# Strong despite wind and weather

**Wind exists abundantly on the Earth and cannot become scarce. All around the world, energy is being increasingly produced from wind. However, the requirements on wind power systems are great—in particular, on those operated in a maritime environment. Sulzer offers surface solutions that protect the wind turbines optimally.**

When wind power installations are set up offshore, it is considerably more acceptable to the local populations than when they are installed onshore. Also, the wind conditions at sea are usually better than those on land are. However, offshore facilities are exposed to particularly aggressive, salty environments, and protecting the wind turbines against corrosion caused by salt and moisture therefore plays a major role in the viability of the installation. At the same time, the materials used must be able to withstand varying forces, high impacts, and distortion. Gearboxes are often used to change the rotary speed and the torque between the rotor and the generator. Such gearboxes have to be able to withstand up to 144 million revolutions of the rotor shaft or 15 billion revolutions of the generator shaft during the service life of a modern wind energy system.

The most common cause of breakdowns in wind power plants is the wear and fatigue of components such as transmission gears. Such failures usually result in long downtimes for the system. Sulzer offers surface solutions that protect the steel from wear and corrosion and prevent breakdowns.

## Well protected from salt water

The E.IONIT OX process was specially designed to protect against salt water in the maritime environment. E.IONIT is a heat treatment that enriches and strengthens the edge regions of ferrous materials with nitrogen by means of nitriding processes (see *Sulzer Technical Review* 2/2012). Using E.IONIT, higher edge hardnesses are achieved than with conventional methods, such as case hardening. The E.IONIT OX process also includes an oxidation process, and, in addition to nitrogen, also incorporates carbon into the edge zones. This surface treatment refines conventional steels—with all their advantages of stretchability and strength—into high-performance materials. The desired properties, such as wear resistance, corrosion resistance, vibration resistance, and fatigue strength are set up where they will later be needed in use, namely in the edge zones and on the surface of the components. In this way, cost savings are possible through the replacement of expensive materials with cheaper ones. For example, cheaper tempered steels can be used in place of stainless steel.

Compared to hard-chrome-plated surfaces, E.IONIT OX offers much better protection against corrosion in the maritime environment. What's more, the process is considerably more environmentally friendly. E.IONIT OX has proved its value for hydraulic components such as piston rods and gear parts. Thanks to this surface solution, wind park operators benefit from the longer service lives of the components and less downtime.

**Annette Norin**
Sulzer Metaplas GmbH
Am Böttcherberg 30–38
51427 Bergisch Gladbach
Germany
Phone +49 2204 299 262
annette.norin@sulzer.com

**Jürgen Crummenauer**
Sulzer Metaplas GmbH
Am Böttcherberg 30–38
51427 Bergisch Gladbach
Germany
Phone +49 2204 299 244
juergen.crummenauer@sulzer.com

## Wind energy on the rise

The production of energy from wind turbines is one of the most environmentally friendly technologies for meeting our energy needs. Wind parks have been set up since the 1980s, and the development of wind energy is making rapid steps forward. Wind power plants will be expanded—both on land and in the water—in the next few years. At the end of 2012, a total output of 5863 MW was achieved with 2052 offshore plants (in 73 wind parks), while the total installed capacity worldwide is around 282 482 MW.

The strong and steady winds on the sea are ideal for wind power plants, but the salty environment is problematic for the components.