The increased complexity of service operations require sophisticated predictive maintenance concepts based on targeted analysis of data and the detection of defect origin.

Applying concepts such as proactive predictive maintenance and operational control of unscheduled services can lead to a ‘zero visit hit rate’, outside of scheduled services.

This can optimize turbine reliability and power generation to increase wind farm profitability, especially vital for complex wind farms and the unique offshore environment.

### Abstract

The increased complexity of service operations require sophisticated predictive maintenance concepts based on targeted analysis of data and the detection of defect origin.

Applying concepts such as proactive predictive maintenance and operational control of unscheduled services can lead to a ‘zero visit hit rate’, outside of scheduled services.

This can optimize turbine reliability and power generation to increase wind farm profitability, especially vital for complex wind farms and the unique offshore environment.

### Objectives

- To increase operation efficiency
- To increase value for the customer
- To minimize the number of unscheduled visits – focus on a zero visit hit rate
- To simplify operation in complex projects

### Methods

- Diagnostic data and Siemens condition monitoring vibration patterns are analyzed
- Service technicians given special tasks to correct possible defect origin
- Minimal or no effect on turbine performance
- Defect developed, causing warning through remote monitoring
- Alarm management or Siemens condition monitoring vibration patterns are analyzed
- Service technicians given unscheduled service tasks
- Effect on turbine performance, risk for turbine stop is high
- Corrective action taken to solve problem
- Significant effect on turbine performance

### Results

- Remote Data Analysis (RDA) specialists investigate warning notification before visit in the turbine, to ensure solving not only the specific issue, but also the root cause for the issue. For this reason, number of visits increases temporarily (see above graph).
- This investment reduces down time in the long run; significantly reducing the number of visits by avoiding development and multiplication of the failure.
- Optimized production by reducing down time due to unscheduled service visits

### Conclusions

1. Optimization of turbine reliability
2. Enhanced response times
3. Power generation and profitability

- Especially significant for offshore operations
- Scheduled service is optimized; reducing unscheduled visits
- Minimized visits and minimized risk of deteriorated main components means less cost
- Optimal power generation, positively affecting production output
- Allows a long window for resolve, increasing reliability

### References

1. Based on the Siemens Service diagnostics center