

WTG - Blade repair

Information on GBS - Standard - Training - Certification



1 Reason for training

2 Objectives for training

3 Training methods

4 Documentation of training

5 Company profile

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Why spend resources for repair training and certification?

- Increasing size of turbines and investment creates demand for higher degree of documentation
- Increasing focus on monitoring the actual status of rotors
- Scheduled inspection and proactive maintenance to minimize lost production
- Customer expect qualified and well documented repair solutions from the contractor
- Customer satisfaction
- Avoid bad publicity and reputation in general



Offshore installation of blade


Blade service must have a certified standard?

1. Global Blade Service Standard – providing Service Work Instructions defining general inspection, repair and documentation standard
2. Training in three levels
Documented qualifications and skills
3. Certification of :
 - 1 – Blade Inspection
 - 2 – Basic Blade repair
 - 3 – Structural Blade Repair

Certificate

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Country

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Bean@gbs.com



Has completed the qualifying Training module No. xxxx:
Level C – Blade Inspection

with a proven theoretical and practical satisfactory result.

The holder of this certificate is qualified to:

- Carry out inspection of WTG Blades, hubs and nacelles, according to Global Blade Service Standard.
- Investigate damages by sanding away damaged paint/gelcoat, and make visual inspection of laminate, and bonded joints.
- Assess and categorize damages according to Global Blade Service Standard
- Measure the function of lightning protection system and decide if repairs have to be done
- Decide if B or A level Blade technician have to called in for further inspection
- Fill in Blade status documentation.
- Carry out the following repairs:
 - painted surfaces max. 10 x 10 cm.
 - gelcoat surfaces max. 10 x 10 cm.
- Assist B or A level Blade technician on Basic surface repairs.

The holder of this certificate has basic knowledge of:

- Personal Health and safety risk handling and processing of polyester, epoxy and isocyanate materials
- Blade function and construction.
- Typical defects and damages on blades
- Surface coatings used for blade construction

The time of validity of this certificate is 2 years from date of issue.

Date of issue: 10.05.2010

Trainers signature

Global Blade Service - Certificate
NO. C XXX

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What ?

***Well qualified
Blade Technicians –
prepared to act
professionally
in all situations!***



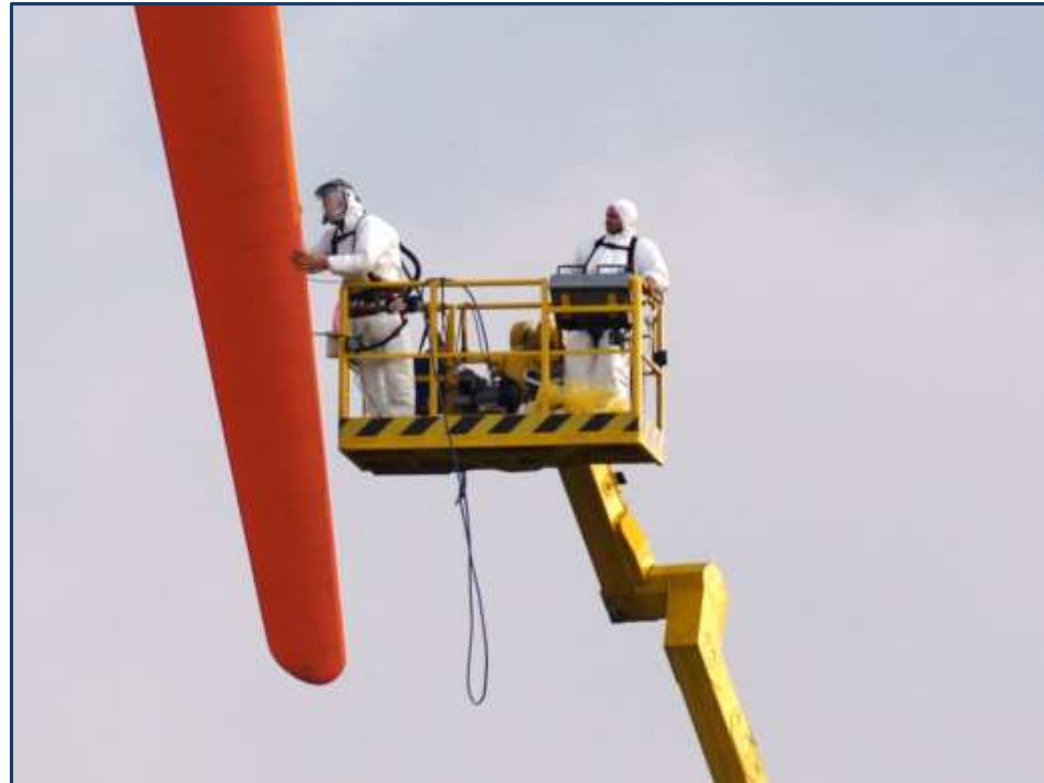
What is the outcome of blade repair training?

