

THE FUTURE OF LUBRICANTS (6)

The application of GERnano® in wind turbines

Due to the application of GERnano®, new formed structures in lubricants also increases the efficiency of wind turbines.

The application of GERnano® in gearboxes has been explained in detail in "Future Lubricants (4)". The new formed structures by the use of GERnano® will give the gearbox oil the following additional properties:

- nonlinear change of the viscosity
- significant increase of its heat capacity

These additional properties will cause a local adaption of the viscosity and the temperature in relation to the different thermodynamic forces on all frictional surfaces in the gearbox. The internal frictional losses will reduce significantly, which leads to a remarkable increase of the power output.

As displayed clearly in the diagram and chart, GERnano® induces a significant increase in power also in small vertical 1,8 kW wind turbine. One can clearly see that at low wind speeds the power output almost doubles. This example shows that due to the application of GERnano®, also with smaller wind turbines and low wind speeds, the economic efficiency improves considerably.

The technical advantages by the use of GERnano® also will lead to an economic success of wind turbines. GERnano® reduces the internal losses of gearboxes and increases their efficiency, lowers the oil temperature, expands the oil change intervals up to 3 – 4 times, reduces wear and tear, increases durability and lifespan.

Maintenance and repair of wind turbines generates high costs. The bearing of the impeller as well as the gearbox have to deal with extreme loads, but at the same time they have to ensure an absolute continuous operation in order to deliver an economic operation.

Downtime, e.g. due to an overheated bearing and high temperatures of the gearbox oil, causes additional operational costs. No electricity can be produced. The application of GERnano® in wind turbines increases its availability and lifespan and at the same time reduces maintenance and repair significantly.

Results vertical wind turbine 1,8 kW rated capacity.

x-axis wind speed in m/s	Output in Watt without GERnano®	Output in Watt with GERnano®
0	0	0
1	0	0
1,5	0	100
2	0	150
3	50	225
4	100	450
5	300	525
6	425	800
7	550	875
8	625	1375
9	775	1550
10	850	1700
11	975	1800
12	1050	1800
13	1175	1800
14	1250	1800
15	1375	1800
16	1450	1800
17	1550	1800
18	1650	1800
19	1750	1800
20	1800	1800

Vertical wind turbine 1,8 kW rated capacity

