Causes of wind turbine blade damage

What causes wind turbine blade failure?

The article presents the potential causes of wind turbine blade failures and discusses the severity of the damage induced by these causes. Factors such as strong storm winds,rain,hail,lightning,repeated wind loads,and shear effectsare explained as sources of structural damage to wind turbine blades.

Can wind turbine blades be damaged?

All potential causes of damage to wind turbine blades strongly depend on the surrounding environment and climate conditions. Consequently,the selection of an installation site with favourable conditions is the most effective measure to minimize the possibility of blade damage.

What are the damage mechanisms associated with turbine blade failures?

Several cases relating the damage mechanisms associated with blades failures, e.g., corrosion-erosion, carbides precipitation, oxidation, coating degradation, high and low cycle fatigue, and creep, are discussed. To converge the topic, the work focuses on gas and wind turbine blades only.

What causes a wind turbine to stop working?

Apart from force majeure situations when the wind turbines cannot function anymore (lightning, tower hit by blade, transport damage, missing external parts), they listed interlaminar failure, transverse cracks from the trailing edge and on the blade surface, fatigue failure in the root connection as critical damage requiring the turbine to stop.

Impact Damage: Impacts from objects such as birds, hail, or debris can cause significant damage to the blade, leading to performance degradation and potential structural failure. Source: Katsaprakakis, ...

In summary, visual measurement provides an intuitive and non-contact pathway for detecting surface-level damage on wind turbine blades. It excels in identifying visible defects and supports rapid ...

The leading edge of the blade faces constant impact from rain, hail, dust, and airborne particles. Over time, this causes material erosion which alters blade aerodynamics, reducing annual ...

Blade damage on wind turbines can result from a variety of factors, both external and internal. As the global blade repair spend continues to rise, it"s crucial to understand these common ...

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Wind turbine blades are essential for converting wind energy into electricity. However, their constant exposure to harsh conditions--like rain, hail, debris, and extreme ...

A review of the root causes and mechanisms of damage and failure to wind turbine blades is presented in this paper. In particular, the mechanisms of leading edge erosion, adhesive joint degradation, ...

The scope of this article is to review the potential causes that can lead to wind turbine blade failures, assess their significance to a turbine"s performance and secure operation and ...

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