oerlikon balzers

oerlikon metco

Reliable wind power

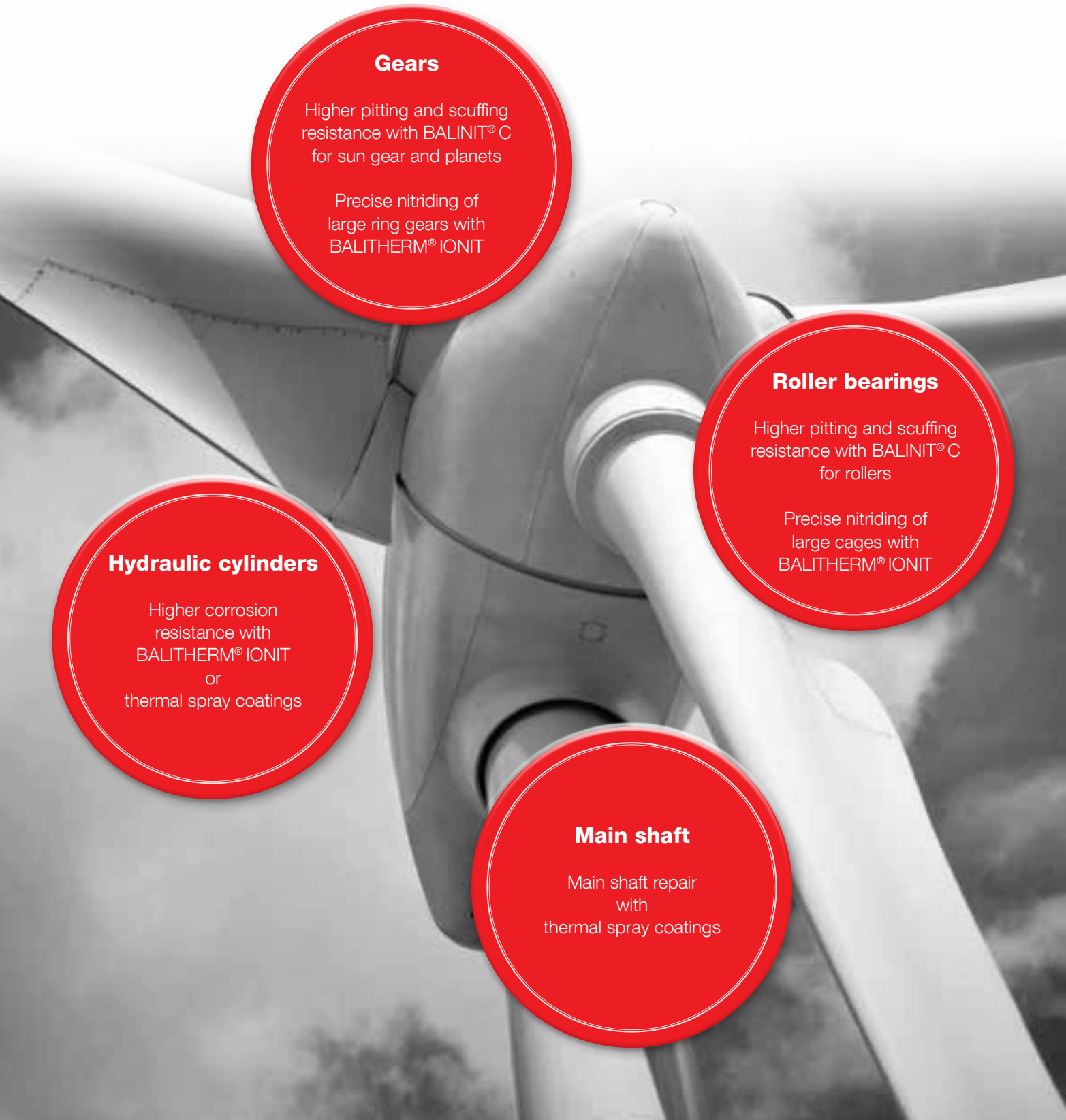
BALINIT PVD coatings, BALITHERM heat treatment and thermal spray coatings for wind turbine components

