



oerlikon
balzers

Innovative solutions for large machine parts

Efficient, environmentally friendly, productive:
surface treatment with BALITHERM IONIT

Open a new world of possibilities with BALITHERM IONIT
Contact us today!

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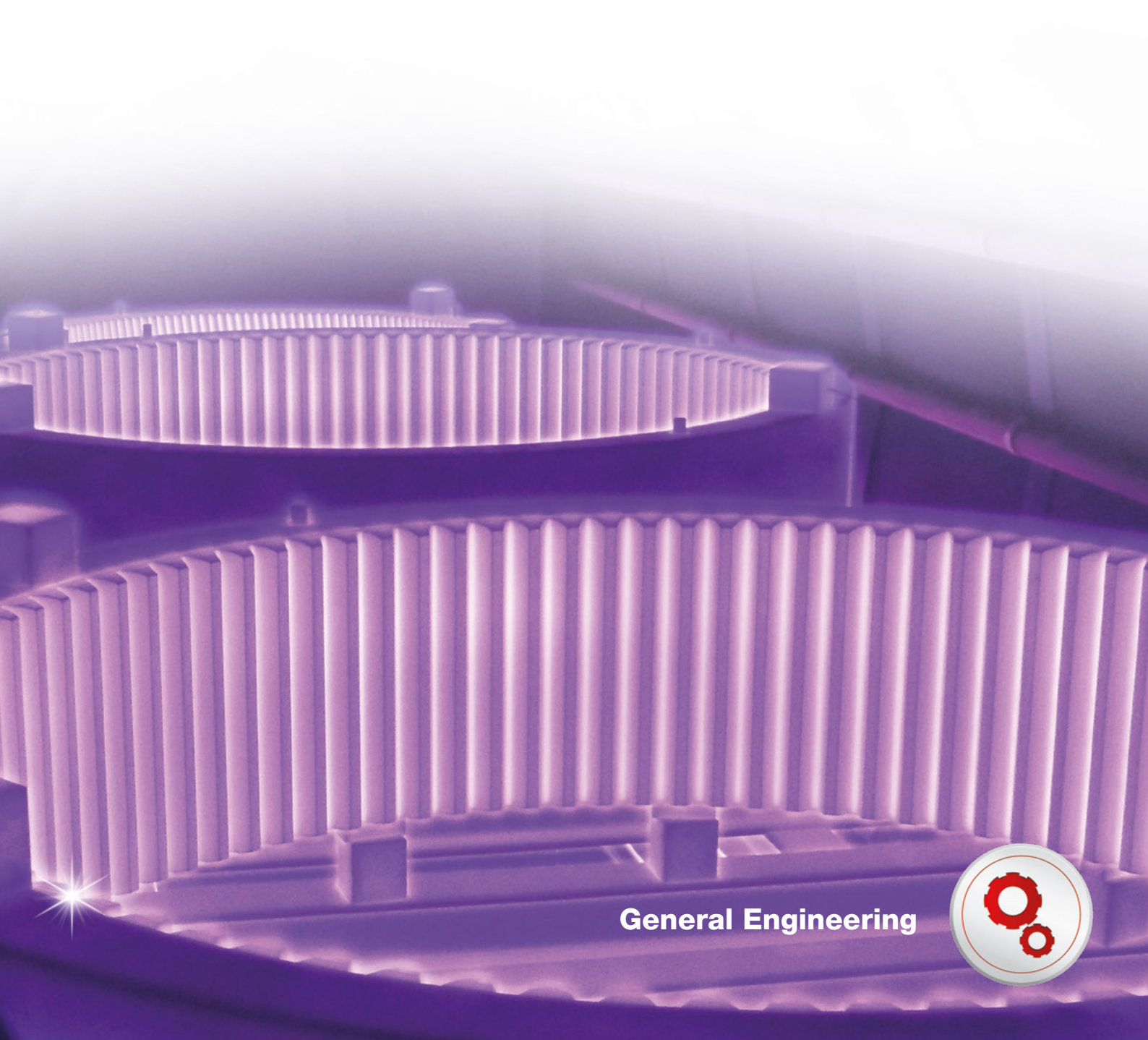
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You can find a full listing
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General Engineering



