced works with a systematic early fault detection. The system is modular and adjusts to any existing gearbox. Smartly controlled. Ideally planned. Correctly logged. The RVM Advanced offers maximum transparency.

In addition to the permanently installed vibration monitoring system, the RVM Advanced and our team of experts are also optionally available for one-off vibration measurements and analyses on site. Both versions increase the system availability through a precise early detection of faults and wear, thereby ensuring a predictive and sustainable operation and service planning as well as an optimal spare parts management.

The RVM Advanced uses data intelligently, automatically and safely.

The RVM Advanced analyzes all relevant parameters of drives, couplings, and gearboxes. The system logs key data and transmits it to the head office via high-quality cryptographic communication standards. If desired, this is also done in the form of individual reporting.

This cross-system condition recording forms the basis for the effective operation of the entire system. The data is either stored locally or directly in a certified RENK data center through secure connections. Highly qualified service personnel can always check the system status.



Advantages for sustainable wind turbines

- Automatic analysis of all recorded parameters
- Intelligent integration of process data of the system control
- Early fault detection for optimal planning of operation and repair
- Smart spare parts management to minimize stoppages

/ Availability

RENK ensures logs and analyses in real-time

/ Transparency

Aggregated mapping of all states in the system at a glance

Vibration measurement

Bearing temperature measurement

Torque and speed measurement

Monitoring the oil supply



All components in view.

With RENK RVM Advanced, manufacturers and operators have online a permanent access to the gearbox, coupling, bearings and oil unit operating status.

RENK offers the best products and solutions – throughout the entire life cycle.



RENK is a driver of innovation and strong partner in the field of wind power technology. Always. And everywhere. As a One-Solution-Provider, RENK offers holistic and reliable solutions from a single source and blends customer proximity with State-of-the-Art-Technology. RENK thus shapes the future of superior wind turbines – with excellent process intelligence, unique project expertise and the highest quality standards for methods and materials.



The highest project expertise for wind turbines. Individual solutions for unique challenges.

Through individual project planning, the interactions of all components are already taking into consideration when designing the plant.

Successful wind turbines with a future are created together.

Project expertise for wind turbines means quality and perfection during the design and modeling. Experienced experts plan individual designs for every challenge together with our partners. This makes turbines into tailor-made complete systems. From the beginning

Already in advance, our experts digitally sketch the entire drive unit – always optimally embedded in its respective environment. Simulation calculations ensure that all components of the gearbox are designed to be operationally reliable. Realistic component deformations and the stress of materials are also precisely determined.

Success according to plan: All components in perfect interaction.

Already during planning, we optimize components together or realize a homogeneous stress distribution. That's because RENK has extensive experience in simulating and validating the entire system, including the electric connection. Programs for torsional vibration calculation and multi-body simulation can simulate the operational behavior of the wind turbine down to the rotor blades while taking all interfaces into consideration.

For certification, RENK provides support according to recognized guidelines, such as those of the German Lloyd or IEC 61400. RENK wind gearboxes are more than just a component of a wind turbine. Equipped with a unique overall system, which is specifically designed for the drive train of the respective wind turbine – thereby ensuring its successful operation.

Safety through project expertise.

Together with its partners, RENK develops custom designs for efficient wind turbines with absolute guideline compliance.



**Success through
project expertise.**

RENK is a reliable partner
in the development of
sustainable wind turbines.

Maintenance for maximum efficiency. Always and everywhere.

RENK assumes responsibility for efficient and sustainable wind turbines. We do everything we can to ensure the availability of all systems and the competitiveness of the plant.

More than maintenance: On-site service, upgrades and original parts.

Maintenance from RENK means service without compromising – anywhere, anytime. RENK takes care of planning and executing all of the tasks involved in new assemblies, commissioning, inspection and maintenance work. Our qualified assembly and commissioning personnel also carry out standard upgrades and overhauls to guarantee the operational reliability of all of your systems.

Optimal planning, the availability of qualified personnel, and the necessary parts and tools ensures that all work runs smoothly. You can depend on the work being performed professionally and on-time, and know that you'll receive a transparent breakdown of the costs. Based on our expertise, we offer quick service to guarantee the maximum availability of your systems.

All-round services for the maximum availability of the system.

On-site service: Many repairs are already possible on the system. Our competent service engineers have the necessary certificates to be able to work on the system. On- and offshore.

Examination and repair: If it is not possible to repair the system, we analyze and optimize the gearbox at our plant. Then it is just like new.

Upgrades: Upgrades can increase the efficiency and thus the value of existing gearboxes – and often can be carried out directly by our specialized personnel. This saves money and optimizes operation.

Original parts: RENK parts are unrivaled as regards their performance, functionality and quality. Original parts ensure decisive advantages in terms of efficiency and success.

Safe. Professional. Reliable.

RENK supports success, optimizes efficiency and ensures the operation of wind turbines with the best on demand support.



RENK maintenance.
The services:

- On-site service
- Examination and repair
- Upgrades
- Original parts



Trusted Partner.

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