Imbalance analysis

cp.max ROTORTECHNIK

Reduction of wear – Reduction of maintenance effort – Reduction of energy loss – Reduction of costs

Optimization – Analysis and Elimination of Rotor Imbalances on Wind Turbines

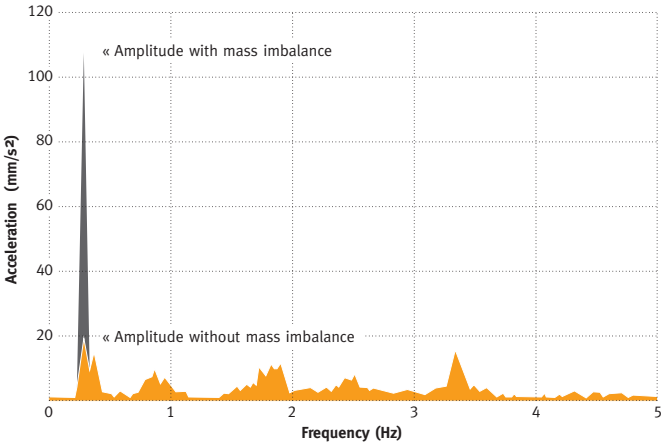
Our services include the following:

» Measurement of imbalances on site
» Interpretation of measurement results
» Elimination of the rotor imbalance

Imbalance vibrations – An often neglected problem

Wind turbines are susceptible to vibrations because of their dimensions and mass distribution. Vibrations appear on each wind turbine within defined limits. But our experiences show that about 35 % of all wind turbines have rotor caused vibrations which exceed the limits. These vibrations cause unusual structural loads, an increased wear, adverse start-up conditions, and often vibration-caused turn off.

Mostly vibration-caused problems are detected too late or are misinterpreted. An available CMS (condition monitoring system) is not always able to interpret the measured signals correctly. The reduction of energy yield and lifetime can be the cost-intensive consequence.



Frequency spectrum of an operating rotor with and without mass imbalance

Causes of rotor imbalances – Diverse possibilities

Rotor imbalances on wind turbines can be differentiated in the two following types caused by several reasons:

Mass imbalances

· Large blade repair
· Fluid inclusions in the rotor blades
· Different static moments within a blade set
· Rotor division error
· Icing

Aerodynamic imbalances

· Different blade angles (blade angle error)
· Deviations of the profile geometry (e.g. profile deviations, twist deviations)
· Damage on the rotor blade (e.g. erosion at the leading edge, damaged or missing flow elements, large cracks in the blade shell)
· Cone angle error, rotor division error
· Icing

Indication and elimination of imbalances – Our special field

We support our customers in preventing the negative effects of imbalances and offer a complete service package. This package includes several parts. First we run the measurements on site. On base of our long-term experience we interpret the measurement results and provide our customer a recommendation of measures. Finally we are able to eliminate the imbalance if necessary. Our customers benefit from the big advantage that we are able to handle the complete balancing process.

In order to provide a trouble-free and reliable operation of your wind turbine, the balance conditions of the rotor blades should be analysed regularly, especially after repairs. However it is very important that each wind turbine is checked by a simple imbalance analysis. If this is done right after construction, any imbalance problem is detected early enough to be solved with low effort and costs.