

CONTACTLESS MEASUREMENT OF ROLLING ELEMENT ROTARY MOTION



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Use Case Contactless measurement of rolling element rotary motion

OBJECTIVE • Measurement of kinematic data and vibrations of individual rolling elements in a wind turbine pitch bearing for the identification of slippage conditions

PROJECT PERIOD • 2020/2021

CHALLENGES

- Small installation space and poor accessibility
- Integration of measurement technology in a highly stressed component
- Optimal radio connection despite heavy covering by metal in the direct vicinity
- Contactless battery charging in grease via slim holes without disassembly
- Running time of at least 10 hours at 13600 measuring points per second per rolling element

REALIZATION

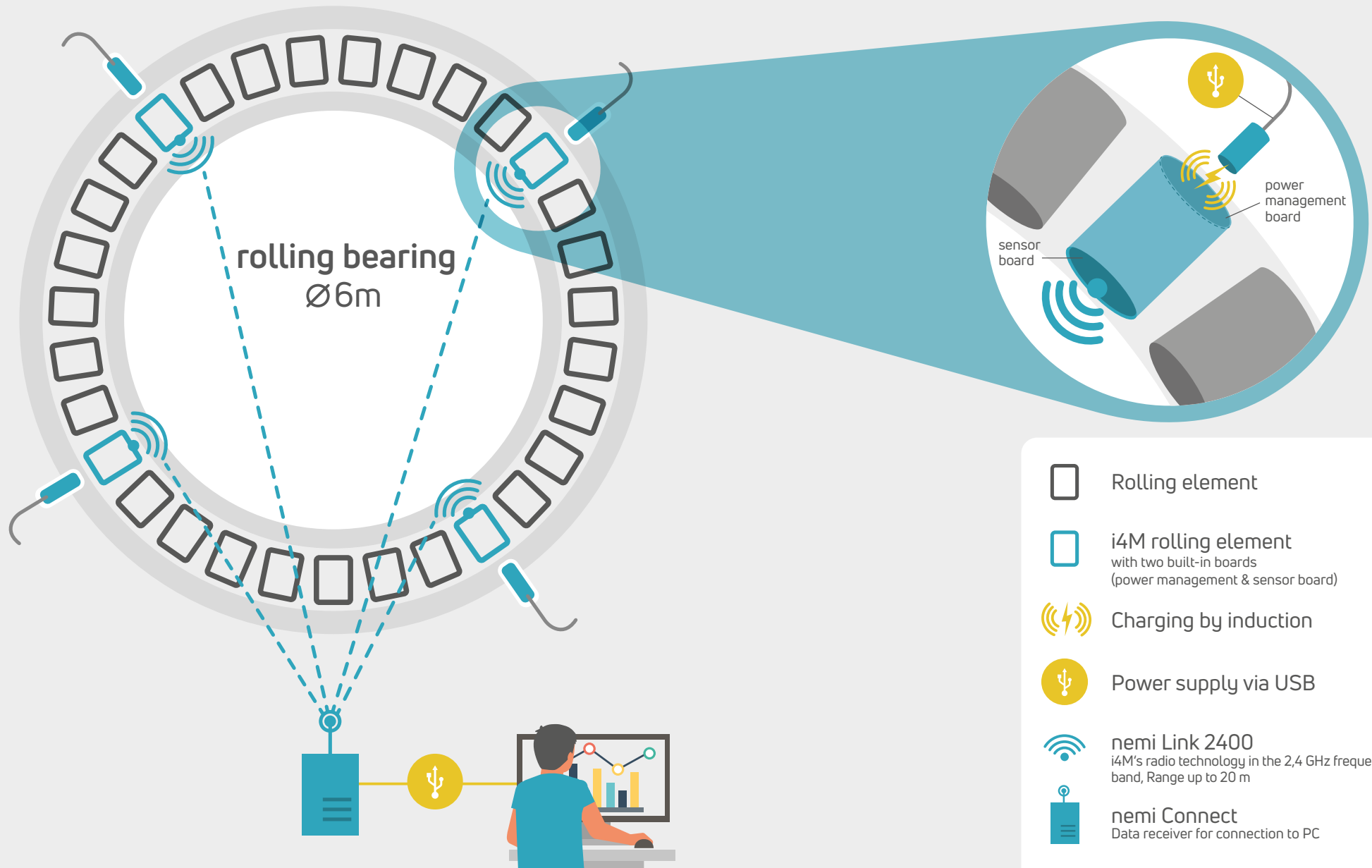
- Measuring system consisting of two interconnected boards per rolling element and a receiver module for data acquisition from several rolling elements
- In each rolling element: one sensor and data transmission board and one power management board for battery connection and charging
- Integrated measuring chain for recording rolling element rotation (acceleration, rotation rate and magnetic field sensors) and vibrations using high-performance MEMS sensor technology
- Wireless data transmission via integrated antenna using nemi Link 2400 radio link in the 2.4 GHz frequency band to a receiver module that is connected to a PC via USB
- Battery charging principle: Inductive via self-developed charging stick with integrated coil and USB connection for power supply

ADVANTAGES

- Fully integrated, encapsulated measurement system with customized boards, wireless data transmission, MEMS sensors and rechargeable battery
- Reliable data transmission despite use in bearing component largely surrounded by metal and lubricant
- Long battery life due to highly efficient, robust i4M wireless technology
- Edge computing capability on the transmitter module
- Fast project implementation in only 4 months



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