General Engineering

Surface solutions for wind turbines

Wind turbines are an increasingly important source of environmentally friendly energy. Their design and exposure to the environment however subjects their structural and engineering parts to high loads and corrosive attack. Oerlikon Balzers and Oerlikon Metco surface solutions increase wear resistance, improve component performance and extend the maintenance cycles of gears, roller bearings, hydraulic and structural parts. We apply Nitriding, PVD coatings and thermal spray coatings to push the performance limits of wind turbine components.

Our surface solutions and your advantages at a glance

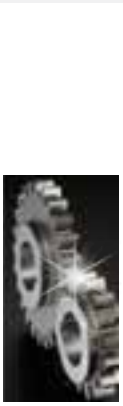


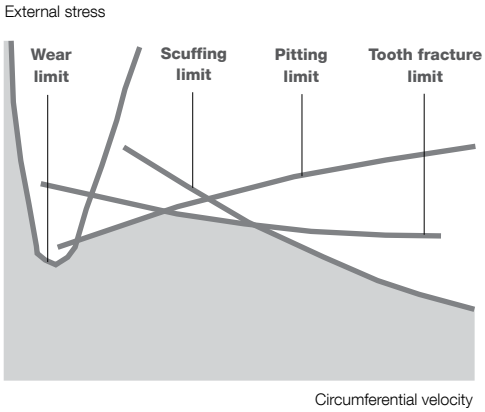
Gear solutions

BALINIT C for reliable and higher performance gears

Wind turbine gears are subjected to high loads, high and low speeds and poor lubricating conditions, which can lead to scuffing and surface fatigue (pitting).

Gear wear is measured by FZG spur gear testing.

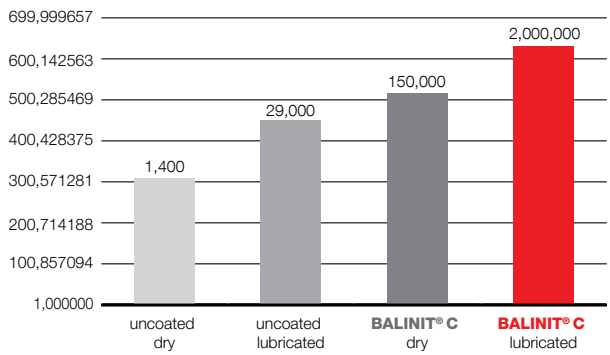




Higher scuffing resistance of BALINIT C coated gears under poor lubricating conditions

In a gear test, unlubricated BALINIT® C (WC/C) coated gears achieve a longer lifetime than poorly lubricated, uncoated gears.

The best results are achieved with coating and lubrication: coatings are, however, never a substitute for a well lubricated system.

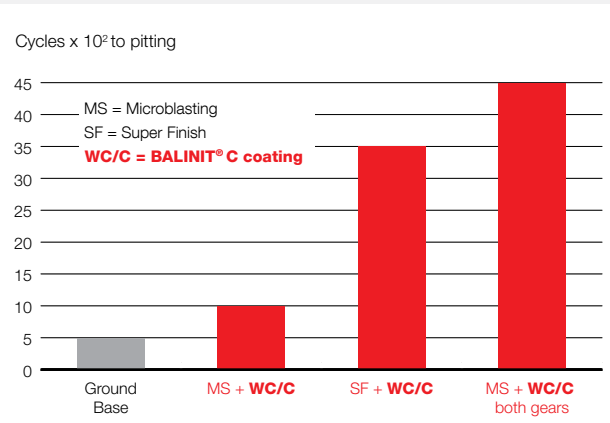


FZG Test: Test data	
Speed	1,000 U/min
Contact pressure	1,000 N/mm²
Lubricant	ESSO CL46B (biological grade)
Oil quantity	1 drop per minute
Source	IMM, TU Dresden

Higher pitting resistance of BALINIT C coating in combination with surface finishing methods in a model test system

Both BALINIT® C (WC/C) coating and superfinish increase pitting life. Maximum lifetime is achieved with a combination of superfinish and BALINIT® C on one gear, or microblasting and BALINIT® C coating of both gears.

