

Wind Turbine Condition Monitoring Workshop

October 8-9, 2009

Day 1, October 8, 2009

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| Session I | Welcome and Introduction Sandy Butterfield, NREL <ul style="list-style-type: none"><i>The Condition Monitoring Opportunity</i>, Fort Felker, NREL<i>AWEA's Perspective on Condition Monitoring</i>, John Dunlop, AWEA<i>The Plum: Estimating the Benefits of CM for Wind Turbines</i>, Chris Walford, Puget Sound Energy (PSE)<i>Vision for Advanced Wind Plant Condition Monitoring</i>, Sandy Butterfield, NREL<i>Offshore Operation & Maintenance Challenges</i>, Walter Musial, NREL<i>Databases for Use in Wind Plant Reliability Improvement</i>, Paul Veers, Sandia | 8:30 am |
| Break | | 10:15 am |
| Session II | Current Condition Monitoring Practices Paul Veers, Sandia <ul style="list-style-type: none"><i>Condition Monitoring of 47 Meter Wind Turbines</i>, Jon Powers, CalWind Resources Inc.<i>A Systematic Approach for Streamlining Condition Monitoring Data</i>, Donald Roberts, DNV Global Energy Concepts (GEC)<i>A Case Study in Wind Turbine Condition Monitoring: Early Gearbox Bearing Wear Discovery and Collateral Damage Avoidance</i>, Tom Francisco, Azima DLI<i>Wind Turbine Condition Monitoring at DONG Energy</i>, Stéphane Eisen, DONG Energy | 10:25 am |
| Lunch (provided) | | 12:00 pm |
| Session III | Drivetrain and System Monitoring Sandy Butterfield, NREL <ul style="list-style-type: none"><i>Condition Monitoring: Theory and Practices</i>, Theo Verbruggen, Energy Research Center of the Netherlands (ECN)<i>Challenges of Condition Monitoring for Wind Turbines and Successful Techniques</i>, André Smulders, SKF Condition Monitoring Center Luleå<i>Winergy Condition Diagnostics System and Roadmap to Advanced Condition Monitoring</i>, Shawn Doner, Winergy Drive Systems Corporation<i>Condition Monitoring of Motor-based Systems</i>, Michael Nowak, Eaton Corporation | 1:00 pm |
| Break | | 2:35 pm |
| Session IV | Lubricant Conditioning and Monitoring Robert Errichello, GEARTECH <ul style="list-style-type: none"><i>Wind Turbine Gearbox Lubrication: Performance, Selection, and Cleanliness</i>, Michelle Graf, The Lubrizol Corporation<i>Lubrication System Design and Run-In Practices</i>, Robert Armbruster, GE Transportation<i>The Road Map to Effective Contamination Control in Wind Turbines</i>, Justin Stover, C.C. Jensen Inc.<i>Experiences in Testing Lubricants Used in Wind Gearboxes</i>, William Herguth, Herguth Laboratories<i>Effective Use of Large Wear Debris Particle Trends to Detect Key Failure Modes of Wind Turbine Gearboxes</i>, Richard Dupuis, GasTOPS Ltd. | 2:45 pm |
| Adjourn for Evening | | 5:00 pm |
| Reception, Sponsored by SKF | | 5:30 pm |

Day 2, October 9, 2009

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| Session V | SHM of Blades, Towers and Foundations Mark Rumsey, Sandia <ul style="list-style-type: none"><i>Load Measurement of Blades</i>, Theo Verbruggen, ECN<i>NDT, CM and SHM of Wind Turbine Blades at the National Labs</i>, Mark Rumsey, Sandia<i>Advances in Real Time Wind Turbine Rotor and Tower Monitoring to Reduce the Cost of Energy</i>, Jason Wood, Insensys Ltd.<i>Foundation and Tower Condition Monitoring</i>, Kevin Lybarger, DNV GEC<i>An Impedance-based Sensor Approach to Structural Health Monitoring</i>, Robert Owen, Extreme Diagnostics, Inc. | 8:00 am |
| Break | | 9:55 am |
| Session VI | Research & Development Shawn Sheng, NREL <ul style="list-style-type: none"><i>Comparing Structural Health Monitoring and Condition Monitoring</i>, Charles Farrar, Los Alamos National Laboratory<i>Synchronous Sampling in Wind Turbine Gearbox Condition Monitoring</i>, Huageng Luo, GE Global Research<i>University R&D in Condition Monitoring Plus</i>, Douglas Adams, Purdue University<i>Investigation of Various Wind Turbine Drivetrain Condition Monitoring Techniques</i>, Shawn Sheng, NREL<i>Modeling the Effects of Prognostics and Health Management</i>, Charles Carter, Sandia | 10:05 am |
| Lunch (provided) | | 12:00 pm |
| Session VII | CM Practices in Other Industries Chris Walford, PSE <ul style="list-style-type: none"><i>Threat Based Maintenance (TBM) — A New View of Maintenance Management in the Commercial Power Generation Industry</i>, David Bell, SmartSignal Corp.<i>Using Condition Monitoring in the Marine Industry as a Benchmark for Wind</i>, Thomas Kent, Kittiwake Developments Ltd.<i>Warranty and Total Cost of Ownership (TCO) Reduction through Earliest Durability Prediction Technology</i>, Kevin Line, Sentient Corporation<i>Nuclear and Fleet Wide Monitoring</i>, Ray Chambers, EPRI | 1:00 pm |
| Break | | 2:35 pm |
| Session VIII | Wrap-up Discussions Sandy Butterfield, NREL <ul style="list-style-type: none"><i>Expectation from Different Sectors of Wind Industry on Condition Monitoring or O&M Strategy</i><i>Gaps Between Present Practices and Expectations, Future R&D Directions</i><i>Who are Interested in Participating in the R&D Efforts?</i><i>Tentative Candidates for Each Identified Topic: Leader and Participants</i><i>Feedback to the Workshop: Format and Content</i> | 2:45 pm |
| NREL National Wind Technology Center (NWTC) Tour, Jim Johnson, NREL | | 3:30 pm |
| Adjourn | | 4:30 pm |