Generator rotor blade clearance

How to measure engine rotor tip clearance?
As long as the blade is a con-ductive material,no matter how the blade tip shape is,the tip clearance can be measured stably and reliably by probe methodunder high-temperature and high-pressure environments. However,the original method can only measure the minimum tip clearance of the engine rotor.

Why is blade tip clearance important in a gas turbine engine?
Blade tip clearance is one of the important parameters affecting the performance,safety and stabilityof a gas turbine engine. However,it is difficult to measure the tip clearance in real time and accurately during the development and test process of an engine.

What is a rotor blade in a wind turbine?
The rotor blade is the key component of a wind turbine generator(WTG) and converts the energy of the wind into a mechanically useful form of energy. It represents a significant cost factor in the overall context of the turbine and at the same time has an enormous impact on the yield of the turbine.

What is the minimum clearance for wind turbine rotor turning?
In Section 6.2.4.1 of Germanischer Lloyd's "Guideline for the Certification of Wind Turbines Edition 2003 with Suppl 2004," it states that: "If the deformation analysis is performed by dynamic and aeroelastic means,at no time may the clearance be less than the minimum of 30%for the rotor turning."

What is a rotor blade?
Part of the book series: Green Energy and Technology ((GREEN)) The rotor blade is the key component of a wind turbine generator(WTG) and converts the energy of the wind into a mechanically useful form of energy.

What is a generator rotor?
The generator rotor represents an excellent combination of electrical,mechanical and man-ufacturing skillsin which the field coils are well insulated,supported and ventilated in a com-pound structure rotating at very high speed (typically 1800 or 3600 rpm).

The rotor tip clearance in a gas turbine engine varies throughout the engine operating regime. It has considerable influence on the engine performance. Blade to casing ...

enthalpy. We propose a turbine embedded in a generator (TEG), wherein the turbine rotor is embedded inside the generator rotor, thus simplifying turbine generator structure using only one bearing. The absence of tip clearance between the turbine rotor blade and casing wall in the TEG eliminates tip clearance loss, enhancing turbine efficiency.

Semantic Scholar extracted view of "An on-line calibration technique for improved blade by blade tip

clearance measurement" by A. G. Sheard et al. ... Capacitive sensor for active tip clearance control in a palm-sized gas turbine generator. ... using a surface modification of the ceramic compressor and rotor with conductive coating.

Tip leakage flow is inevitable due to the tip clearance over rotor blades in turbines. [3] Tip clearance between the runner blade tip and shroud in a Kaplan turbine is inevitable, and the tip leakage flow (TLF) and tip leakage vortex (TLV) induced by the tip clearance have a considerable effect on the flow behaviors. [4]

Blade tip clearance refers to the radial distance between the tip of the rotor blade and the engine casing, which is an important parameter afecting the efciency, stability, and safety...

However, the unique design of the rotor group makes it possible to use an active mechanical design without the need for a high temperature actuator or complex mechan-ical linkages. In a ...

The rotor tip clearance in a gas turbine engine varies throughout the engine operating regime. ... George B. Capacitive sensor for active tip clearance control in a palm-sized gas turbine generator. IEEE Trans Instrum Measur 2005; 54(3): 1133 ... Ramesh Murthy and Singh AK. Effect of structural growths on the rotor blade tip clearance ...

A surface modification of the ceramic compressor and rotor with conductive coating is utilized to create a novel configuration of a tip clearance probe. The probe capacitance varies by ...

In order to gain the blade tip clearance dynamically, a prototype optical fiber measurement system was built and tested based on the rotor test rig. The optical fiber tip clearance measurement system consists of the reflective intensity-modulated optical fiber bundle (sensor), main signal processing unit, high-speed data acquisition card, and a ...

A capacitive tip clearance measurement system, based on a synchronous detection of a phase-modulated signal, for a palm-sized gas turbine engine with an integral ceramic rotor piece, using a surface modification of the ceramic compressor and rotor with conductive coating. The efficiency of a gas turbine has an inverse relationship to the clearance ...