BALITHERM IONIT

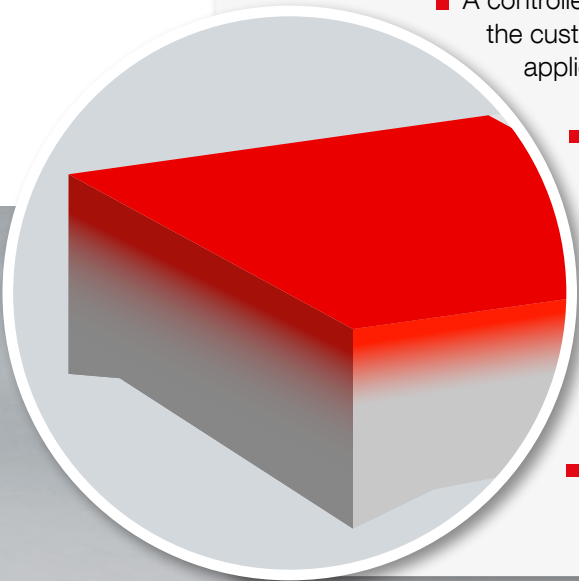
The surface hardening solution for machine parts

Nitriding is a classical and powerful surface hardening method where nitrogen diffuses into the surface to form a several hundred micrometer thick diffusion zone and a wear resistant compound layer.

At Oerlikon Balzers, we have the largest plasma nitriding equipment worldwide, enabling the treatment of large machine parts such as wind turbine ring gears, marine gears or large propellers.

BALITHERM® IONIT is the Oerlikon Balzers plasma nitriding process to achieve a precise and predictable diffusion treatment.

Your benefits of the BALITHERM IONIT nitriding process



BALITHERM IONIT offers clear benefits to you:

- A controlled process that allows the precise nitriding depth according to the customers' requirements and the individual adjustment to specific applications.
- Precise temperature control also at low treatment temperatures (standard 480 °C) for excellent surface structure and dimension control of large parts.
- No remachining required.
- Largest plasma nitriding equipment worldwide, enabling the treatment of huge machine parts: up to 40 tonnes and to a diameter of 3 metres by a length of 10 metres (d3 x 10 m).
- Environmentally friendly process as no poisonous gases or chemicals are used.

Where can our surface treatment solutions support you?

Nitriding depth and hardness depend on steel composition, nitriding temperature and treatment time: Oerlikon Balzers

runs standard recipes for customers, or applies individual customer-tailored processes.

Material group	Materials	Material number	ASTM / SAE / AISI	Hardness [HV 0.1]	Hardness [HRC]	max. NHD [mm]
Grey cast iron	EN-JS2070	0.7070	100-70-03	> 800	> 64	0.3
Tempered steel, alloyed	40NiCrMo6	1.6565	4340	800 - 900	64 - 67	0.8
	34CrNiMo6	1.6582	4337	800 - 900	64 - 67	0.7
	42CrMo4	1.7225	4140	800 - 900	64 - 67	0.8
	30CrMoV9	1.7707	4340	800 - 950	64 - 68	0.7
Nitriding steel	31CrMoV9	1.8519	–	800 - 950	64 - 68	0.7

Complete list available on request. The values for the materials shown are guide values.

Sometimes even small dimensional growth is not acceptable: BALITHERM® IONIT, a plasma nitriding process, offers a very precise process control and significantly less growth and

distortion compared to gas nitriding processes, even for large parts. This precision is especially important for wind turbine gears.

Example: wind turbine ring gear

Diameter 2 m, 1.8 t

BALITHERM® IONIT shows significantly less distortion compared to gas nitriding. The plasma surrounds the gear geometry very homogeneously.

