SENSEOR
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Wireless SAW Temperature Sensors for wind turbine monitoring

Optimized secure & cost-effective wind turbine operation

SAW Temperature Sensors

Surface Acoustic Waves Technology

- Wireless sensors, small, light
- Passive sensors (no battery, infinite autonomy)
- Robust & stable
- Maintenance free
- Embeddable in materials like composites
- Multisensor configurations for multiple control points
- Data acquisition through RF-transceiver with direct reading on GUI or in customer monitoring system
- Wireless Sensor Networks compatible

Thermowell stainless steel packaging
Adaptable length & diameter

TSA D100
-15°C +165°C
M18
L (Insertion) 80 mm
Ø 9 mm

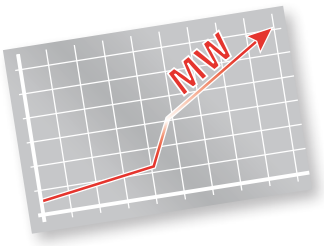
XEMCFP
-20°C +120°C
M14
L (Insertion) 185 mm
Ø 8 mm

Enhanced monitoring inside turbines

New complementary continuous condition monitoring solution for predictive maintenance, where Vibration Analysis, classic thermography or other standard solutions are not effective

- Wireless sensors mounted directly on rotating bearings, rotors & shafts
  → New measurement points impossible with standard sensors
- Maintenance-free batteryless sensors placed even in remote or hazardous locations
  → Operate even in electro-magnetic fields or at high speed rotations
- Direct temperature measurement on the most critical parts
  → More accurate & fast measurement than sensors mounted on the engine casing
  → Early fault detection & alarm with precise indicators enabling to stop & repair before damage
- Easy-to-install flexible monitoring solution
- Easy-to-use system & direct temperature read-out with configurable alarms
  → Maintenance operators directly involved in surveillance & preventive actions

Ex: Temperature control on rotating bearing of off-shore wind turbine
Direct measurement on the most critical points to regulate operation in real-time & prevent damage



Fast & high ROI: increased capacity, extra production days
= higher power production, reduced operation & maintenance costs

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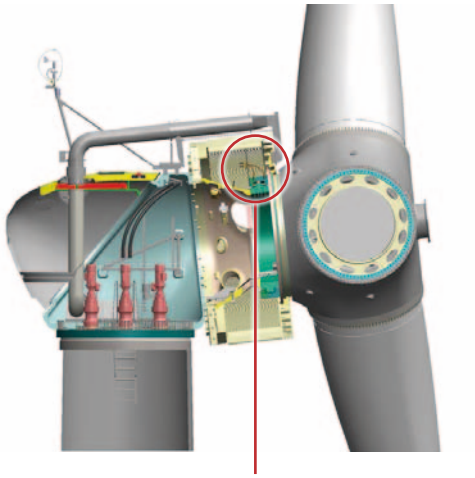
High performance wind turbine monitored with SAW sensors

XEMC DARWIND

Global supplier in the offshore wind industry
High-end multi-megawatt high-yields/minimum maintenance lightweight turbines

Wireless temperature measurement in wind turbine generator

→ 2 wireless SAW temperature sensors in thermowell packaging screwed in outer bearing (rotating at 18 rpm)
→ Deported antennas with coaxial cables
→ High-performance wide band (430-450 MHz) transceiver in generator for simultaneous interrogation
→ Typical interrogation distance between the transceiver & sensors antennas: 1 m



2 wireless sensors & transceiver

- Detection of abnormal temperature increase & alarm before limit is exceeded => prevention of undesired bearing condition due to harmful thermal expansion
- Increased reliability, higher throughput

"We constantly seek for new ways to improve the performance and reliability of our wind turbines. These wireless batteryless sensors enable measurement on the rotating part inside generator, on the outer bearing, where we monitor continuously the temperature for safety reasons."

B. F. Ramadhani, Electrical Engineer - XEMC DARWIND (The Netherlands)

Wide range of high-value measurements

- Torque monitoring on rotor, drive train, in gearbox
- Strain monitoring for Structural Health Management on/in blades, column, foundations, anchors of offshore wind turbines
- Temperature profile monitoring in mold or inside blade during manufacturing process
- Pressure & temperature monitoring of hydraulics
- Strain/vibration measurements for complementary points in Vibration Analysis (on rotating parts, in inaccessible locations)

Standard products or customized development
& field engineering by our expert engineer team

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