Blade off that occurs during operation will generate a sudden imbalance excitation and make the rotor become inertially asymmetric, which leads to large instantaneous impact load and induces more complex rotor dynamic phenomena. In order to study the transient dynamic characteristics for complex rotors suffering from blade off, a mathematical model for ...

Wind turbine generator (WTG) has three major systems: 1. Rotor system. This includes blades that capture energy and a rotor hub that connects the blades to the shaft, along with pitch mechanism that assists in efficient capture of energy. 2. Nacelle. This contains all the components that sit on top of the tower, except the rotor system. It ...

Generator rotor blade clearance

Optimization and active control of the tip clearance of turbine blades has been identified as a key to improve fuel efficiency, reduce emission, and increase service life of the engine. However, reliable and real-time tip clearance measurement is difficult due to the adverse environmental conditions that are typically found in a turbine. We describe a dual-beam fiber ...

Ohya et al. [30] 2008 Existing open rotor Optimized in stand-alone Co?oiu et al. [31] 2011 SICE-1kW Modified NACA4412 Wang et al. [32] 2012 Novel multi-blade Divergent frustrum Aranake et al. [33 ...

Tibor F, Friedrich BP, Georg B. Capacitive sensor for active tip clearance control in a palm-sized gas turbine generator. IEEE T Instrum Meas 2005; 54: 1133-1143 ... Analysis of uncertainties in measurement of rotor blade tip clearance in gas turbine engine under dynamic condition. Proc IMechE Part G: J Aerospace Engineering 2014; 228: 652 ...

Since a generator requires mechanical energy to produce electricity, the rotor plays the most crucial part by generating an electric field between it and the stator, a set of electrical conductors in coils. 2. Find the Necessary Tools. Before you can check your generator"s rotor, you"ll need some essential electrical equipment.

This chapter talks about inspection of the rotor, mostly while removed from the stator. It aims to serve as a guide to learning the specific problems and failure mechanisms, and their identification that will make it possible to correctly assess intrinsic risks for a given design, and to notice explicit signs of deterioration, damage, and/or impending failure. In large machines, balance ...

The figure below is a photograph of a generator fan that has its blades welded to an inner hub. The hub is shrunk on to a generator"s rotor shaft end. The highest stress location for this design is at the weld attachment ...

When a compressor is throttled to the near stall point, rotating instability (RI) is often observed as significant increases of amplitude within a narrow frequency band which can be regarded as a pre-stall disturbance. In the current study, a single compressor rotor row with varying blade tip clearance (1.3%, 2.6% and 4.3% chord length) was numerically simulated ...

The static pressure difference between the suction and the pressure side of the impeller blades produces a secondary flow over the tip of the rotor blades. This tip clearance flow is important for ...

The stator channel was divided into 5 equal sections along the circumferential direction, and 5 dimensionless circumferential angles: (theta) = 0.1, 0.3, 0.5, 0.7, and 0.9 sections were taken into analysis. The CO2 fraction contour at each location was displayed in Fig. 6.The circumferential position and radial depth of gas ingestion change with the relative ...

AC impedance test. The AC impedance test is used to find indications of shorted rotor turns. The test is performed by means of applying an AC voltage across the field winding and raising it in 10-volt steps up to 100-120 volts, or till the current supply gets maxed out.

Large turbines are periodically torn down, inspected, and rebuilt. Turbine blade clearance to the case is one of the most critical measurements. Too close and the blades could expand and the turbine could be destroyed, too far away and efficiency is lost and power is sacrificed. This makes it vital to know the actual blade tip clearance.

Blade tip clearance is one of the important parameters affecting the performance, safety and stability of a gas turbine engine. However, it is difficult to measure the ...

the measurement area. Meanwhile, a rotor speed Table 1. Change in tip clearance caused by different factors of an engine. Factors Blade tip clearance Blade fracture Larger Blade crack Smaller Disk creep Smaller Casing deformation Depends on the deformed shape Temperature fluctuation Depends on the thermal expansion law of blade material and ...