Compared to superfinish, only BALINIT® C coating provides the additional advantage that the gear surfaces are effectively protected against scuffing wear under poor lubricating conditions (start-up).



Test data	
Test gear	FZG-C_{mod} 16MnN Cr5E
Speed	2,250 min^{-1}
Torque	450 Nm
Oil temperature	90+/-3 °C (oil sump)
Lubricant	SAE 75W

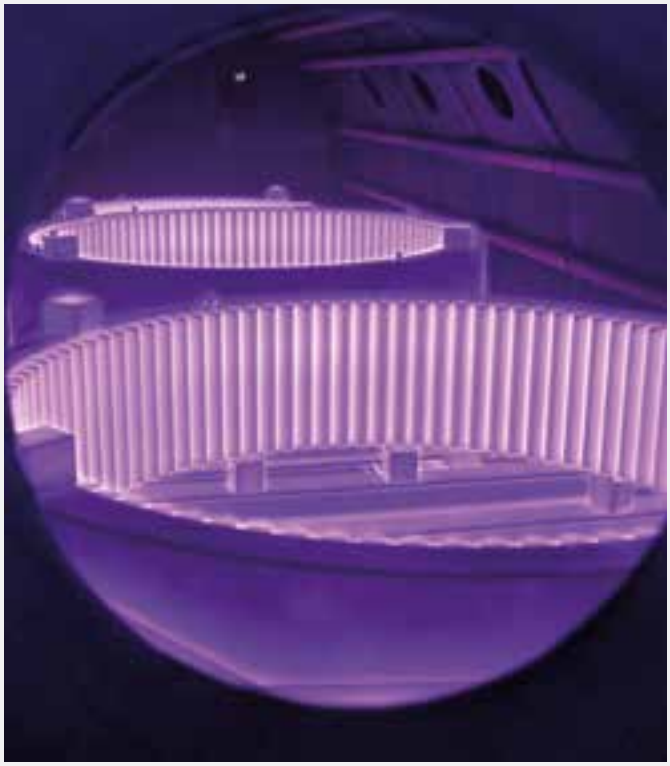
BALITHERM IONIT for large gears

For large gears, such as those in marine and wind turbines, PVD coatings cannot be used because of limited equipment size. BALITHERM® IONIT nitriding is a powerful treatment for parts up to 3 meter diameter, 10 m length, and/or weights up to 40 tons.

BALITHERM® IONIT plasma nitriding of a 2.5 meter diameter wind turbine ring gear. Accurate process parameters allow for significantly less distortion than conventional gas nitriding processes.

A BALITHERM® IONIT treated 2 meter diameter ring gear showed five times less roundness deviation and seven times better planarity than gas nitriding.

A FZG pitting test according to DIN 3990-5 achieves with 1300 N/mm^2 on DIN 42CrMo4 heat treatable steel a top value compared to gas nitriding (1000 N/mm^2).

