VGB PowerTech | Wind

… is the first address for all operators of wind power plants regarding technical, environmental as well as strategic issues and acts as hub for the wind energy sector in Europe

VGB POWERTECH

VGB Forschungsprojekt

"Benchmark of Blade-based Ice Detection Systems"

Ulrich Langnickel

➢ Research Project: “Evaluation of ice detection systems for wind turbines – Part I”

- Ice detection systems, review study
  - Published by Meteotest AG in VGB PowerTech Journal, 2016
  - Nacelle-based ice detectors: 10 systems (well tested)
  - Blade based ice detectors: 4 systems (a quantitative comparison was not available)

➢ Instrumental icing is NOT blade icing

- Standstill structure vs. moving structure
  - blades may cross several air layers
  - different wind speeds
  - vibrations and acceleration forces
- Different size/shape of structure (sensor vs. blade)

Source: Meteotest

➢ **Research Project:** “Evaluation of ice detection systems for wind turbines
Part II - Benchmark of Blade-based Ice Detection Systems”

- Four bladed based systems (fos4x, Wölfel, eologix,Weidmüller) are installed at the Vestas V90 wind power plant in Stor-Rotliden, Sweden.
- The wind turbine is operated by Vattenfall.
- The performance of the systems are being analyzed and evaluated. Camera images of sensors and the blades are being taken and used as reference.
- The participating VGB member companies have access to the data of the different sensors via an online tool (Password protected).
- The research project was initiated mid 2016 and the test period of this challenging and first of its kind project has been extended into the winter season 2019/2020.

➢ **Research Project:** “Evaluation of ice detection systems for wind turbines
Part II - Benchmark of Blade-based Ice Detection Systems”

- Vestas V90,1.8 MW, 95 m hub
- No blade heating, no restrictions due to icing
- Stor-Rotliden, Sweden
- ~ 500 m.a.s.l.
- Owner and operator: Vattenfall AB

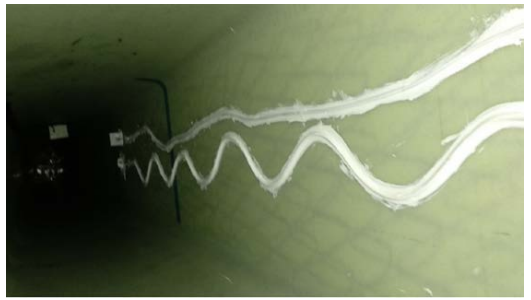
➢ Installed “Blade-based Ice Detection Systems”

- weidmüller, BLADEcontrol
- wölfel, IDD.Blade
- fos4X, fos4Ice

Vibration sensors, inside-glued

- eologix

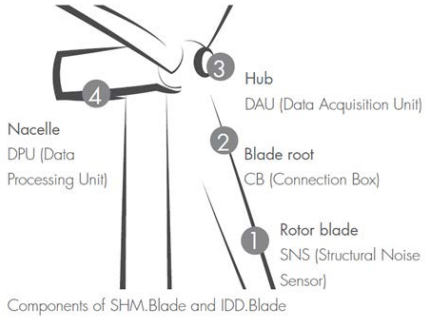
Impedance sensors, outside-taped



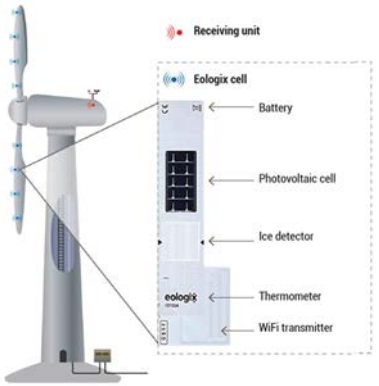
fos4X

Weidmüller

Source: Meteotest



Components of SHM.Blade and IDD.Blade

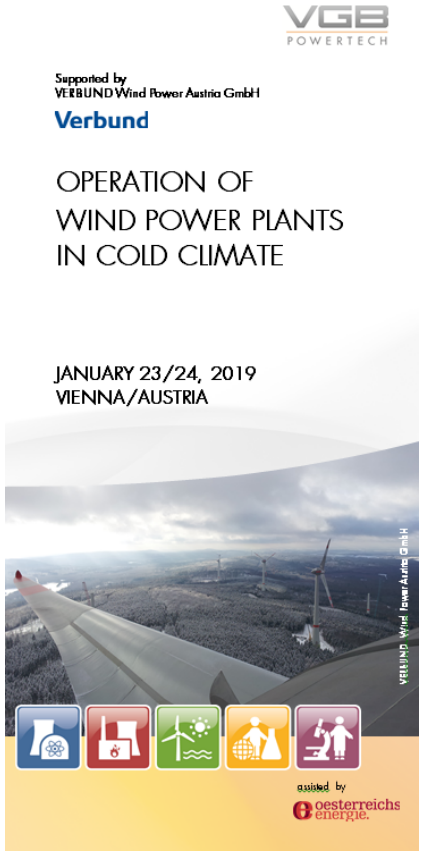


- **Blade camera, Webcams**
- **Electrical cabinets**

Source: Meteotest

➢ VGB Conference “Operation of Wind Power Plants in Cold Climate

- Conference days: End of October 2020 (the date is not fixed yet)
- Detailed presentation of the VGB project “Evaluation of ice detection systems for wind turbines Part II – Benchmark of Blade-based Ice Detection Systems”



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Looking forward to answering any additional questions you might have.

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Status: June .2019

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