

WIND TURBINES

How do Wind Turbines Work?

Are you curious about how wind turbines work? You're not alone. The mechanism behind these structures, turning wind into usable energy, is both fascinating and important for our sustainable future.

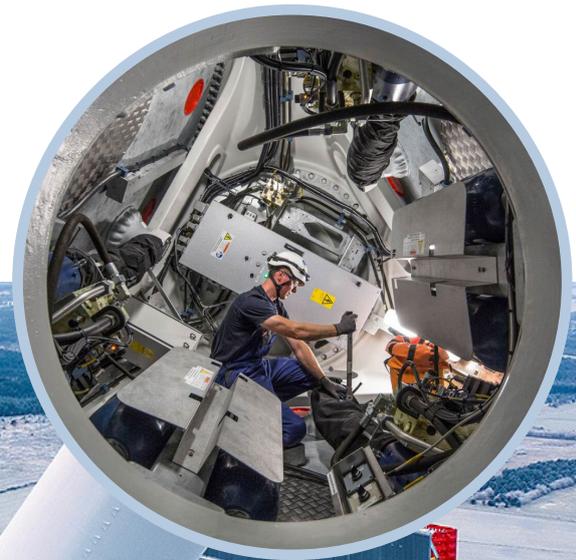
At BGB, we specialise in delivering rotary solutions that have a profound impact on the wind industry. In this article, we'll explore the intricate world of wind turbines and their functionality.



Understanding the Basics: How Do Wind Turbines Work?

Wind turbines operate on a simple principle. When the wind blows, it turns the blades of a rotor that is connected to the main shaft. This shaft spins and drives a generator, converting mechanical energy into electrical energy, the kind we can use in our homes and businesses.

Despite the simplicity of this process, the technology and components involved are incredibly sophisticated.



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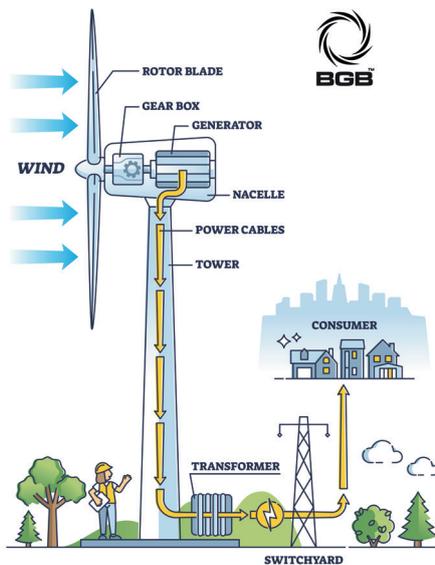
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Parts of a Wind Turbine

Every wind turbine consists of several critical wind turbine parts. The most visible are the blades and the rotor. Made of lightweight, durable materials, the blades capture the kinetic energy of the wind. They're designed with a unique shape to create a pressure differential between the front and the back of the blade, enabling the pitch. The rotor, the element to which the blades are attached, is the heart of the turbine.

Beyond the rotor and blades, there are many wind turbine components that bring the process to life. These components include:



The Nacelle

Positioned on top of the tower, the nacelle houses all of the mechanical components needed for electricity generation. Key parts include the main shaft, gearbox and generator.

The main shaft, which the rotor turns, connects to a gearbox. The gearbox's role is to increase the rotor's relatively slow rotational speed to a higher speed suitable for the generator. The generator then uses this motion to produce electrical energy.



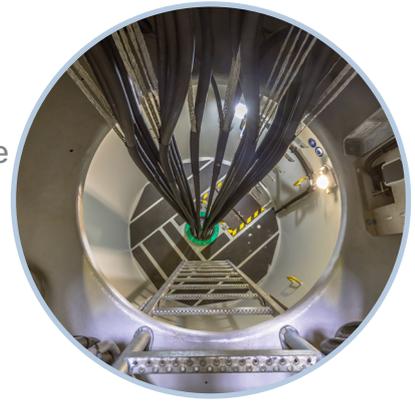
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Control Systems and Sensors

Wind turbines include a range of sensors and control systems to ensure optimal performance, safety and longevity. These sensors monitor wind speed, wind direction, temperature and more. If the wind speeds become too high, the turbine's control system will trigger a shutdown to prevent damage.



The Tower

The tower is crucial in maximising a wind turbine's efficiency. The taller the tower, the stronger and steadier the wind the turbine can access. It also serves as a support structure for the nacelle and rotor.

Essential Additions: Rotary Unions, Lightning Protection and Wind Turbine Slip Rings

In our journey to understand the functionality of a wind turbine, some additional components deserve special mention: the rotary unions, lightning protection systems and wind turbine slip rings. These elements are crucial in ensuring efficient and safe operation of the turbine.



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Rotary Unions

Rotary unions are critical components in wind turbines. These devices provide a seal between a stationary supply pipe and a rotating part such as the rotor, to allow the transfer of fluids, hydraulic fluids or other media. In wind turbines, rotary unions are commonly used in hydraulic pitch control systems, enabling the pitch of the blades to adjust to wind speed and direction, maximising efficiency.

For further information on the function of rotary unions, check out our recent article: [What is a Rotary Union?](#)



Lightning Protection

Wind turbines, given their height, are naturally prone to lightning strikes. Without lightning protection systems, these strikes can cause significant damage to the turbine's components and even lead to failure. Lightning protection systems typically have receptors near the blade tips, which are connected to the hub via wires. When lightning strikes, the energy is safely directed to the ground, as it transfers through the hub via lightning brushes, bypassing sensitive components.



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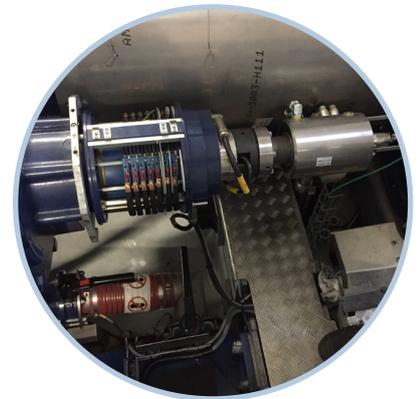
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Wind Turbine Slip Rings

Wind turbine slip rings play a significant role in the wind energy sector. As a part of the electrical generation and transmission process, these devices transmit electrical power and data signals from a stationary component to a rotating one, without tangling wires despite the constant rotation.

For large scale wind there are typically two applications for slip rings. Pitch control and generator slip rings, which transfer three phase power from the generator to the bus bars where the power goes on to converters for power conditioning.

In wind turbines, slip rings are typically located in the nacelle, where they enable power and data transmission while the nacelle rotates to face the wind. By maintaining electrical continuity, they contribute to the turbine's overall performance and reliability.



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In Summary

Understanding how wind turbines work and the components behind these powerful structures help us appreciate the intricate technology involved in harnessing wind energy. It also highlights the importance of companies like BGB, who are committed to delivering innovative rotary solutions that further the advancement of wind energy technologies. As we look to a future increasingly reliant on renewable energy sources, wind turbines stand tall as a beacon of sustainable innovation.

At BGB, we understand the importance of every component in a wind turbine. Our rotary solutions are engineered to withstand the dynamic loads and harsh environmental conditions that wind turbines face. Our aim is to enhance the efficiency and durability of wind turbine parts, contributing to the global efforts of sustainability. Get in touch with us today for more information.



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