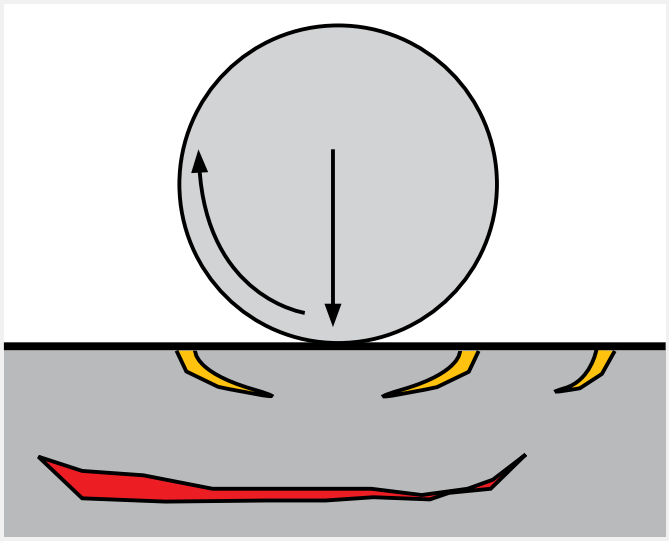


Roller bearing solutions

BALINIT C increases pitting resistance of bearing rollers

Coating of wind turbine rollers with BALINIT® C (WC/C) bearings improves pitting resistance. Bearings thereby exhibit longer service life and better reliability.

Excellent running-in behavior, low friction and anti-galling properties due to formation of an effective barrier between metal/metal contacts; effectively suppress metal structural damages such as white etch cracks and, ultimately, fatigue failure.



Pitting mechanism

BALITHERM IONIT for bearing cages

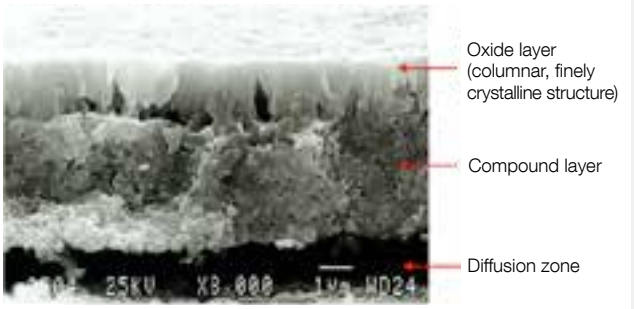
BALITHERM® IONIT is successfully used to nitride large bearing cages of wind turbine bearings. Nitriding increases the sliding wear resistance against the rollers. Optimum wear performance is achieved with nitrided cages running against BALINIT® C coated rollers.

Solutions for hydraulic cylinders

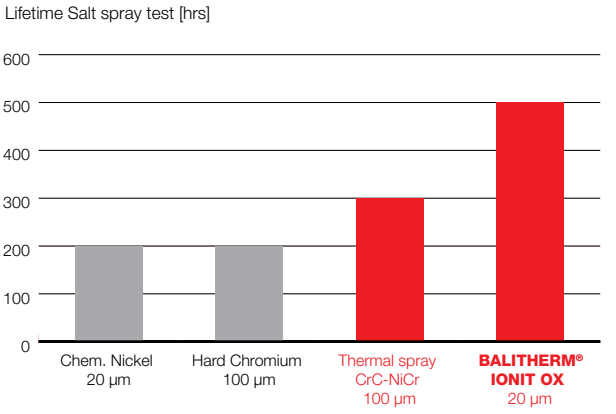
BALITHERM IONIT OX for hydraulic cylinders

BALITHERM® IONIT OX is a gas nitriding process with oxidative post treatment to form an Iron oxide layer.

SEM micrograph of oxide and compound layer



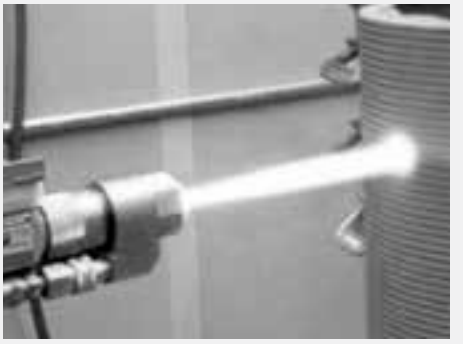
BALITHERM® IONIT OX, with a 20 µm thick compound layer, achieves lifetimes of up to 500 hrs in salt spray testing. Both thermal spray coatings and BALITHERM® IONIT OX are powerful alternatives to chemical nickel or hard chrome plating.