Qualified fibre technician on erection sites for:

1. Inspection of blades
2. Documentation of blade status
3. Avoid installing defective blades
4. Repairs on ground rather in air

Qualified technician for repair of:

1. Cosmetic damages
2. Laminate damages
3. Structural damages
4. Documentation of all repairs



Repair in air from basket

Objectives for: Level 1 - Blade Inspection?

Qualifying the participant to:

- Carry out internal and external inspection, assess and categorize damages on blade surfaces and laminate
- Carry out minor cosmetic repairs on gelcoat and painted surface according to instructions and quality specifications
- Handle and process chemicals according to environmental, health and safety standard.
- Fill in inspection reports and documentation for damages



Attendant profile: WTG installation technicians
Wind farm owners / technicians

Objectives for: Level 2 - Blade Repair?

Qualifying the participant to:

- Carry out internal and external inspection, assess and categorize damages on blade surfaces and structure
- Measure the function of lightning protection system
- Replace lightning receptors
- Carry out defined repairs in laminate and core material
- Fill in inspection reports and documentation for damages and repairs

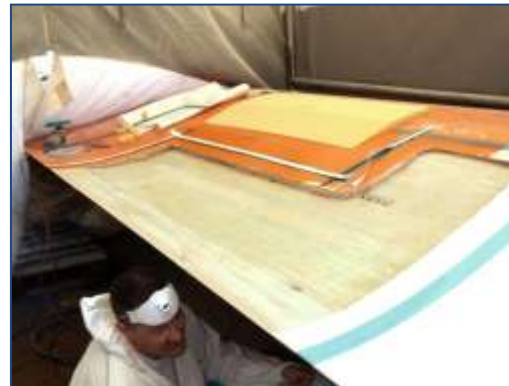


Attendant profile: WTG Blade service technicians
Wind farm service technicians

Objectives for: Level 3 – Structural Blade Repair?

Qualifying the participant to:

- Carry out inspection and categorizing of complicated damage to blade structure
- Define root cause for complicated damage
- Carry out repairs of complete blade structure according to instructions
- Fill in inspection reports and documentation for damages and repairs



Attendant profile: WTG Blade repair specialist

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Theoretical training

Slide show for training plan includes:

- Main index with links to all learning modules
- Learning modules supported by photos
- Theoretical exercises
- Links to hand outs
- Links to documentation
- Links to instruction or informative videos
- Links to external materials



Learning modules: (examples)

- Health and safety
- Blade construction
- Materials
- Production process
- Inspection and categorizing damage
- Repair technique
- Laminate quality
- Documentation

Theory 30% of training hours

Practical training - in workshop or in the field

Exercises individual and in groups

Exercises includes: (examples)

- Inspection
- Preparing for repair
- Field repairs
- Documentation
- Health and safety



Workshop 60% of training hours

Test of qualifications

Theoretical test

- Questions in writing representing all training objectives

Practical test

- Individual practical test in workshop
- Representing training skills for actual training level
- Representing documentation for actual training level



Participant must pass:

- Theoretical test
 - Practical test
- to receive certificate for actual training level

Test 10% of training hours

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Why documentation - and what?

Reason for documentation

- Standardised training courses
- Same training by different trainers
- Easy to use for new trainers
- Easy to update
- Easy to translate to local language
- Easy to split up for shorter trainings

Topics for documentation

- Outcome and objective of training course
- Outcome and objective of sub modules
- Main index incl. time schedule
- Speakers notes to all slides
- Objective and description of exercises
- Trainers notes for exercises
- Theoretical test including test key
- Practical test
- Links to technical documents
- Links to health and safety documents
- Database for certificates

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The company's operating area is primarily education and training in:

- Blade Maintenance
- Blade Inspection
- Blade Repair
- Documentation

Including training of employees for blade production.

Main competences are:

- Clarification of goals and competencies
- Qualification clarification
- Formulation of learning objectives
- Production of training material - text, photos, videos, exercises, tests etc.
- Specification and layout of educational facilities
- Implement education and training
- Documentation of training and qualifications
- Training and supervision of coaches / instructors

For:

- *Information*
- *Meeting*
- *Demonstration of training programme*

please contact:

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