

Application Note

Noise Testing of Wind Turbine Power Generators (IEC Standard 61400-11 Second Edition)

Noise is an important factor in the development and deployment of wind turbines. To protect the environment, the level of noise emissions is strictly limited in many countries. IEC Standard 61400-11 specifies the measurement and analysis techniques of noise emissions by wind turbine generator systems.

Korea Institute of Energy Research (KIER) located in Daejeon, South Korea, purchased m+p international's SO Analyzer for measuring and analyzing the noise produced by the wind turbine power generators at its test site in Gangwon province. Testing is fully compliant with IEC Standard 61400-11 second edition.



Wind turbines of Korea Institute of Energy Research in Gangwon, South Korea

To determine the noise characteristic of a wind turbine power generator one reference microphone and three optional microphones are placed around the turbine according to a standard pattern. The reference microphone is placed downwind of the turbine, two microphones are placed at 60 degrees on the left- and right-hand side of the reference microphone and the fourth is placed in the upwind direction of the turbine. The distance of the microphones to the wind turbine tower is determined by the tower height and rotor diameter.

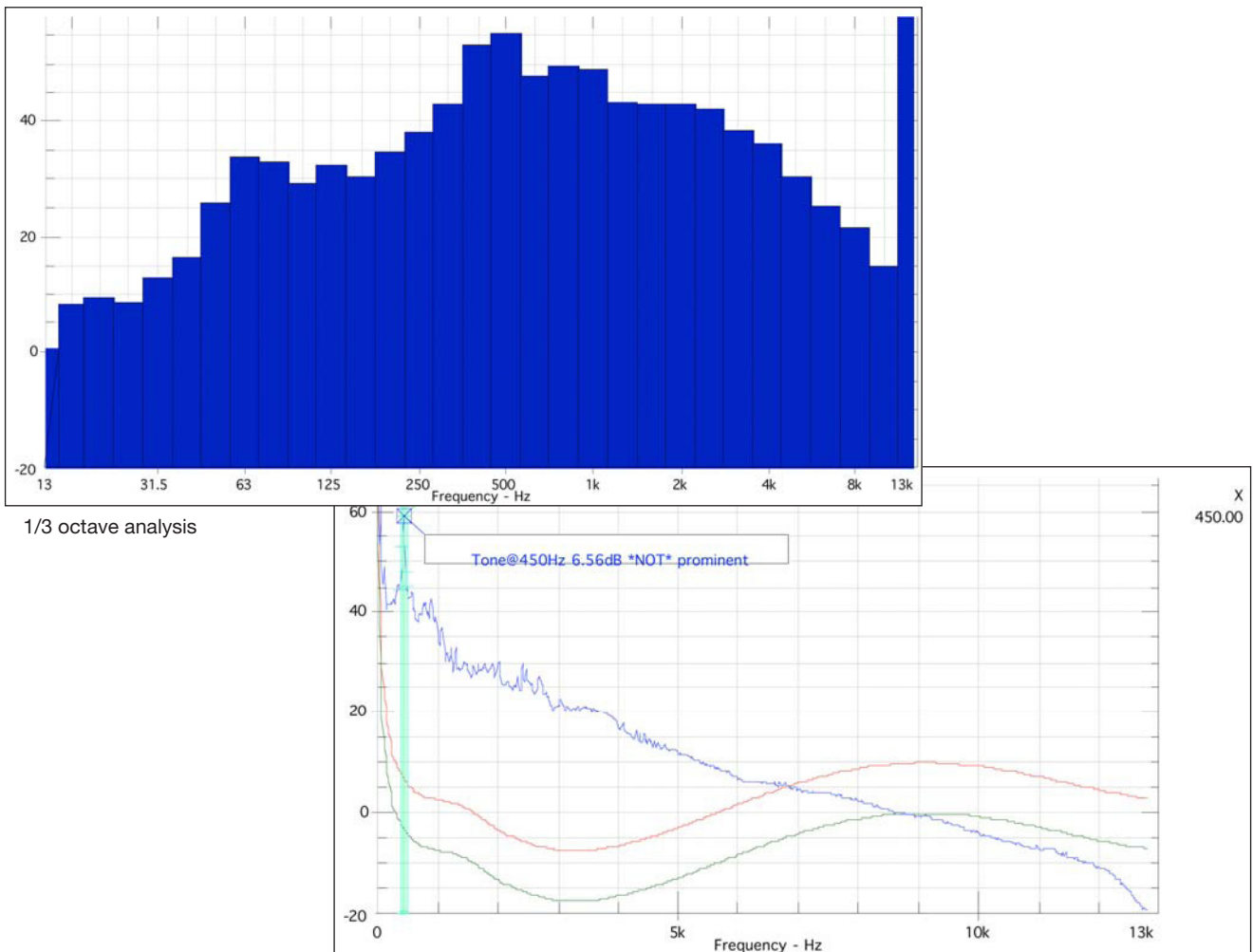
The test duration depends on the wind conditions (direction, speed) and can last from a few hours to several days. The noise measurements must be taken with the turbine running and also when stopped to acquire the background noise. It is important that no other ambient noise coming from trains, cars, animals, etc. occur during the measurements.

With the SO Analyzer, the data from the microphones can be analyzed in real time on a laptop PC and be stored for post-processing and reporting. The noise response is typically measured over a frequency range from 20 Hz to 10 kHz.

Acoustic measurements include:

- A-weighted sound power level
- 1/3 octave band levels
- tonality

This data has to be determined at the integer wind speeds of 6, 7, 8, 9 and 10 m/s.



Tonality: Characterizing the audible significance of tones

SO Analyzer is operated with the 4-channel NI 9234 CompactDAQ acquisition device from National Instruments. This compact and rugged device is ideal for portable applications in the field.



SO Analyzer with 4-channel NI 9234 CompactDAQ acquisition instrument

For central data management SO Analyzer provides comprehensive capabilities for browsing, viewing, editing, rescaling and copying & pasting to ActiveX applications. Reports can be easily and quickly created in Word and are available as bitmap or ActiveX document.

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