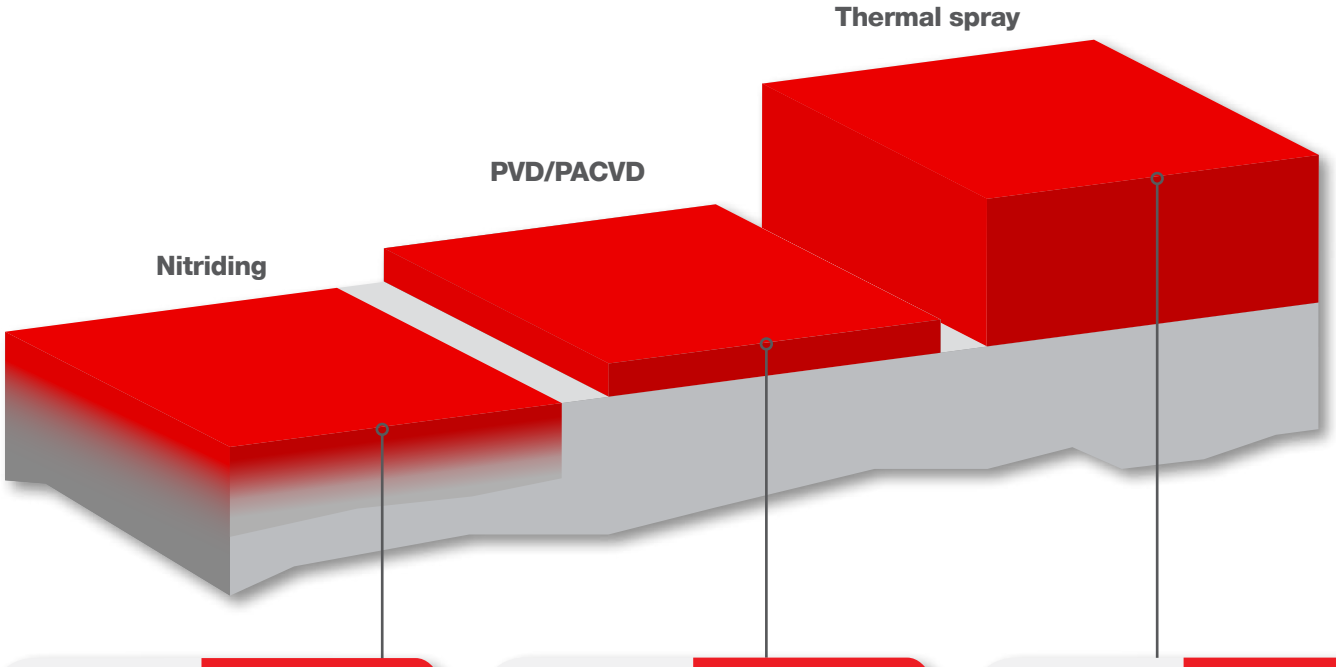
Main shaft solution

THERMAL SPRAY for main shaft repair

Thermal spray (HVOF) coatings are also used to repair worn areas of main shafts. Preferred coating materials are Nickel alloys as base material and Molybdenum as top coating. Wear scars up to 2 mm deep can be filled up.



Recommended coatings for wind turbine components



	BALITHERM® IONIT
Coating material	Fe-nitride compound layer and diffusion zone
Micro hardness (HK 0.01)	Up to 1000 at the surface
Thicknesses compound layers	5 – 20 µm
Thicknesses diffusion zones	300 – 800 µm
Colour	black grey

	BALINIT® C
Coating material	WC/C
Micro hardness (HK 0.01)	approx. 1,000
Typical thickness	1– 4 µm
Coefficient of friction against steel (dry)	0.1 – 0.2
Colour	anthracite

	HVOF
Coating material	Mo
Hardness	approx. 500 HV
Typical thickness	Up to 2 mm
Function	wear protection
Colour	metallic

Benefit from efficient and environmentally friendly BALINIT and BALITHERM Service Contact us now!

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