

MAXIMISE PRODUCTION WITH CMS

WHY MONITOR A WIND FARM?

Condition Monitoring Systems (CMS) enable asset managers to identify issues early so that they are dealt with in the most cost effective manner. Conducting preventative maintenance on major components can save up to 50% of the return to service cost through better scheduling of repair works and reduced repair costs. Preventing catastrophic failure also reduces HSQE risk.

WHAT ISSUES CAN CMS PICK UP?

The following defects/failures can be detected by vibration condition monitoring:

- » Blade misalignment
- » Gearbox, generator and main bearing failures
- » Gear failure (wear, tooth cracks, etc.)
- » Generator imbalance
- » High speed shaft misalignment
- » Lubrication issues

DON'T THE OEMs MONITOR CMS?

In warranty, yes, most OEMs will use CMS analysis to limit the costs of their defects warranties which increases their profit on the maintenance contract. However, the wind farm will have paid for the CMS to be installed and therefore the owner should utilise this data to their advantage.

OEMs are unlikely to highlight defects detected through CMS, particularly nearing the end of the defects liability period or end of warranty. Our team identified a defect on a Swedish wind farm and ensured the manufacturer resolved it during the warranty period, almost certainly saving the client in excess of €2.5 million.

OEMs are looking at a much larger fleet and therefore may not configure alarm levels as sensitively so that defects are allowed to progress further, in some cases all the way to failure, before they are noticed. Assisting the OEM to find defects before failure, and therefore reducing the costs during the service period, has allowed RES to negotiate a reduction in maintenance fee for some sites.

CAN I WAIT UNTIL AFTER THE WARRANTY PERIOD TO INSTALL CMS?

The sooner it's installed, the more value you can get out of it. An independent (non-OEM) review of main component health is an essential part of the end of warranty process and can identify serial defects and provide independent evidence to support it.

IS THERE ANY POINT IN INDEPENDENT CMS FOR LONG-TERM SERVICE CONTRACTS?

Yes, service contracts vary, but even when components and logistics are included, availability warranties are often time based with no consideration of lost production. A turbine with a failed component could be offline for as long as 3 months, compared to 3 days for a scheduled repair.

During warranty periods, independent monitoring can be carried out less frequently and focus on data quality. Out of warranty, Independent monitoring can help reduce unnecessary interventions and can offer detail which allows more targeted inspections.

WON'T CMS INCREASE LOST PRODUCTION BY TURNING THE TURBINE OFF EARLIER THAN REQUIRED?

No, intelligent monitoring identifies the issue early and allows continued operation while repairs are planned and implemented at a time least damaging to annual production, or at a time when critical equipment is known to be readily available. In addition, an understanding of failure progression provides the confidence to continue operating the turbine with a known defect, eliminating unnecessary intervention to physically check progression. Issues across multiple turbines at a given site can be dealt with simultaneously, again minimising downtime and cost.

IS CMS TOO EXPENSIVE TO BE INSTALLED ON OLDER TURBINES?

If a permanent, retrofitted CMS is not cost effective, an offline vibration analysis may be an option. This involves fitting portable equipment for a short time and can be particularly useful for design life assessments.



Cost saving of CMS over 5 years

WHAT IS THE PAYBACK PERIOD FOR CMS?

Payback time depends on the reliability of the components and the contracts in place. As an example, retrofitting condition monitoring systems to a fleet of 66 MW class turbines had a component payback period of 10 months from cost of repairs and downtime reduction. Savings will continue to be accrued during the remaining 15 years of operation.

ARE OTHER MONITORING TECHNIQUES CHEAPER AND BETTER?

Some other techniques are cheaper but none give the same level of detail and therefore as good a chance of early diagnosis and accurate prognosis.



Techniques	Pros	Cons
Drive train offline vibration analysis	It provides some monitoring of the equipment	Preferable to have similar wind conditions and hard to predict cost for each inspection
Online gearbox oil debris analysis	Early detection, cost per unit is low	Cannot diagnose specific faults
Grease and oil sampling	Low cost as samples are taken as part of service, limiting downtime	Relies on consistent sample method
SCADA data analysis	No additional installation required	Delayed indication of failure compared to vibration (significant damage has already occurred)

ABOUT US

RES (Renewable Energy Systems) has developed and/or built over 12 GW of renewable energy capacity worldwide and has an asset management portfolio exceeding 2 GW. RES is active in a range of energy technologies including onshore and offshore wind, solar, energy storage and transmission.



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