Optimum orientation of technical operation: A practical example

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Agenda

ENERTRAG – Company Profile

Target of Operation and Maintenance

Operations by ENERTRAG WindStrom
- Accredited Inspection Department
- ENERTRAG Power System
- 24/7 Remote Control Center
- Engineering
€1.5 billion = invested to date
950 MW = 540 turbines installed
1,400 supervised turbines
€250 million = annual turnover
2.2 = Twh of electricity generated per year
400 Employees

The success story of ENERTRAG

First Wind turbine
ENERTARG Grid
Initial Operation of Hybrid power plant

1998
2011
2012

40 Wind turbines
Incorporation of ENERTRAG AG
Start direct marketing of energy
ENERTRAG grid extension up to 660km

1.4 million people provided with electrical energy by 520 wind turbines
Target of Operation and Maintenance

Conservation of nominal condition of wind turbine generators and potential improvements to stabilize and increase energy production

AND

System availability at optimal costs regarding predetermined frame conditions

AND

Extension of life time.
M&O costs in relation to all other costs

Exploitation
Design and planning
Process of approving
Turn key construction

{ Project costs covered by financing

Maintenance & Operation

Maintenance: 4/5
Operation: 1/5

15%  4%  3%  5%  3%

70%

Lease payment
Comm. Management
Insurance
Grid access
Costs of financing
M & O
Different experts with all sorts of experience makes customer helpless
Accreditation process

Quality Management ISO 9001
Definition of processes and implementation
Request for Accreditation at DAkkS
HSE Management acc. BS OHSAS 18001

May 2012 3 years 18.08.2015

Accreditation according
ISO 17020:2012
Type C

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Inspections by ENERTRAG WindStrom

Validation of competence

- Qualified inspectors
- Continuous training
- Accredited Inspection department
- Effectiveness checks
- Resources

Recommendations for Further actions

Repair and Refurbishment

Management of Maintenance

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- Wind Farm Management state of the art.
- Professional Soft- and hardware for RES.
- Today 2.5 GW connected to ENERTRAG PowerSystem.
- Individual Reporting for every requirements.
- Higher Value by direct marketing of turbine production.
- Software for Billing and Accounting.
- Substation Control for active and reactive power.
- Data interfaces for utilities.
• Control of active and reactive Power according to the requirements of the grid code
• Monitoring of all producing WTG
• Continuous checking of the specified value
• Continuous control according to the requirements from the utility
• Manufacture independent system
• Remote control from utility and direct marketing company
24/7 Remote Monitoring Centre

- Immediate response to all messages - 24/7
- Wind turbine generators online

→ Permanent Information

Monitoring of 1400 Wind Turbine Generators
**Installation of Engineering Competence**

**Electrical Engineering – Frequency converter**
- Fault analysis
- Design of improvements

**Control Systems**
- System Software Re Engineering
- Definition of Data interfaces

**Condition Monitoring**
- Online Monitoring of the complete drive train
- System of SKF: 200 Systems installed

**Rotor blades**
- Analysis of damages and structural weakness
- Quality Management of repair

**WTG Components**
- Analysis of weakness
- Definition of qualified suppliers

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Combination of planned and predictive Maintenance
Analysis of WTG Operational Data via:
• CMS
• Performance Data
• Frequency and Type of Failures

Identification of the Problems
• MTBF Detection
• Root Cause Failure Analysis
• Quality and Quantity of Maintenance
• Technical Cause of Failure
  • Design
  • Operation
  • Quality
  • Operational Cause of Failure

Technical Modification
• Maintenance Technology
• Design Modification
• Third party supplier

Field Testing
• Measurements
• Analysis of Performance Data
• Analysis of Type and Frequency of Failures

Implementation
• Design Modifications of serial products
• Modification of Maintenance Procedures or Quality
• Modification of Operational Procedures
• Modification of third Party Suppliers

Solving the Problems
• Testing and Evaluation
• Implementation to Serial
• Retrofit to running WTG
Thank You for your attention!