Blade
Repair Report

Losheim II
Turbine 204730
Local Turbine ID Lo3
Blade Serial 78120402WHBD26204

Wind. It means the world to us.™

Table of **Contents**

1 Introduction

On 10/05/2023, blade repair was performed and completed at turbine no. 204730 installed in Losheim II wind farm.

The aim of this report is to detail repair activities completed on blade 78120402WHBD26204, and provide recommendations, if any.

Site	Losheim II
Wind Turbine Type	V90
Wind Turbine Number	204730
Wind Turbine Local ID	Lo3
Blade Manufacturer	Vestas Blades
Blade Length (m)	44
Blade Serial	78120402WHBD26204
Blade Index	A
Repair Date (DD/MM/YYYY)	10/05/2023
Report Creator	prm

Blade Serial Number: 78120402WHBD26204

##BladeSerialPlateImage##

2 Naming and Definitions

Shell	The function is to give an aerodynamic profile.
LW	Leeward - also known as suction side. LW shell is upper side during production. This side faces towards the tower.
WW	Windward - also known as pressure side. WW shell is under side during production. This side is facing the wind.
LE	The leading edge of the blade, i.e. the “nose” that is heading into the wind during operation.
TE	The trailing edge of the blade is the thin edge where the airflow leaves the blade during operation.
PPT	Pre-Preg Technology. This term is used for blades where the main structure is the spar
Spar	This is the main structural component of PPT blades. It is positioned between the shells and resists loads and forces.
SST	Structural Shell Technology. This term is used for blades where the main structure is in the shells.
Web	It is positioned between the shells and has to transfer loads and forces.
Bond Line	Line of adhesive bonding two parts together.
Flap Wise	The flap wise load is the motion of the blade caused by the wind. These loads are normal to the WW and LW shell surfaces of the blade
Edge Wise	The edge wise loads are caused by a combination of the rotation of the rotor and the mass of the blade itself, in the direction from LE to TE or vice versa.
Receptor	Metallic lightning receptor disc on the blade surface
SMT	Solid Metal Tip is a part of lightning protection.
Copper cap	May be installed at the tip on blades without SMT to improve lightning protection
Copper strip	May be installed at the tip on PPT blades to improve lightning protection
AAOs	Aerodynamic Add-Ons, optional parts attached to the blade surface to improve aerodynamic performance
GF	Gurney Flap is an Add-On used for production increase.
TVG	Tip Vortex Generator is an Add-On for noise reduction
RVG	Root Vortex Generator is an Add-On used for production increase.
STE	Serrated Trailing Edge is an Add-On for noise reduction
Stall Strip	Add-On used for stall control on stall-regulated turbines
LEP	Leading Edge Protection, either coating, tape or shells. May be applied to the blade leading edge in the outboard section to reduce erosion.

3 Damage Overview

Blades have been inspected according to the relevant work instructions and any damage detected has been classified in accordance with *Condition Monitoring of Vestas Blades*. Based on this guideline, detected damages are categorized in accordance with the following categories:

Damage Categorization

Category	Finding Description	Recommended Action
1	**Cosmetic**	No action necessary Monitor at next inspection
2	**Minor** No impact on functional integrity of the blade	
3	**Functional** Minor impact to the functional integrity of the blade	Repair within 12 months and monitor according to timeline defined by Vestas engineering team
4	**Serious** Impact on the functional or structural integrity of the blade, but not threatening safe operation	Repair within 6 months and monitor according to timeline defined by Vestas engineering team
5	**Critical** Structural integrity of the blade is severely compromised, may lead to catastrophic failure	Immediate intervention required WTG to remain in pause until approved to return to operation
		*** A modified action or time frame may be defined by Vestas engineering team**

3.1 Blade 78120402WHBD26204

##BladeDamagesTable##

4 Repair Summary

The blade repair described in this report has been repaired according to relevant work instructions in accordance with Vestas repair specification. All removed materials were replaced with like materials to restore the blade to satisfy it's intended design life.

The repair work took place over 1 day(s) and was completed on 10/05/2023.

