



## CJC™ Application Study

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2015



### CUSTOMER

Availon GmbH in Rheine and Erfurt, Germany. Availon is a globally leading service provider of a complete range of services regarding wind turbine generators (maintenance, optimization and upgrades). In the wind farm "Wangenheim-Hochheim" of the wpd AG Availon services 17 WTG of same type.

### THE SYSTEM

Wind Turbine Gearbox GE® 1.5 s (Wangenheim 9)  
Manufacturer Gearbox: Lohmann + Stolterfoht  
Oil type: Addinol Eco Gear 320 S  
Oil volume: 380 litres

*GE is a registered trademark of General Electric Company, US.*

### THE PROBLEM

The wind turbine is in operation for more than 10 years. Regularly, oil samples were taken from the gear oil which were analysed by an independent laboratory. The last oil analyses showed an increased particle content with more than 1.6 million of particles > 4 µm and more than 750 particles > 38 µm in 100 mL oil. The laboratory reports recommended to improve the oil cleanliness.

### THE SOLUTION

A CJC™ Fine Filter unit HDU 15/25 with CJC™ Fine Filter insert BG 15/25 (3 µm absolute) and a pump flow of 120 ltr/h was installed. The integrated filter insert removes particles, water and oil degradation products (varnish / resins, oxidation by-products, sludgy residues etc.) simultaneously. Dirt holding capacity: approx. 1.1 kg  
Water holding capacity: approx. 400 mL

The filter unit is equipped with an additional preheater warming-up the oil to make it filterable also at lower operating temperature. Due to this the filter efficiency increases also in part-load operation and contaminants are steadily removed from the oil.

### THE RESULT

Due to the additional offline fine filtration the oil quality and cleanliness classes were significantly improved. Before the offline filtration started, the oil had a cleanliness class of ISO Code 21/20/15 (according to ISO 4406), which improved within approx. 28 weeks to ISO 18/16/12. The amount of particles > 4 µm were reduced by 89.97 % - from 1,696,389 to 169,215 particles in 100 mL oil. This will result in less wear on the gearbox and consequently a significantly longer lifetime of the gearbox.

In 2013, Availon retrofitted 70 WTG in different wind farms with CJC™ Fine Filter units.

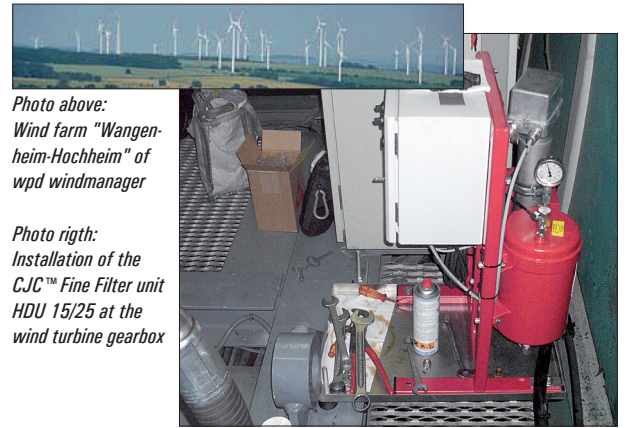


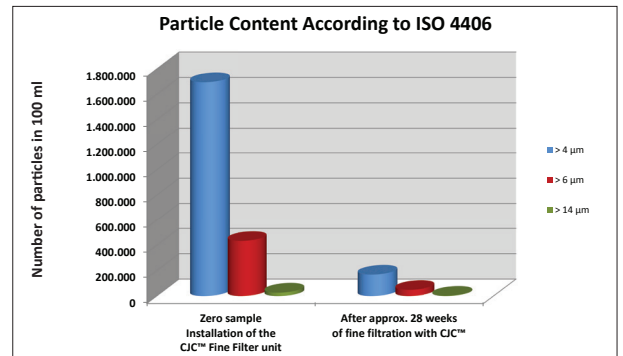
Photo above:  
Wind farm "Wangenheim-Hochheim" of wpd windmanager

Photo right:  
Installation of the CJC™ Fine Filter unit HDU 15/25 at the wind turbine gearbox

### THE RESULT

	WITHOUT fine filtration 10.12.2013	WITH fine filtration 24.06.2014
Particle > 4 µm	1,696,389	169,215
Particle > 6 µm	434,522	48,951
Particle > 14 µm	27,440	2,854
Particle > 21 µm	5,761	300
Particle > 38 µm	758	0
ISO Code 4406*)	21/19/15	18/16/12
SAE AS 4059	12A	8A

*\*) Further information on cleanliness classes are available on request.*



### COMMENT

**Jochen Holling, Mechanical Engineer, Availon GmbH:** „After installation of the CJC Offline Fine Filter units in the WTGs we can be sure to maintain the gear oil in an optimal way. In several test set-ups we have proven and tested different filtration systems: 3-stage elements (inline filters), bypass filters and offline filters – with the result that continuous offline filtration is the best system for oil care. The respective oil analyses show that the oil is considerably cleaner than before which can also be seen. We are very satisfied with the results and we want to equip further WTGs with CJC Offline Fine Filters when a significant improvement of the oil quality is necessary.“