Life Extension with DigitalClone® Prognostics

When SunEdison's gearboxes began failing prematurely, they needed a way to predict and extent their fleet's life.

> *"Predictive maintenance allows us to be able to manage maintenance downtime and costs better than reactive maintenance programs"*
>
> *-Frank Silvernail, Vice President of Engineering*

EXECUTIVE SUMMARY

SunEdison, a wind turbine operator with 980MW of capacity across 16 wind farms, started experiencing early gearbox failure.

Wind turbine operators have a pressing need to extend the life of their gearboxes and bearings due to premature failures. The importance of reliability operations forces operators to make difficult predictions and decisions regarding future failure risk for warranty renewal and maintenance and operations planning.

To predict and extend the life of their gearbox, SunEdison chose DigitalClone Live. With the solution, SunEdison can quantify their fleet's future failure risk under the real operating conditions for each turbine "As Is" and analyze how "What If" scenarios such as recommended changes in duty cycle, components, oil treatments, service intervals could extend their fleet's life. In addition, a return-on-investment calculator developed by Sentient and SunEdison enables asset managers to control how their decisions today would lead to the longest gearbox life and most attractive return-on-investment.

The multi-physics prognostic DigitalClone model integrates with SCADA and sensor operational data to calculate the time until cracks will initiate in the component materials being used and when those cracks will cause mechanical failure. Then, the model updates the failure risk based on operational changes and alerts users of how to control their asset life and performance. By interfacing our customer's DigitalClone prognostic models through the Internet to improve the life of fielded assets, we are supporting what GE and others now call the Industrial Internet.

THE CHALLENGE

When SunEdison's wind turbines failed early, they needed a solution to extend the life of their gearboxes and bearings.

APPLICATION

Clipper Liberty 2.5MW Gearbox

THE SOLUTION

SunEdison chose DigitalClone Live prognostic technology to predict their fleet life As Is and to understand how changes to operations and maintenance would affect life and financial performance.

RESULTS

With DigitalClone Live, SunEdison now knows gearbox failure rates and locations across its fleet including critical bearing and gear components listed for inventory and supply chain management. Sentient Science is monitoring 218 wind turbine gearboxes with prognostic-based remaining useful life calculations per gearbox. Now, SunEdison can budget for gearbox failures and replacements and run what-if studies to minimize operations and maintenance costs.

ABOUT SENTIENT SCIENCE

Sentient Science, headquartered in Buffalo, NY provides computational performance product testing, life extension, remanufacturing risk reduction, and supply chain services to increase the remaining useful life of industrial assets in power generation and defense markets. For the first time, Sentient Science is able to calculate the point in time when critical components and systems will begin to fail and make recommendations to extend the life of these components, systems and assets, creating financial value for its customers by reducing operations and maintenance (O&M) costs. In June 2014, The White House honored Sentient Science with the SBIR/STTR Tibbetts Award for their DigitalClone multi-physics prognostics modeling simulator, which is now available commercially.

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

Sentient Science has been a member of the Industrial Internet Consortium since September 2014. The Industrial Internet Consortium is a global public-private organization of over 140 members, formed to accelerate the development, adoption and wide-spread use of interconnected machines and devices, intelligent analytics, and people at work. Founded by AT&T, Cisco, General Electric, IBM and Intel in March 2014, the Industrial Internet Consortium catalyzes and coordinates the priorities and enabling technologies of the Industrial Internet. Visit www.iiconsortium.org.