



Insensys Rotor Monitoring System **RMS**

Ice, Rotor Imbalance, Lightning and Blade Damage Detection

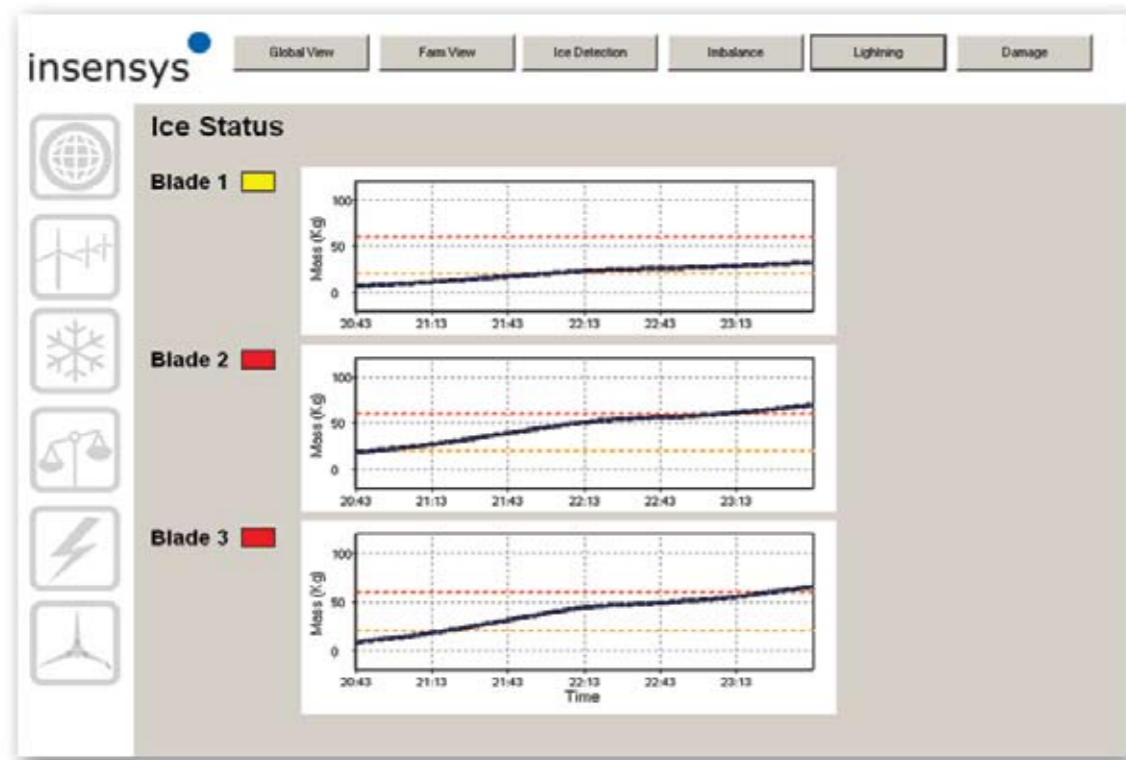
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Insensys systems deliver increased turbine availability and improve operational cost effectiveness.

The Insensys Rotor Monitoring System is a proven, robust, measurement system designed specifically for wind turbines.

Insensys Rotor Monitoring System **RMS**

RMS delivers cost effective, real-time, monitoring and early fault detection for wind turbine operators, improving turbine productivity and availability, reducing the cost of ownership and enabling safer operation.



Using technology and deployment methods proven in the wind turbine market, RMS can be retrofitted to an operational turbine in less than one day or designed in during turbine manufacture to deliver accurate, reliable, data. Insensys offers a full data analysis service around the turbine rotor performance.



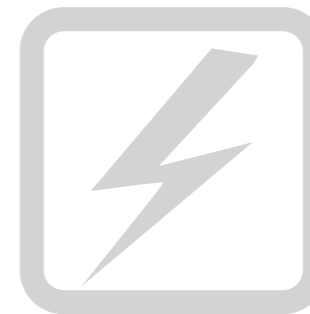
Ice Detection

Provides the operator with a measurement of ice build-up on a turbine blade. This information enables the operator to avoid ice throw or turbine damage. The ability to measure when ice has been shed enables generation to restart earlier and with confidence. This delivers a typical increase in generating revenue of €10,000 (\$16,000) per year for turbines in cold climates via predicted, controlled, shutdown and automatic restart.



Rotor Imbalance Detection

Provides real-time data on rotor imbalance, measuring yaw misalignment, wind shear and turbulence in addition to differences in blade mass and aerodynamic performance. RMS imbalance detection enables earlier and planned remedial action, maximising generation capacity and avoiding costly secondary damage.



Lightning Strike Detection

Provides notification of which blade has been struck, the intensity of strike, peak current and rate of change of current delivering the operator an indication of possible damage to the blade, turbine and lightning protection systems.



Blade Damage Detection

Provides real-time alarm notification of damage impacting the structural or aerodynamic performance of a blade. Enables more effective planning of remedial action and preventing costly secondary damage.

Insensys Rotor Monitoring System **RMS**

Condition monitoring of your rotor using proven wind industry technology.

RMS	Performance summary*
Ice Detection	
Resolution per blade	0.2% of blade mass
Response time	10- 60 minutes (user configurable)
Rotor Imbalance	
Aerodynamic efficiency	Comparative value per blade independent of wind speed
Mass imbalance	0.2% of blade mass
Rotating shaft bending moment	Vector and Value [kNm]
Static bearing bending moment	Vector and Value [kNm]
Response time	30 seconds
Turbulence	Derived from output data
Yaw misalignment	Derived from output data
Pitch imbalance	Derived from output data
Blocked drain hole	Derived from output data
Lightning Detection	
Peak current	Real time data over full range of IEC values [kA]
Peak dl/ dt	Real time data over full range of IEC values [kA/ μ s]
Response time	1 second
Gross Blade Damage	
Change in structural performance	Changes in structural performance of the blade due to delamination of leading, trailing edges, internal delamination of shear webs and box beams, gross cracking of laminate
Change in blade mass	Loss of part of the blade
General	
Initial setup and zeroing	Automatic
Periodic calibration	Automatic
Flags and alarms	User configurable thresholds Rate of ice build up provided for availability predictions
Data transmission	Options include GSM / GPRS to central monitoring server and direct interface to operator's monitoring system
System integration	Open architecture designed to integrate to existing PLC / SCADA systems

* Final RMS system performance is dependent on specific turbine model, location and conditions.

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Insensys Rotor Monitoring System **RMS**

Delivering Ice, Rotor Imbalance, Lightning and Blade Damage Detection

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