

### ***blade care*** academy

- Know-how transfer - learn from experience
- easy to understand presentation

## **Analysis and repair of rotor blade damages**



### **Rotor blade inspection & repair**

Seminar contents:

- Common rotor blade damages
- Analysis of rotor blade damages
- Overview of repair methods
- Understanding inspection reports
- Evaluating the severity of the findings
- Estimating required repair complexity
- Developing, evaluating & judging repair quotations

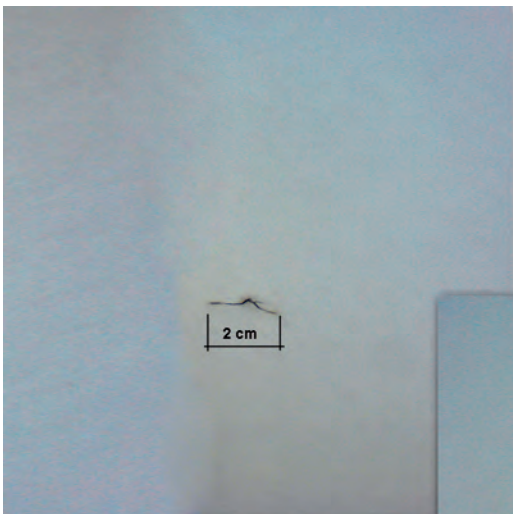
## Everything you always wanted to know about rotor blade problems \*...

Our seminar „Rotor Blade Inspection & Repair“ has been established to meet our customer's demand to gain a better understanding of possible problems and assessment of required repair effort.

Participants in the seminar will benefit from our years of experience in inspecting and repairing rotor blade damages of all kinds.

Through a presentation that is easy to follow, and with time for discussion, all of the common types of rotor blade damage will be explained, along with a discussion of relevance and repair priority, given implications for the continuing efficient operation of the turbine.

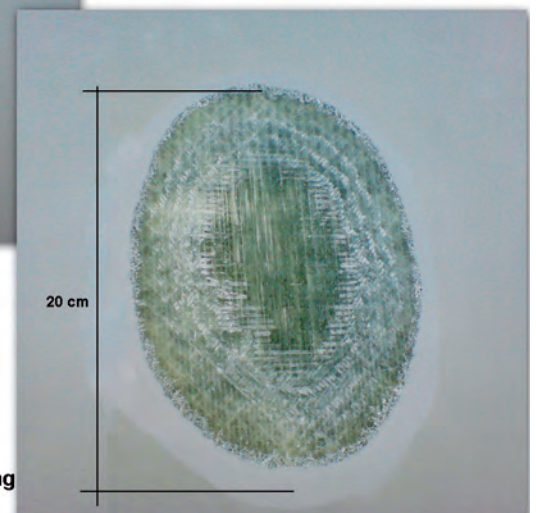
Participants will learn how to analyze damage, including how to identify problems that lie hidden beneath the surface. You will learn to evaluate inspection and assessment reports, and to judge the accuracy of quotations for repair work. The professional expertise gained in this seminar will enable you to demand quality and fair pricing, improving your bottom line.



