

# Bladena Structural Blade Course

## Course outcome:

- Understand wind turbine blades from a structural perspective
- Apprehend the loads on blades under different field operation conditions
- Classify structural blade damages and understand the risk of each damage type
- Basic understanding of blade design and testing philosophy
- Understand different inspection methods leading to big data, followed by how to use this

## Why this course?



**Focussed on the specific needs**



**Taught by experts**



**State-of-the-art knowledge**



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# An example of course overview

## Module 1: Structural overview of wind turbine blades

- Blade design drivers and trends
- Blade regions and structural function
- Blade structural components

## Module 2: Structural failure modes

- Peeling in bondlines
- Transverse cracks and skin debonding
- Buckling
- Twisting / Cross sectional shear distortion
- Flutter
- Transition zone failures

## Module 3: Materials and manufacturing

- Blade materials and manufacturing
- Blade assessment (introduction to strain/stress failure criteria)
- Interlaminar and bondline failure

## Module 4: Approach to structural Root Cause Analysis

- State-of-the-art methods and tools
- Lifetime assessment methodology
- Understanding scaling factors

## Module 5: Testing of wind turbine blades

- Full-scale testing methodology used today
- Future requested full-scale tests
- Large-scale testing and sub-component testing
- Field testing

## Module 6: Introduction to standardization & certification

- Current standardization procedure
- Limitations in certification requirements and how to approach it
- Status IEC and DNV-GL standards
- Additional requirements: Owners requirements

## Module 7: Operation & Maintenance

- Field data survey
- Field data categorization and severity
- Decision making strategies
- Inspection and Non-Destructive Testing (NDT)
- End of Warranty inspection
- Maintenance strategies

