

Early Detection in Wind Turbine O&M: 3 simple images

by Brogan Morton on February 12, 2013

Early detection in wind turbine operations and maintenance matters for three core reasons.

Gearbox failure costs

Turbine maintenance costs comprise 35 to 45% of operating expenses post-warranty. Replacement of a single gearbox on a 100-turbine wind farm can eat up a considerable portion of your annual maintenance budget.

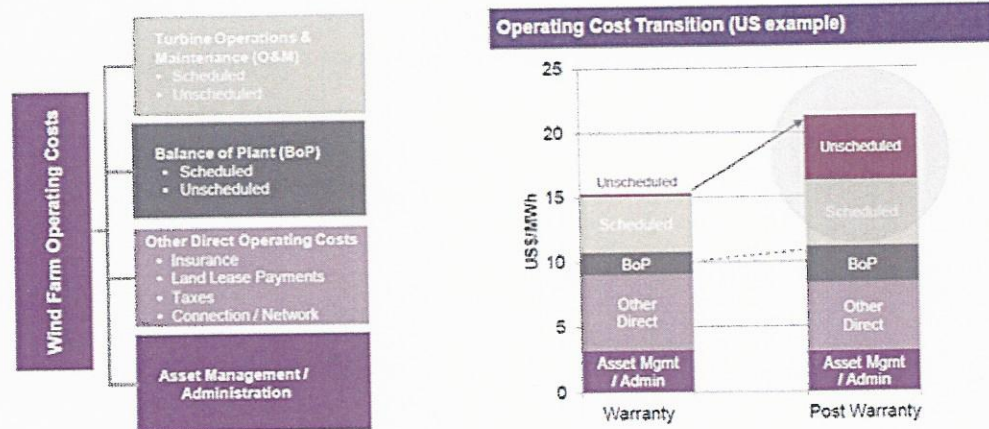
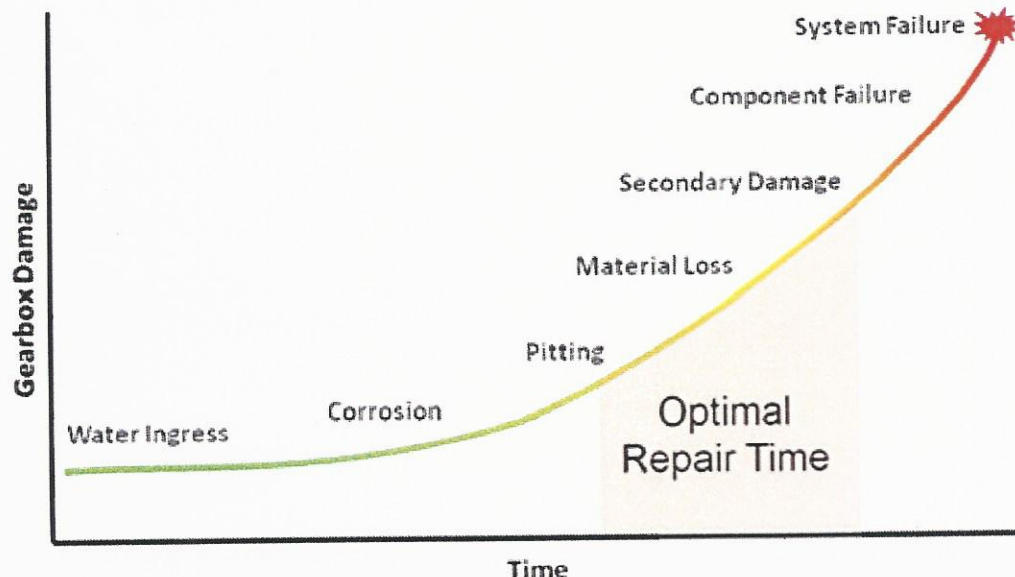


Figure 1: Operating costs from a U.S. asset owner

Escalating effects

Failure is a process, not a single event. The optimum window of detection is after the fault starts to propagate but before serious wear and secondary damage occurs. For example, as a bearing fault starts to grow, more and more wear-debris is shed. Carried by the lubrication, debris particles travel through the gearbox where they can find their way into other gears and bearings initiating further damage. Avoiding this secondary damage is the key to saving money.



Newhouse 1

Figure 2: The optimum window of detection is when operators can maximize return on investment.

Secondary damage compounds costs

Here's an example of the differential cost of repair when damage in the high-speed shaft is detected early on versus after secondary damage. The total savings of \$216,000 includes the **avoided cost** of a crane and complete gearbox rebuild, plus lost revenue from turbine downtime.

	Reactive maintenance		Predictive maintenance	
Outcome	Fault leads to unexpected failure of a high speed bearing with significant secondary damage. Crane needed to pull entire gearbox. Gearbox needs to be refurbished.		Fault detected early, replacement scheduled for next low wind period. Bearing can be replaced up-tower, no crane needed.	
Repair Costs	Crane cost:	\$100,000	Crane cost:	\$0
	Gearbox rebuild:	\$154,000	Up-tower repair:	\$44,000
	Total:	\$254,000	Total:	\$44,000
Lost Production	14 days @ \$600/day:	\$8,400	4 days @ \$600/day:	\$2,400
Total Cost		\$262,400		\$46,400
Net Savings		Baseline		\$216,000

Figure 3: Cost savings of predictive maintenance in a gear box.

Brogan Morton is the Product Manager for Turbine Health Monitoring at NRG Systems.

Additional resources:

[The Value of Early Detection, WindTech International, January 2013](#)

[Techniques for Predicting Future Gearbox Health, Windcurrents, 2011](#)

[White papers and technical papers from NRG Systems](#)

3+1

Tagged as: [Detection](#), [Early Detection](#), [Failure Cost](#), [gearbox](#), [Maintenance Cost](#), [O&M](#), [operations and maintenance](#), [Turbine Maintenance](#), [Wind turbine](#), [Wind Turbines](#)

{ 0 comments... [add one now](#) }

Leave a Comment

Name *

E-mail *

Website

//

Submit

Previous post: [Wind supporters must speak out](#)

Next post: [NRG Systems gears up for WINDPOWER 2013](#)

