



Gearbox Inspection in Wind Energy Converters

The gearbox transmits the power and transforms the torque with the low rotation speed at the rotor into a lower torque with a higher rotation speed at the generator shaft. Unplanned downtimes caused by gearbox problems in the drive train of a wind energy plant burden the operator with costs not taken into account. In individual cases, the costs can be so high that the entire financing can be at risk.

The **SV-Veltrup** carries out special gearbox inspections, on behalf of operators, investors, wind energy plant manufacturers, planning offices and insurance companies, in order to detect risks at an early stage.

Goal

The purpose of videoendoscopy of the gearbox is to determine the current technical condition of the gearbox, to recognize early damage and - through the early recognition - to avoid follow-up damage. In the case of damage, information about the further operation or the required repairs will be given in order to:

- minimize the risks of an unplanned downtime,
- discover possible damage, for example prior to the end of the warranty,
- record the exact condition of the gearbox, for example for the insurance company,
- record the exact causes in cases of gearbox damage.

Scope

With each gearbox inspection carried out by **the expert Veltrup**, the entire gearbox is inspected with extreme care, years of experience and always with state of the art inspection and documentation technology. During the inspection and after consultation with the contractor the following techniques are used:

• Videoendoscopy

Inspection of all accessible bearings and of gearing parts which are not visible from the gearbox service lid. Condition statements on the basis of the documents produced of the inspected gearbox components (for example planetary bearings, sun pinion etc).

• Toothed gear moulding followed by a SEM-inspection

The production of a tooth flank moulding with the assistance of a special moulding mass on the damaged tooth flank with an accuracy of 0,1 micrometers. The tooth moulding is examined under a scanning electron microscope (SEM). On the basis of the SEM inspection, the characteristics of the inspected damage (for example micropitting, downtime marks etc.) can be documented.

• Laser alignment

Inspection of the gearbox-generator alignment with the assistance of a measurement laser which can document any eventual deviations. Timely recognition of an excessive displacement and the avoidance of subsequent reworking by the WEC manufacturer prevent bearing damage caused by excessive restoring forces.

• Vibration Analysis

Inspection of the drivetrain with the assistance of a mobile vibration measurement system with a subsequent evaluation of the measurement values. Bearing and toothing damage are recognized at an early stage and measures can be taken on time on the part of the operator / plant manufacturer in order to avoid further damage.

• Materials testing of dismantled parts

Metallographic inspection of dismantled gear toothing parts, bearings, sealing rings etc in order to determine the characteristics of the damage.

Results

In a comprehensive condition report, as an original and PDF-file, all defects or damages found are named, described and, to a large extent, photographically documented. This inspection report contains information on the condition of the gearbox inspected. It certifies the possible absence of defects or points out any defects or damages. Furthermore, the report contains all possible deadlines for repair of defects, recommendations for the scope of repairs and the date for repairs. In the case of serious damage to the bearings or gear toothing with possible follow-up damage, the plant operator will be recommended to shut down the machine until its removal.



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