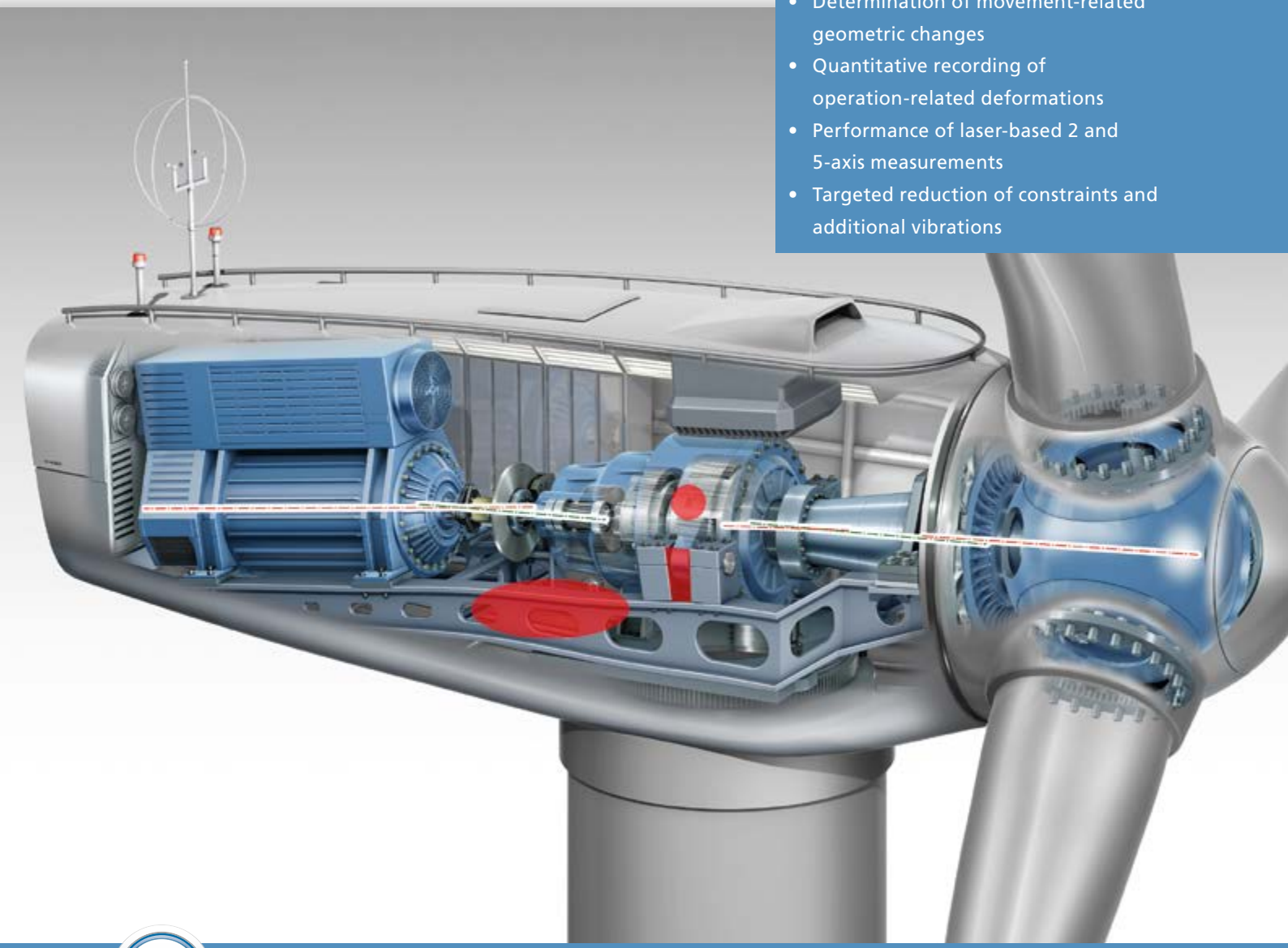
PRÜFTECHNIK

PRÜFTECHNIK ServiceCenter

Determining movement-related structural deformations in order to reduce constraints and additional vibrations

- Determination of movement-related geometric changes
- Quantitative recording of operation-related deformations
- Performance of laser-based 2 and 5-axis measurements
- Targeted reduction of constraints and additional vibrations



MEASURE, EVALUATE AND REDUCE VIBRATIONS

VIB 4.2 Determination of dynamic movements and structural deformations

Using failure mode effect analysis (FMEA), the risks associated with geometric deviations can be considered and priorities for requisite optimizations can be derived. A distinction is to be made between form and surface deviations, production-related geometric errors, deviations in geometric movement behavior and structural deformations. With regard to the risk of failure, structural deformations due to dynamic loads are the most dangerous and can result in premature fatigue.

PRUFTECHNIK specialists are happy to advise you in relation to geometric measuring options and perform deformation and movement measurements of this nature (online as well) using laser optical technology, contactless displacement sensors or even strain gages.
With regard to geometric deviations, a decision is then to be made as to which of the following structural deformations are dominant and how they are to be corrected.

Structural deformations due to kinematics

They arise in relation to quality deviations and non-precise installation and alignment of machine components to each other. These production-related errors may change as a result of wear, material fatigue and/or subsidence. Instances of loosening, cracks and collisions are, for example, to be taken into consideration should sudden changes occur.

Constraints stress structures that are to be corrected

Structural deformations due to thermal causes

Internal and external temperature changes result in thermo-mechanical stresses and deformations. These thermally induced factors should be determined in advance so that they do not affect operational behavior and performance under operating conditions.

Arrangement for online recording of thermal deformations of the main bearing and the main gearbox in relation to each other

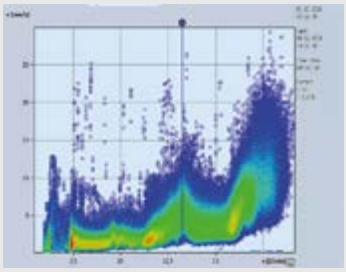
Structural deformations due to load and weight-related causes

With regard to wind turbines, the weight and the position of components have a significant impact on the geometry of the turbine. The structural deformations due to load and weight-related causes are to be recorded and are also to be accounted for in the alignment process.

Clamping units must be correclt positioned in relation to each other before they are connected

Structural deformations due to dynamic loads

With regard to elastically flexible machines, additional geometric stiffness-dependent deviations arise under operating conditions. However, dynamic forces from the rotor or control processes and resonance passage can result in geometric deviations in the nacelle that may have an effect on structural deformations.



Two-month recording of vibration speed parameters using the rotor speed at the main bearing measurement point and the resulting deformations in the nacelle

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