



**2011 WIND RELIABILITY
WORKSHOP**
August 2-3

**Blade Vital Signs-
Ongoing Inspection,
Repair and “Tune-up”
Strategies**



we keep it turning

What do we know about blade health?



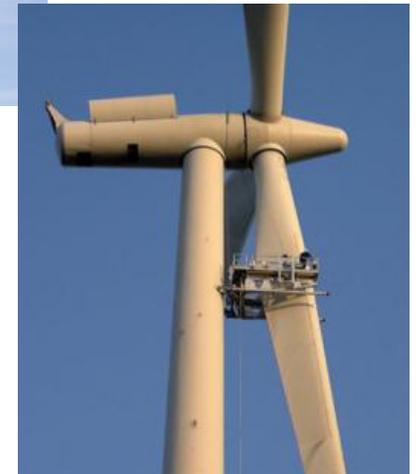
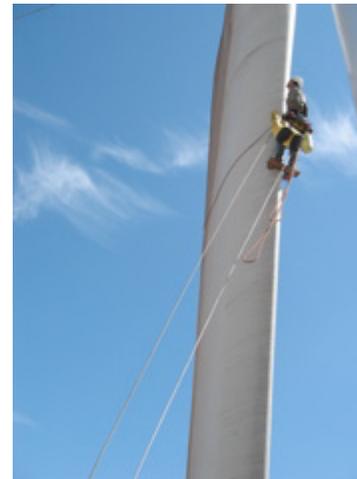
Challenges

- What are we looking for?
- Difficult to see blade defects at a distance
- Tower height and blade surface area



Access Methods

- Rope access
- Cranes
- Suspended scaffolding



Blade Inspection Techniques



External

– Visual

- From ground with optics
- Up close and personal



– Non-Destructive-Testing (NDT)

- Tap testing
- Advanced NDT to detect known serial issues

– Conductivity Testing (Lightning Protection)



Internal

- Confined space issues affect time and cost efficiency

Proper documentation of findings

Cradle to Grave Mentality



Obsolescence



20+
year
life

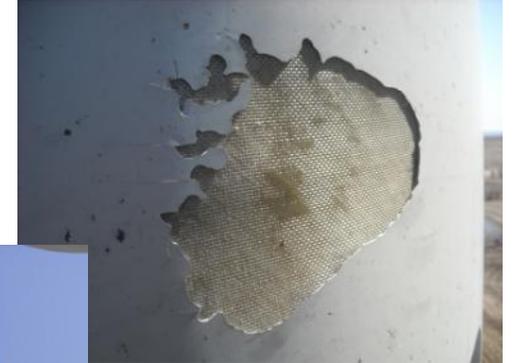


we keep it turning

Ignorance may be bliss, but...



Examples of blade damages

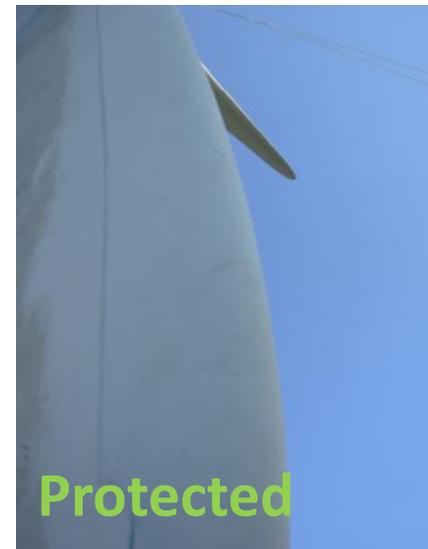


Are blades and environmental conditions matched properly?



Buyer awareness

- What challenges does a specific site present?
- Are blades leading edges protected?



Preparedness



Once operational:

- The first two years are a crucial baseline of wear and tear
- Inspect externally and internally
- Document all results
- Utilize a service company that can assist with findings

Prevention



After inspection:

- Analysis of data to determine a repair priority
- Repair
- Document all repairs

Proactive



Pre end-of-warranty inspection

- Inspect externally and internally in advance so warranty claims may be made on time

Post warranty inspection at regular intervals

- Both internal and external every two years is suggested

Tune Up Strategies



we keep it turning

Lessons Learned



- Improved blade quality through positive feedback loop
- Regular inspection and repair strategies
- Site specific considerations
 - Rain, ice, dust, salt, lightning, wind shear, etc.
- Blade leading edge protection
- Increasing output with tune-up or enhancement strategies
- Sharing blade condition data with Sandia's BRC

Thank you for your attention!



Contact details:

Chris Bley

cbley@ropepartner.com

(831) 460-9448

ropepartner.com



we keep it turning