**Statement in report: crack in gelcoat**



**Diagnostic finding at repair: dry laminate**



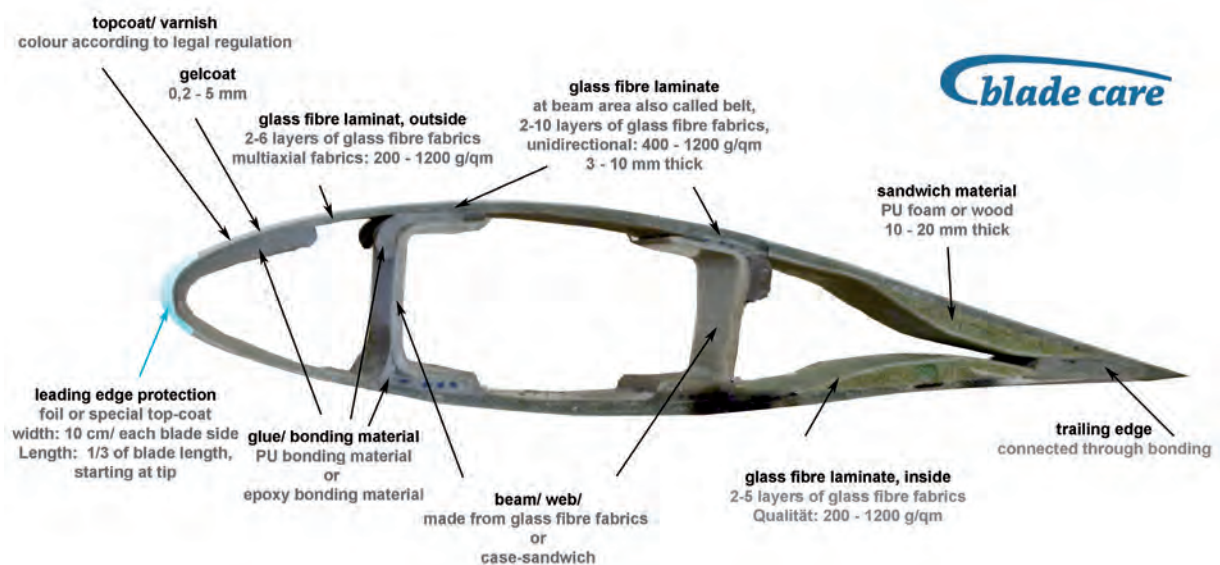
**Repair measure: 3 layers of laminate. sanding, filling, sanding, painting  
Duration because of curing time: 2 days**

## For whom is the seminar interesting?

- Wind turbine owners & operators
- Personnel responsible for service & maintenance
- Administrators responsible for service & maintenance
- Administrators responsible for tendering & commissioning repair work

## And what are the prerequisites – except for interest?

- No technical skills required
- Relevant technical information will be delivered through an easy to understand presentation.



Cross-section of a typical rotor blade

## Allow us to share our experience - Presenter expertise

After his academic studies in aeronautics, space technology & aircraft construction, the presenter stayed on the ground and now applies his expertise in the field of rotor blade service.

As joint owner of a wind turbine, which he services and maintains, he began investing and working in the wind power industry in 1993.

Since 2001 he has been investing research efforts & providing rotor blade service using non-destructive methods to assess rotor blades.

In addition to this seminar on rotor blade inspection, we offer modules on rotor blade repair work. Seminars and workshops are performed worldwide.

Mr. Zimmer, lead presenter, is also active in the "Renewable Energy Academy", RENAC, in Berlin, Germany, and is director of the rotor blade service company "**blade care** GmbH", Berlin, Germany.

## Duration & location

- Duration of seminar is 1 to 2 days
- Date and location by arrangement

**blade care ACADEMY**

### Rotor blade damage – Cracks at trailing edge

- > Appearance & Implication
  - > Vertical/ horizontal cracks
  - > Vertical crack runs into blade shell on pressure/ suction side
- > Cause
  - > Mostly material failure or production flaw
  - > Overload
- > Repair effort
  - > Medium, mostly lamination work is required (hours)
  - > Very Extensive – blade has to be taken down

**blade care ACADEMY**

### Rotor blade damage – Leading edge, erosion

- > Appearance & Implication
  - > Top-coat/ gel-coat damage-area at leading edge - area starts at tip and affects most likely 1/3 of blade length
- > Cause
  - > Normal wear & tear
  - > Material failure
- > Repair effort
  - > Medium (day) – depending on repair standard
  - > Extensive (days) – when restoration and lamination work is required and when protection foil is to apply

**blade care ACADEMY**

### Rotor blade damage – Damage analysis – example 1

- > Appearance in report
  - > Gel-coat damage, spider cracks
- > Appearance at repair work
  - > Laminate beneath gel-coat is burned – further clearance of the damage area shows that sandwich material and inner laminate layers are burned.
- > Repair effort
  - > Extensive (days)
    - entire burned area has to be cut out
    - replacement of all laminate layers, sandwich material, gel-coat and top-coat.

## We are looking forward to your response

If interested please call and state your requirements. The seminar can be tailored specifically to your demands. Quotations are free, noncommittal and individualized.

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