

Digitalization in Wind Power

DIGITAL BIRTH CERTIFICATE

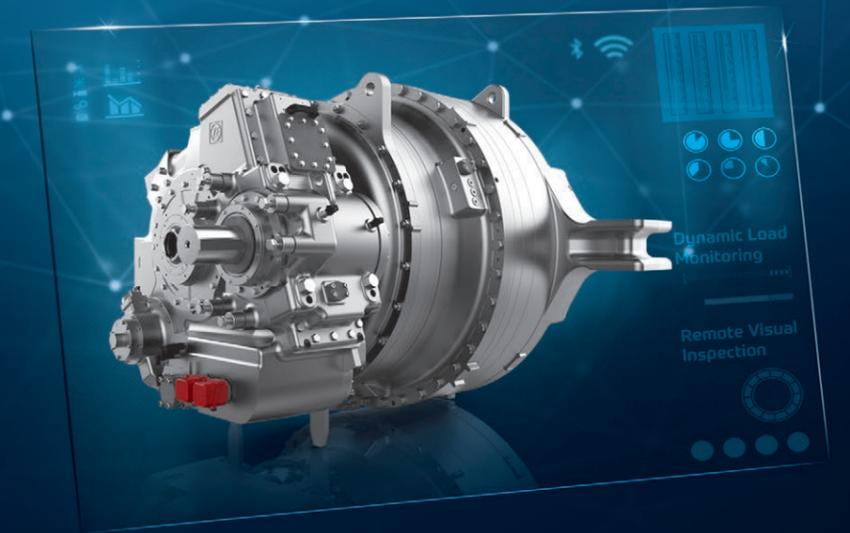
DATA PLATFORMS



DATA ANALYTICS

LIFE CYCLE MONITORING

SENSOR SOLUTIONS

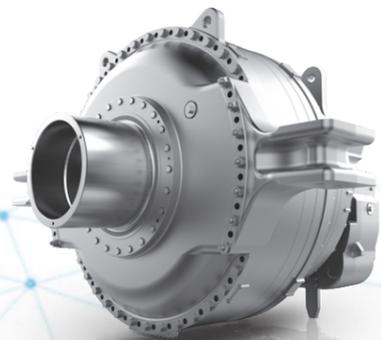


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Intelligent connection solutions

Continuously innovating, ZF's next generation Intelligent Wind Turbine Gearbox will reduce the Levelized Cost Of Energy. Digital solutions integrated with ZF's high performance mechanical systems will bring new opportunities to optimize the energy yield and decrease the operational cost of wind farms.



Gearbox knowledge

Design models | reliability prediction | maintenance schemes

Consumed Lifetime

- Based on SCADA or speed and load measurements
- Using Digital Birth Certificate and Individual Component Failure Modes

Remaining Lifetime

- Combining field inspection data and statistics with consumed lifetime calculations
- Driven by accurate reliability prediction methods

Drive Train Dynamics

- Avoid peak loads exceeding the design strength
- Provide data overview, history and trends

As-built Gearbox Information – Digital Birth Certificate

- Configuration of gearbox
- Components batch and supplier information
- Non-conformity reports, end-of-line testing, ...

Performance Data – Life Cycle Monitoring

- Configuration of drive train, service logbook
- SCADA, Condition Monitoring Systems
- Various sensor and connectivity solutions (load, speed, lubrication status, vibrations, cameras)

Cloud Service – Life Cycle Analytics

- Provide data overview, history and trends
- Automated detection of anomalies
- Remaining lifetime calculations
- Remote monitoring information

Intelligent Wind Turbine Gearbox

Reducing the Cost of Energy

More power output and reduced operational costs

ZF's Intelligent Gearbox is a key component for Intelligent Wind Turbine Performance Management, optimizing operations and maintenance of wind turbines.

The Intelligent Gearbox combines data from gearbox manufacturing, performance monitoring and advanced reliability models to enable better self-diagnostics and predictive maintenance, increasing availability of turbines. In addition, energy yield can be improved significantly thanks to the power upgrade potential. ZF's Intelligent Gearbox contains integrated sensors and is enabled by a cloud platform, digital performance monitoring and data analytics algorithms.



Benefits

Avoid downtime due to unexpected breakdowns

Reduce downtime by better management of predictive maintenance and spare part availability.

Get more energy out of every turbine

Increase the output of turbines operating at nominal value, without reducing the lifetime.

Spread the investment over time

Extend the lifetime of the gearbox using remaining lifetime estimates.