

# Common Fault Analysis of Wind Turbine Generators

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.

Which approach is best for wind turbine generator fault diagnosis?

Finally, the application of four categories of model-based, signal-based, knowledge-based and hybrid approaches to wind turbine generator fault diagnosis is summarized. The comprehensive review shows that the hybrid approach is now the leading and most accurate tool for real-time fault diagnosis for wind turbine generators.

What is a typical wind turbine fault diagnosis process?

Typical wind turbine fault diagnosis process (Adapted from ). The fault diagnosis procedure for wind power bearings mainly involves real-time monitoring of the system using a large number of sensors installed on the device.

How is fault diagnosis of wind turbine bearings based on artificial intelligence?

Fault Diagnosis of Wind Turbine Bearings Based on Artificial Intelligence Artificial-intelligence-based fault diagnosis of wind turbine bearings is divided into two main categories, symbolic reasoning (knowledge-based) and numerical computation (neural-network-based) fault diagnosis .

Why is real-time fault diagnosis of wind turbine bearings important?

Real-time fault diagnosis of bearings not only decreases the occurrence of drive train breakdowns, but also reduces the maintenance costs of the equipment and enhances operational efficiency . In this paper, we focus on the latest progress of wind turbine bearing fault diagnosis by systematically combining the research results of recent years.

What are the common faults of a wind turbine generator?

Common faults of wind turbine generator. Generator electrical faults are mainly stator eccentricity, rotor eccentricity, broken rotor bars, and looseness. The main manifestations of generator stator faults are overheating of stator windings, insulation damage, and grounding.

Fault diagnosis and preventive maintenance techniques for wind turbine generators are still at an early stage compared to matured strategies used for generators in conventional power plants. ... Vibration analysis is the most ...

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Request PDF | Fault analysis of wind turbines in China | The installed capacity of wind turbines in China increased rapidly in the past 10 years. Against the backdrop of growing ...

Vigilant fault diagnosis and preventive maintenance has the potential to significantly decrease costs associated with wind generators. As wind energy continues the ...

This chapter presents an overview of wind turbine generator technologies and compares their advantages and drawbacks used for wind energy utilization. ... of ways. For ...

The analysis of the data of some 7,000 wind turbines has revealed the main problems causing downtime and, therefore, lost potential energy production when the wind ...

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 ...

Compared with faults in other major components of wind turbines, the downtime of wind generators was the longest, up to 7 days, in which winding faults was accounted for ...

PDF | On Dec 14, 2022, Kaleem Khodabux and others published Overview of major faults in wind turbine components | Find, read and cite all the research you need on ResearchGate

of model-based, signal-based, knowledge-based and hybrid approaches to wind turbine generator fault diagnosis is summarized. The comprehensive review shows that the hybrid approach is ...

LIU ET AL. 3 FIGURE 2 The typical structure of WTs [4]. FIGURE 3 The annual fault rate and downtime percentage of wind turbine system main components [5]. The direct drive wind ...

This article presents a standardized analysis of failures in wind turbines concerning the main technologies classified in the literature, as well as identifies critical ...

Abstract. This paper presents a review of existing theory and practice relating to main bearings for wind turbines. The main bearing performs the critical role of supporting the turbine rotor, with ...

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 ...

1 &#0183; In many countries, wind turbines have proven themselves to be a great solution as renewable energy [1]. Though there are other resources of renewable energy which involves ...

The components such as blades, generator, control system, power converter, gearbox, and sensors in wind

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turbine systems are easily damaged, their faults can lead to low ...

Finally, using SCADA data from two 2 MW direct-drive wind turbines as examples for analysis and discussion, the results show that: (1) health indicators have good stability and ...

Wind turbine generator: The dataset is not compared with other algorithms (Jin et al., ... An experimental setup was devised to simulate faults in a wind turbine system. Common faults ...

Wind energy has a crucial role in providing sustainable energy. By the end of 2017, the world-wide wind power installed capacity has risen to 540 GW [1], of which 169 GW ...

The rotor is connected to a generator directly in a direct drive turbine or through a shaft and a series of gears (i.e., a gearbox) that speed up the rotation and allow for a ...

This paper aims to identify important errors that affect the performance and can easily detect the faults of wind turbine generators (WTGs). Wind turbines are subjected to ...

The most common faults in generators include overheating, abnormal noises, and damage to insulation. Qiao and Lu presented an exhaustive survey of the various CM and fault ...

a general trend of upscaling for wind turbine installations, with larger machines appearing each year. This trend is cap-tured in Fig.2 which shows yearly average rotor diameters and power ...

Inter-turn short-circuit fault of the stator winding is one of the most common faults of asynchronous generators and often found in doubly-fed wind turbines. ... The study ...

High penetration of wind power with conventional grid following controls for inverter-based wind turbine generators (WTGs) reduces grid inertia and weakens the power ...

Moreover, the symptoms of the common faults and related diagnosis techniques are discussed. Meanwhile, this paper mainly aims to survey the most recent condition and performance ...

The implementation of machine learning techniques allows to prevent in advance the degeneration of any component present in a wind turbine, as well as the ...

Rotor imbalance is a common fault in wind turbines, which may enhance radial loads that induce faults on the main bearing and gearbox. ... Li W, Shao Y, et al. (2015) ...

This paper analyzes the stator current spectrum in the dqo frame of both healthy and faulty generators using EMN modelling and WT. The fault feature is extracted using discrete wavelet transform (DWT). The fault ...

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With the rapid development of wind power industry, the reliability of wind turbines has become a hotspot in wind power research. The failure modes and research ...

This paper summarizes the current research, challenges, and countermeasures of intelligent O& M in the wind energy industry and forecasts its development trend based on a ...

2021. The electric generator is estimated to be among the top three contributors to the failure rates and downtime of wind turbines. For this reason, in the general context of increasing ...

As a rich clean and environmentally friendly renewable resources, wind energy has emerged as a strategic choice for countries around the world. Because the wind turbines ...

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