

# Abnormal noise from wind turbine generator bearings

What is a wind turbine generator failure analysis & fault diagnosis?

In this article, a comprehensive and up-to-date review of wind turbine generators failure analysis and fault diagnosis are presented. First, the electrical and mechanical failures of various WTG components, including stator, rotor, air gap, and bearings, are analyzed. Then, the fault characteristics and root causes of WTG are studied.

Can bearing faults be detected in wind turbines?

The proposed method emerges as a robust solution for detecting bearing faults amidst challenging signal environments. Its capacity to accurately diagnose bearing faults, coupled with its proficiency across diverse scenarios, positions it as a potent diagnostic tool for wind turbine systems.

What is the bearing status of a wind turbine?

Bearings are the core components of the wind turbine's mechanical transmission system, but the bearings of wind turbines are prone to wear and failure during vibration, and it is often difficult to determine the fault-bearing status and fault location. Therefore, the monitoring and fault diagnosis of wind turbine bearing status are very necessary.

How to solve the problem of generator bearing imbalance in wind turbines?

Compared with the existing research, the proposed method can effectively solve the problem of GAN gradient disappearance and gradient explosion, generate high-quality samples, and then balance the data set, effectively solve the problem of generator bearing imbalance in practical engineering wind turbines, and improve the fault diagnosis accuracy.

What causes a wind turbine bearing to fail?

Insufficient lubrication in the bearing of the wind turbine generator will lead to poor heat dissipation of the bearing, which will cause bonding on the surface of various components inside the bearing. When the load is too large, it will accelerate the process of gluing and make the bearing fail. The bearing fault is caused by uneven force.

Is there a spalling fault in the outer race of generator bearing?

A spalling fault was found in the outer race of the generator bearing in this wind turbine. This finding demonstrates the success of the proposed method in identifying generator bearing fault features in wind turbines in a wind farm. Fig. 37. Detected Fourier support for the vibration signal.

Thereby, as bearing frequency peaks appear, these are easier to distinguish and correlate to different issues with the drivetrain, which is in line with a previous study using ...

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cause abnormal operating conditions.<sup>3</sup> Undetected or unrectified ... Bearings in wind turbine generators are essential load-bearing elements. Maintenance requires disassembling and ...

Abstract. Renewable energy is a clean and inexhaustible source of energy, so every year interest in the study and the search for improvements in production increases. Wind energy is one of the most used sources of energy, ...

Generator faults can contribute significantly to the overall downtime experienced by a wind farm due to component failure, with around 1 failure per year in state-of-the-art offshore wind turbines [3-5].

Deteriorating performance of a generator bearing manifests itself on abnormal changes of the vibration signal, torque, and bearing temperature (Yang et al., 2017; Feng et al., 2020). Vibration analysis and data-driven approaches have ...

At the same time, since the collected sound signal of the wind turbine generator bearing contains a lot of noise, it is necessary to use certain methods to reduce the noise of ...

the noise problem. The effectiveness of the model is first validated using open bearing datasets, then verified using real signals collected from industrial-scale wind turbine pitch bearings. The ...

Wind and solar are leading the growth and it is predicted that by 2027, both wind and solar will provide almost 20% of power generation worldwide [5]. Looking specifically at wind energy, a ...

Bearings are critical constituents of wind turbine generators, serving to locate and support the rotational components in the generator [1], [2], [3]. During extended operation, the ...

However, the high cost of operation and maintenance (O& M) (10-15% of the total income for onshore farms and 20-25% for offshore wind turbines at 20 years of operating life) ...

With the increase of the wind turbine capacity, failures occur on the drivetrain of wind turbines frequently. Since faults of bearings in the wind turbine can lead to long downtime ...

When the generator shaft rotates, heat is generated by electrical resistance in the windings. The windings are located close to the generator bearings and heat is transferred from the windings to the bearings. ...



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