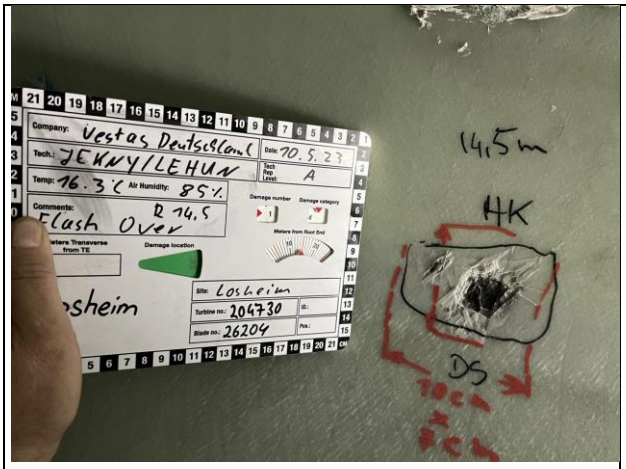
A summary of the work completed:

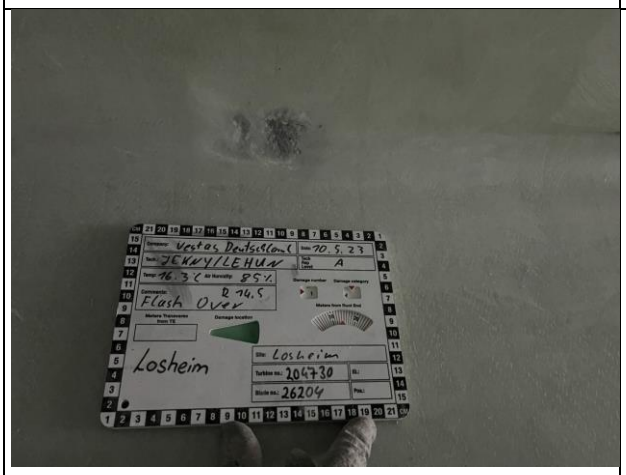
Damage No. 1
1) Laminate Layer Removed
2) Glass Lamination

