Sequoia IT

Solution for Wind Turbine Vibrations Monitroing

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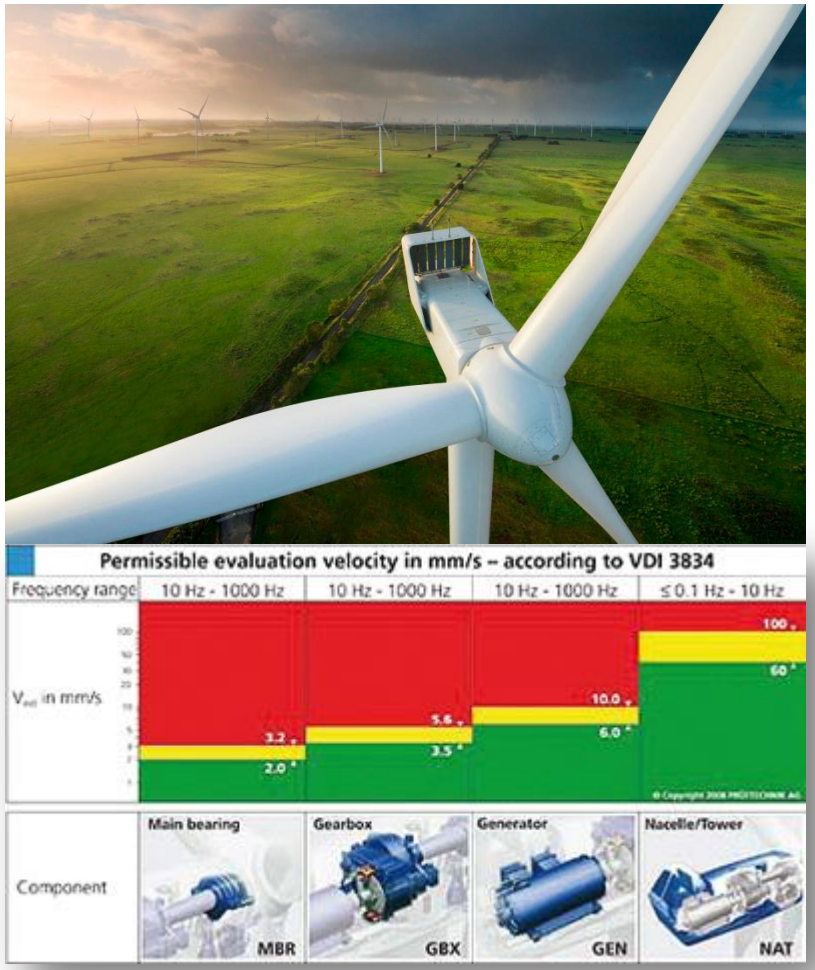
Introduction

Wind Turbine Vibrations Monitoring

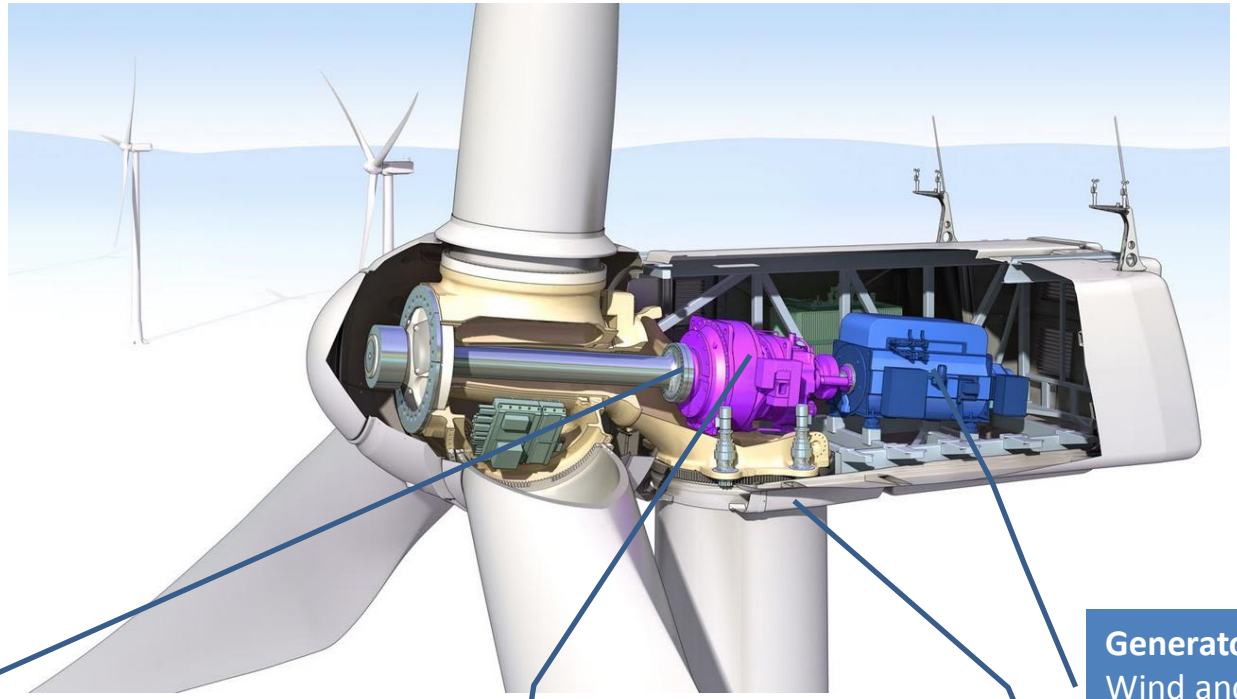
Vibrations Monitoring on Wind Turbine is of fundamental importance for assesment of turbine condition, improve maintenance operations, avoid unaspected breakage and reduce service cost.

