retroX - Digital Backbone for Existing Turbines

retroX offers a stand-alone retrofit solution for digitalization and efficiency optimization of existing turbines. Collecting and extrapolating load data provides relevant information about the remaining lifetime of the turbine.

Digitalization
Know your turbine.

Optimization
Higher yield.

Continued Operation
Be optimally prepared.

Asset Transparency as Key for Optimization
Increase performance transparency as well as condition transparency through real-time data access to enable the optimization potential of your turbine and wind farm.

More Information
www.fos4x.de/retroX
Avoids detrimental loads, helps optimizing blade design, and enables turbine lifetime extension.

Identifies different types of degradation and damage based on analytical and empirical tools.

Detects critical ice masses and alarms when a threshold is reached.

AEP Increase
Create turbine specific portfolio of initiatives for AEP optimization
Tackle static performance issues (e.g. rotor imbalance)
Reduce curtailments with additional apps (e.g. blade ice detection)

Life Time Extension
Improve commercial decision making for continued operation
Use real load data to allow less conservative lifetime assessment
Be able to trade life time for output or make better PPAs

Risk Mitigation
Detect premature structural damages early on
Be informed about the structural pain points of your assets
Improve risk reporting for management and owners

OpEx Reduction
Get greater transparency of assets through more and smarter data
Automate recurring analyses and make informed decisions
Improve maintenance planning and empower predictive approaches

TLC
Turbine Load Control
Avoids detrimental loads, helps optimizing blade design, and enables turbine lifetime extension.

RIC
Rotor Ice Control
Detects critical ice masses and alarms when a threshold is reached.

TIC
Turbine Integrity Control
Identifies different types of degradation and damage based on analytical and empirical tools.

X4edge Performance Apps
Improves sector curtailment and power curve over the entire range of wind speeds and terrains.

Manages noise curtailment to increase overall energy output or even enable a specific site at all.

Supports the optimization of the entire wind park, for example by balancing wake effects.

**Basic Solution**

- **Initial Investment**
  - fos4Blade sensor platform
    Proven serial product used in hundreds of turbines
  - Edge computer
    DPU with real-time digital twin (basic version)
  - Connectivity
    3G/4G connection and field bus/SCADA integration

- **Operation**
  - Data transfer and storage
    Buffer of dynamic data and continuous cloud transfer
  - IIoT cloud platform
    Offline analysis, updates and device management
  - SCADA integration
    Integration via API into existing 2nd level SCADA software

**Upgrades**

- **Performance Optimization**
  - Performance & condition reports
    Event-based or periodical load, performance and condition reports
  - Performance apps
    fos4X and 3rd party software optimization products
  - Individual services
    Automate specific analyses, deep-dives into your data

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**TEC** Turbine Efficiency Control

Improves sector curtailment and power curve over the entire range of wind speeds and terrains.

**BNC** Blade Noise Control

Manages noise curtailment to increase overall energy output or even enable a specific site at all.

**WFC** Wind Farm Control

Supports the optimization of the entire wind park, for example by balancing wake effects.
About / Contact

fos4Blade & X4edge
We provide sensors and solutions to drive smart wind energy

Under the umbrella brand “X4edge” we bundle our portfolio of digital products for the optimization of wind turbine performance. These products are based on our reliable sensor platform “fos4Blade”.

The X4edge performance apps close the gap between the fundamental measurement of blade properties and real customer value. With our industry expertise and cutting edge model-based analytics, machine-learning and AI techniques, we convert sensor data from the edge into relevant, actionable insights that can be accessed from wherever you are.

Founded in Munich in 2010, fos4X GmbH is a specialist for reliable fiber-optic measurement technology and sensor technology as well as for innovative data analysis. It develops IIoT and edge computing solutions and enables digital transparency, significant cost reductions and efficiency increases for the wind industry.