5 Blade 78120402WHBD26204 Repair Procedure

Damage No. 1

1) Laminate Layer Removed





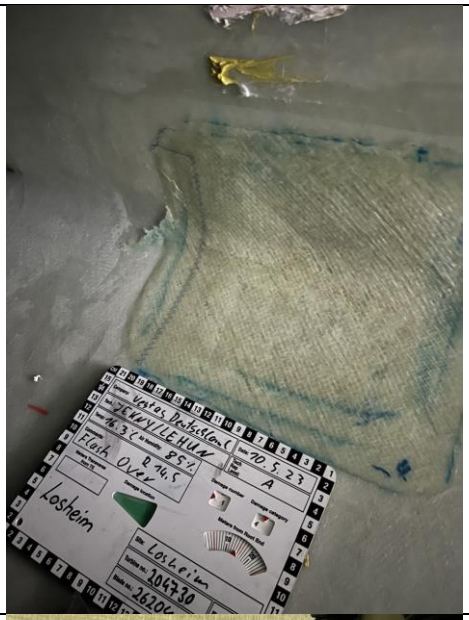
Date (DD/MM/YYYY)	**10/05/2023**

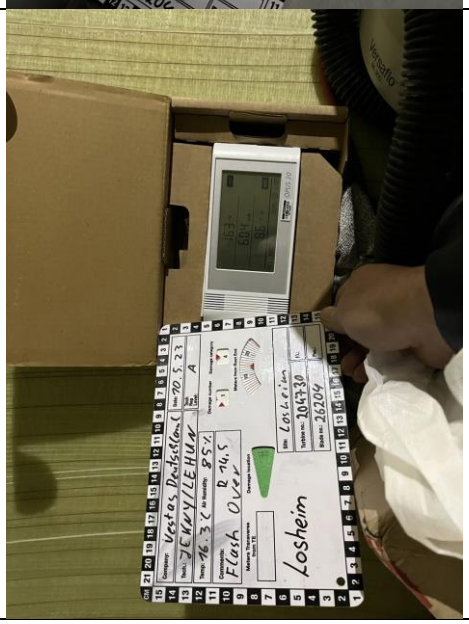
Damage size

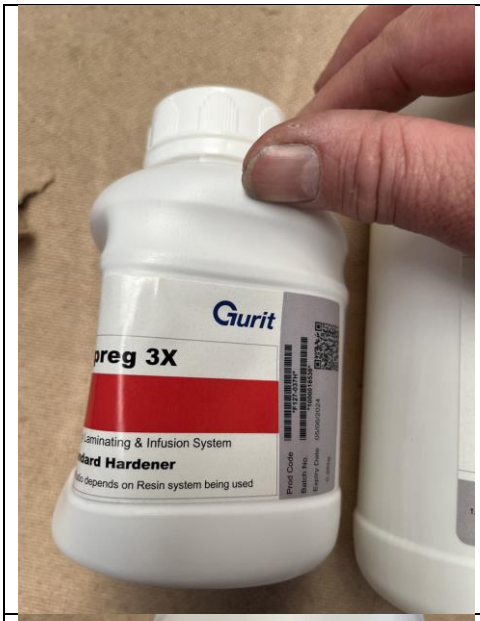
Max removal - CW (mm)	50	Max removal - SW (mm)	150

Damage No. 1

2) Glass Lamination





Date (DD/MM/YYYY) **10/05/2023**

Ambient conditions			
Amb Temp (°C)	16.3	Relative Humidity %	60.4
Surface Temp (°C)	16		

Glass fabric lamination			
Max CW (mm)	200	Max SW (mm)	300
Number of Layers	4	Description of Layers (ex. Biax600, Triax1200)	Biax 936gsm

Structural repair resin

Resin Type	Ampreg 30		
Resin Batch Number	10000018538	Resin Expiration (DD/MM/YYYY)	05/06/2024
Hardener Type	Ampreg 3X Standard		
Hardener Batch Number	10000018538	Hardener Expiration (DD/MM/YYYY)	05/06/2024

Cure cycle			
Cure time (min)	300	Cure temp Start (°C)	20
Cure temp Mid (°C)	66	Cure temp End (°C)	75

5.1 Conclusion

CIR approved.

Vestas Wind Systems A/S
Hedeager 42 · 8200 Aarhus N · Denmark
Tel: +45 9730 0000 · Fax: +45 9730 0001
Vestas@Vestas.com
Vestas.com

Confidentiality and Disclaimer

The recipient of this document, including its subsidiaries, related companies, employees, agents and sub-contractors (collectively the “Recipient”) undertakes that Vestas Wind Systems A/S, as trustee for all direct and indirect subsidiaries of Vestas Wind Systems A/S including the sender of this document and all employees, agents and sub-contractors of Vestas Wind Systems A/S (collectively “Vestas”) keep confidential any information contained in this document (including any appendixes) and/or other documents and data to the extent that the same are derived from or related to such information.

This document is a non-binding Indicative Offer and an estimate only and is subject to change, and that it does not constitute an offer to provide any goods or services and, (save only for this disclaimer and confidentiality undertaking which is intended to have legal effect) is of no legal effect.

Vestas accepts no responsibility in any way for, and makes no representation, express or implied, and gives no warranty or undertaking of any kind with respect to the accuracy or completeness of any disclosed Information.

The Recipient cannot rely on the information disclosed in this Indication Offer (including any appendixes and supplements) and/or any oral or written communication in connection with it for any purpose, and accepts and agrees that (save in case of fraud) Vestas shall have no liability in contract, tort (including negligence), for breach of statutory duty or otherwise in connection with any information disclosed herein.

If any undertaking or other provision in this disclaimer and confidentiality undertaking shall be held to be illegal or unenforceable, in whole or in part, under any enactment or rule of law, such undertaking or other provision or part shall to that extent be deemed not to form part of this disclaimer and confidentiality undertaking but the enforceability of the remainder of the undertakings and other provisions in this disclaimer and confidentiality undertaking shall not be affected