WIND TODAY

THIRD QUARTER 2006

Making a Texas-Size Difference

Buffalo Gap Wind Farm

Wisconsin Wind in the "Go Around" County

Madison Gas and Electric Wind Farm

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3065 Pershing Ct.
Decatur, IL 62526

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continued from page 19

to those used by one of the V-47 turbines at Buffalo Mountain. Vibration analysis detected and identified a seeded fault on the planetary gear race.

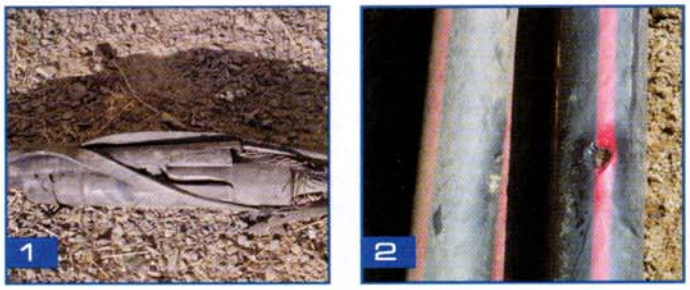
Seeded-fault testing of vibration and other condition monitoring techniques under controlled conditions combined with field tests will provide a more comprehensive assessment of vendor condition monitoring systems than field testing alone, EPRI concluded.

EPRI will document the value of lube-oil monitoring after one year of testing at Buffalo Mountain, and is considering modifying the TVA project to include seeded-fault testing of vendor systems.

IEEE Cable Test Technology & Protocol

Testing also was addressed by Benjamin Lanz, who focused on the application of Institute of Electrical and Electronics Engineers (IEEE) recommended cable test technology and protocol.

While cable technology has changed over the last few decades (from PILC cables to extruded power cables), the standards for testing cables at wind site-distributed generation were not updated until 2001. The traditional DC high potential withstand test is no longer supported as an acceptance test or maintenance test for extruded cable.



1: A joint that was found to be performing below IEEE standards and was not repaired. The joint failed in less than three years.
2: A hole drilled partially through the cable is suspected to be sabotage. This defect would have passed any other type of test and later failed.

Lanz points to IEEE 400-2001 as the proper guide for field testing and evaluation of the insulation of shielded power cable systems. If the cable system can be tested in the field to show that its partial discharge level is comparable to that obtained in factory tests on the cable and accessories, it is convincing evidence that the cable system is in excellent condition. The power frequency off-line PD diagnostic test is the only test which fulfills the IEEE standard recommendation, Lanz said.

The off-line PD test not only satisfies the latest standards, but assures long-term performance. You can assure reliability and limit liability with a comprehensive PD testing program, Lanz suggested.

PD is an electrical discharge that does not completely bridge the space between two electrodes, Lanz explained. The voltage at which PD first appears is the inception voltage (PDIV). The PD is extinguished when the voltage is reduced below the level called the extinction voltage (PDEV). Problems arise in collector systems when transient voltages excite PD activity within the defects and cause a concentrated erosion process to eat away a small amount of cable insulation. A defect left in this state will eventually cause the cable to fail.

Defects that can be found at

wind sites include heat shrink joints; joints with the wrong conductor splice or crimp tool used; terminations (where the semicon is cut back too far); and defects due to thermal load. Other defects may result from a poor cross-bonding technique piercing the outer semicon layer; terminations; cable manufacturing defects; or if a fence post is hammered into the cable.

To help assure cable reliability, wind farms may follow a five-step implementation process:

1. Design and logistics integration: select team (for design and operations), schedule team meeting, gain executive sponsorship, plan logistics, design for reliability and analyze cost benefit.

2. Specific site proposal: define field team, develop one-line diagram, optimize logistics, and develop proposal.

3. Field survey and repair: Schedule survey, perform survey, repair defects, and retest repairs.

4. Recommendation and monitoring proposal: compile results, conduct an autopsy, conduct analysis, and propose an improvement and monitoring program.

5. Monitoring program: Define team, implement program and select warranty options.

Health and Safety Guidelines

During the session, James Heenan also described the British Wind Energy Association's (BWEA) initiatives for improving health and safety.

The BWEA Health and Safety Group identified areas where common standards, guidance or training would help "reduce the risks of incidents occurring throughout the life phases of on/offshore wind farms; and put in place means of facilitating ongoing development of BWEA health and safety activity in the UK wind industry."

BWEA has established four initiatives, including a guidance book, training standards, a database and access systems (offshore). The guidebook is available online (*www.bwea.com/safety/*).

BWEA recognized that training standards would ensure consistency of health and safety competence, help the wind energy industry maintain a positive image and, most importantly, keep people safe.

Heenan described two training programs that have been piloted and adopted by BWEA, a marine survival program and a work at height program.

BWEA has also adopted the UK ECITB safety passport scheme which covers the following topics:

- Introduction to health and safety law and permits to work
- Safe working practices and scaffolding
- Safe access and egress
- Accident and first aid procedures
- Fire precautions and procedures
- Control of Substances Hazardous to Health (COSHH) and PPE
- Manual handling
- Noise
- Working with cranes and heavy equipment
- Excavations

The next three BWEA courses will include draft standards on crane safety, managing projects and electrical safety.

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