Turbine condition could be evaluated on the basic of machine specific overall vibration levels. For Wind Turbine up to 3MW the evaluation of overall vibration values is based upon VDI 3834 standard



Component to be monitored

VDI 3834 Required Monitoring Point



Generator Vibrations
Wind and Transversal wind Direction (1 sensor)

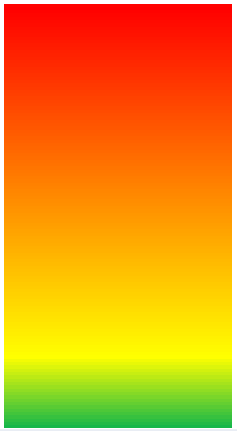
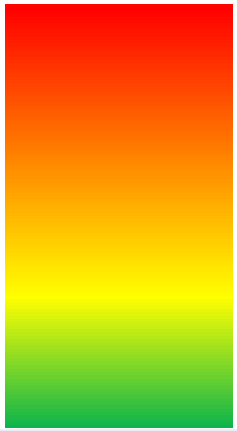
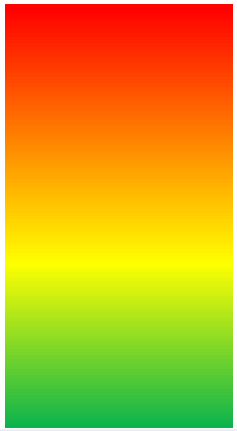
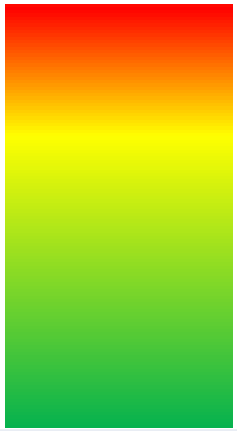
Main Bearing vibrations
Axial & Radial Direction (1 sensor)

Gear Box Vibrations
Axial & Radial Direction (2 sensors)

Tower / Nacelle Vibrations
Wind and Transversal wind Direction (1 sensor)

Limits suggested per component

Permissible evaluation in velocity in mm/s - According to VDI 3834

Frequency Range	10-1000 Hz	10-1000 Hz	10-1000 Hz	0,1 – 10 Hz
RMS velocity (0 to 200 mm/s log scale)				
Component	Main Bearing	Gear Box	Generator	Tower / Nacelle

Power up to 3 MW

SEQUOIA IT Solution for Wind Turbine

SeTAC Family

SMART Tri-axial MEMS digital sensor

Features & Benefits

MEMS based technology grant high robustnes of the system, further the frequency range from 0 to 1500 Hz makes it ideal for all wind turbine component. The capacity to read DC allow for direct verification with gravity

Tri-axiality grant that only one sensor is needed for measuring point compare to standard technology

SMART, the internal processor compute and compare vibrations level against standard limit and supply wind power control system with simply alarm message when limit (different level for warning and danger) are exceded. Each sensor further can store in its internal memory up to 12.000 event that can be later retrieved

The **DIGITAL** output allows for easy integration with Wind Tower control system

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SEQUOIA IT Solution for Wind Turbine

SeTAC Family

SMART Tri-axial MEMS digital sensor

Advanced possibility

- Each sensor its a stand alone, indipendent and reliable vibration monitoring system that does not require any other component at Wind Turbine Control level
- The solution is higly scalable ftom 1 to several sensor depending on specific wind turbine confiuration
- Data can bea easy retrieved by local sensor memory for historical analysis
- RAW data can be request on-demand for more advanced analysi in case of possible dangerous level
- SPECTRAL Analysis can be computed directly at sensor level for adavanced diagnostic real time analysis

SEQUOIA IT Application example

Low power Vertical wind Turbine

This special case of wind turbine, does not required a sofisticated vibration monitoring system.

Anyway high wind speed can lead to pole instability and therefore turbine can be seriosoly damaged by this condition.

A simply monitoring system based on SETAC has been developed providing direct control on th first flessural mode of turbine pole, that automatically shut down the turbine in case of eccessive vibration are register.

Further the sensor has been realized with special material to grant furher protection against lighting

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SEQUOIA IT Application example

IMPSA Select SeTAC

IMPSA, a major Brasilian company operating in the wind turbine market extensivelly used SeTAC for WIND TURBINE TOWER control.

They use mainly the SeTAC for TOWER vibration. The digital, extremelly low frequency vibration data are continuosolly register by wind tower control system.

Active control is than activated based on digital data to dinamically control tower vibration.

Data are transmitted using simple commercial TCP RTU PROTOCOL

thank you for the attention

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