ASSET WELLNESS™ FOR WIND

The Challenge of Maintaining a Reliable Fleet Around the Globe

Renewables now play an important part in meeting the world's energy demand, and wind is one of its fastest growing sectors.

- According to the Global Wind Energy Council (GWEC) annual report, global wind energy capacity reached 433GW in 2015, a 17% increase from the previous year
- The GWEC expects that number to double to 792GW by 2020, as countries are being driven to develop more renewable energy

These strong winds of growth present both opportunity and challenges for the wind turbine original equipment manufacturer (OEM) and wind farm owner operators who are responsible for day to day operations of these geographically dispersed wind farms. The estimated life span of a wind turbine is more than 20 years; however, gearbox technology has not yet matured to the point where they can be expected to work reliably for two decades. Identifying problems and performing maintenance on these gearboxes is a key issue for turbine OEMs and Owners alike.

RENEWABLES USE DATA TO ACHIEVE ASSET WELLNESS™

- OEM Managing 6,000 North AmericanTurbine Service Contracts
- Owner Assuming Risk for Fleets Coming out of Warranty
- Needed to Achieve Challenging Cost Reduction and Availability Goals
- SeamlesslyImplemented Asset Wellness™ Program across 190 Wind Farms
- Oil Now Changed On Condition; up to 50% Savings
- Data Analytics Highlight Lubrication Degradation Issue; Supplier Changed

OEM Battles Costs

In 2010, one of the top two global turbine OEMs contacted DINGO for help with this gearbox maintenance issue. They provide maintenance service contracts of 2-5 year durations for almost 6,000 turbines in North America. A significant expenditure for them was the repair and maintenance costs associated with the gearbox and performing oil changes in the lubrication system. Customers were frequently enquiring about gearbox and oil condition and the OEM was very limited in their ability to respond since:

- Each of the 80 field offices managed their own oil condition data, there was no central system.
- Data was being received from five different oil analysis providers, each in a different format with inconsistent limits.
- The large number of samples meant that sharing of this information was very difficult.

Given that one of the OEMs major goals was to increase the percentage of service contracts, they needed to:

- Address customer data requests quickly.
- Stop performing oil changes on schedule to satisfy customer requests with no knowledge of oil condition, at a cost of $5000 per incident.

After trying to develop an in-house solution for 12 months they contacted DINGO for help.

DINGO

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The Solution

DINGO implemented its Asset Wellness™ software Trakka® in August 2010 to provide a data management platform for the 6,000 turbines. The primary goals addressed by this implementation of Trakka® included:

- Reduce unplanned breakdowns and maintenance by allowing the OEM to monitor the condition of all gearboxes and hydraulic systems.
- Consolidate all oil analysis information in one system that is available on demand to all staff.
- Provide benchmarking across the entire database so maintenance decisions would be driven by data analysis, not schedules.

The Results

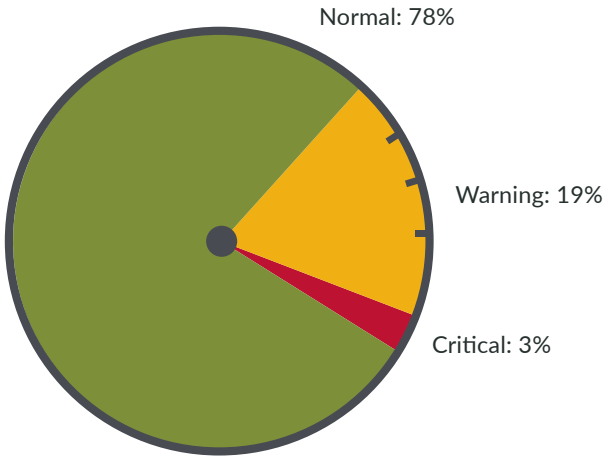
The program has been attributed with a number of key improvements for the OEM:

- Oil drains are now performed on condition, resulting in up to 50% saving in oil use.
- Data analytics is helping drive lubricant selection, maintenance decisions and comparison of gearboxes.
- 87,000 samples from 11 ,500 components across 180 wind farms are now available to all 100 project offices, immediately. This results in very rapid response time to customer data requests.

OFF-WARRANTY TURBINES

669 Assets

- X 20 (3%)
- ! 128 (19%)
- ✔ 514 (78%)



Owner takes charge

In 2012, one of the key customers of this OEM had several wind farms operated by another large OEM coming to the end of their warranty period.

The owner decided to take over the maintenance activities for these turbines but with very little experience in this area, they reached out to DINGO for help with the data management and analytics of oil analysis information. DINGO implemented Trakka® for over 650 off-warranty turbines and compiled the data from three separate lab sources into a single database.

Using DINGO's data analysis capabilities the owner was able to:

- Establish practical alert limits and maintenance actions to respond to any abnormal conditions.
- Data trending has allowed oil drains to be extended from three to five years.
- Data analytics has shown degradation of certain oil types, prompting a change in oil supplier.
- Ability to benchmark and compare components across the entire database using data analytics so any maintenance work can be prioritized for their limited resources.

For more information about DINGO's Asset Wellness™ solutions for energy, please visit **DINGO.com**.

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