

LE Erosion

Examples, Severity & Repair

DTU Wind Risø – 2018/02/22

Mertcan Bayar



Agenda

1. LE Erosion
2. LEE Examples
3. Severity & Categorization
4. Repair
5. Current Works

LE Erosion

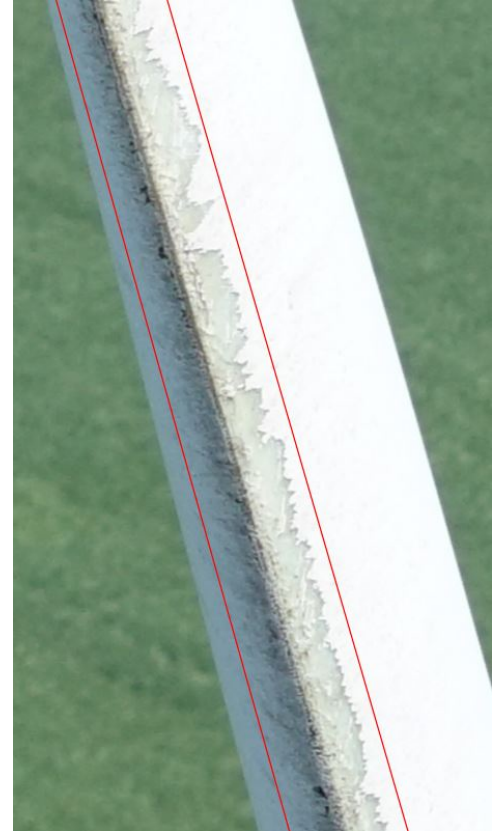
- Degradation of LE material
- Level of erosion depends on,
 - Climate conditions
 - Blade coating & underlying material
 - LE Protection, etc.
- Results;
 - May lead to high downtime
 - May require expensive repairs
 - Can result in loss of AEP



Source: <https://www.windpowerengineering.com/maintenance-operations/easily-applied-covering-fix-leading-edge-erosion/>

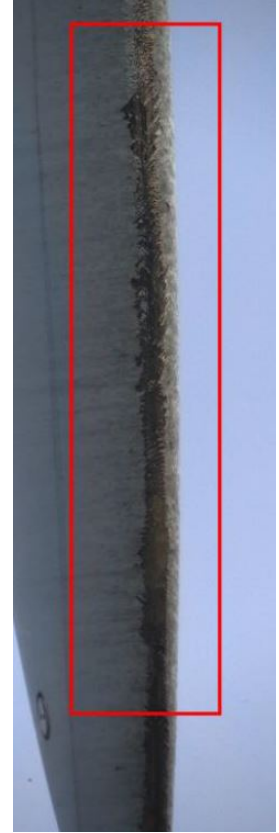
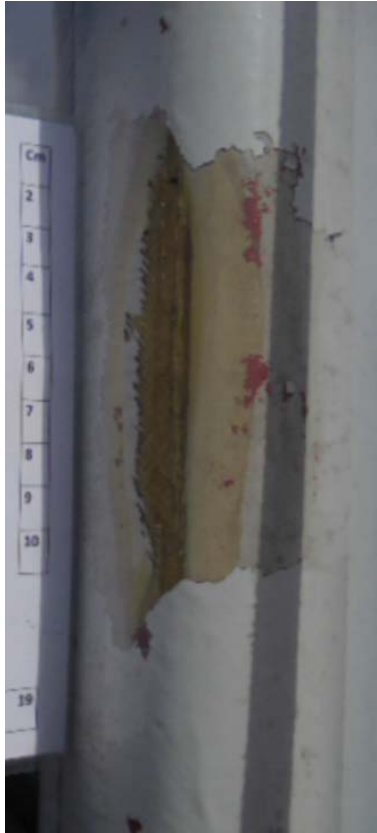
LEE Examples - Onshore

2018/02/22



LEE Examples - Offshore

2018/02/22



Severity & Categorization

2018/02/22

	CATEGORY	DAMAGE	ACTION	TURBINE
	1	 Cosmetic Readings of lightning system below 50mΩ	 No need for immediate action	 Continue Operation
	2	 Damage, below wear and tear	 Repair only if other damages are to be repaired	 Continue Operation
	3	 Damage, above wear and tear Readings of lightning system above 50mΩ	 Repair done within next 6 months	 Continue Operation
	4	 Serious damage	 Repair performed within next 3 months. Damage monitored	 Continue Operation
	5	 Critical damage	 Immediate action required to prevent turbine damage. Contact technical support	 STOP Operation <i>safety is not ensured</i>

Repair

- Complexity depends on
 - Damage size
 - Depth
 - Blade type
- Also, weather conditions (!)
 - Effective on availability
 - May lead to increased costs
 - Temp. $>15^{\circ}\text{C}$ and $\text{RH}<70\%$
- New repair materials (?)



Current Works

- Aligning with one manufacturer on damage categorization
- Conducting LEP material testing
- Measuring AEP loss on different LEP types
- Helping our suppliers to improve

Questions?