- 

Roundness: 20 µm (5 times better than GNC*)
- 

Parallelism: 15 µm (8 times better than GNC*)
- 

Flatness: 15 µm (7 times better than GNC*)
- *gas nitrocarburising



Applications of BALITHERM IONIT: treatment of large ring gears

BALITHERM IONIT for large wind turbines

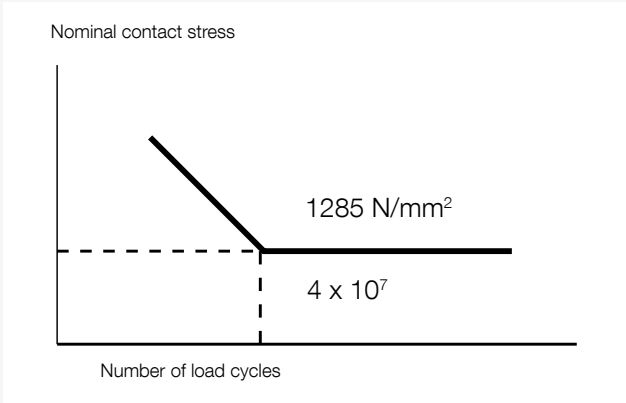
Nitriding processes generally have small dimensional changes and distortion, as the typical nitriding temperature of 480 °C is below tempering temperature (typically > 600 °C) and most of the nitrogen diffuses into the material.

Wind turbine ring gears are exposed to high loads, the surface performance is limited by the surface fatigue (pitting) resistance. The pitting resistance depends on the surface hardness profile.

The FZG institute of Cogwheel & Gear Construction of the Technical University of Munich (TU Munich) has analysed the pitting resistance of BALITHERM® IONIT treated gears:

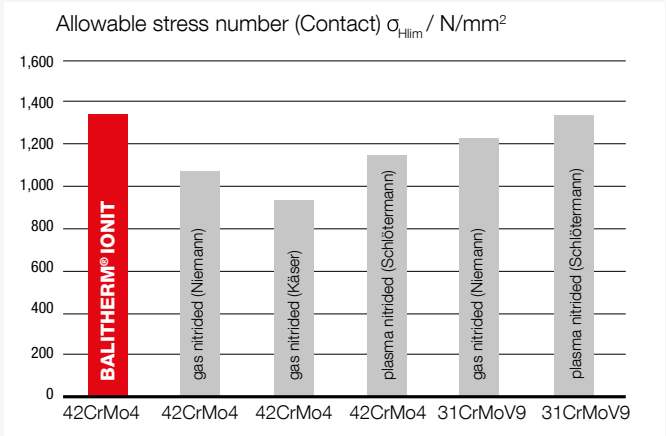
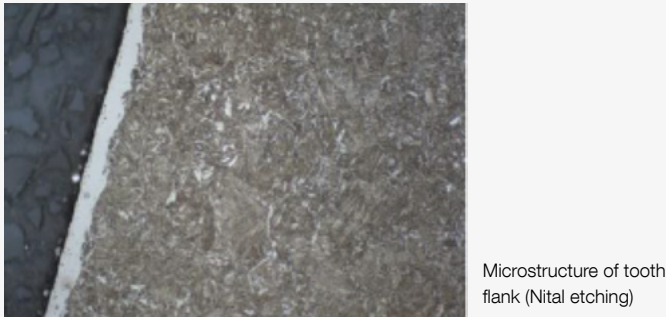
Pitting damage of gear flanks

- Steel:** 42CrMo4
- Module:** 5 mm
- NHD:** 0.45 mm
- Compound layer thickness:** 14 µm



The BALITHERM® IONIT treatment of steel 42CrMo4 achieves a nominal contact stress of 1285 N/mm² in the FZG pitting test.

Gear flank cross section



The FZG institute of the TU Munich concluded that the allowable stress number of BALITHERM® IONIT treated 42CrMo4 steel with 1347 N/mm² lies significantly above gas nitriding and achieves a higher quality than 31CrMoV9 steel.

BALITHERM IONIT for marine gears

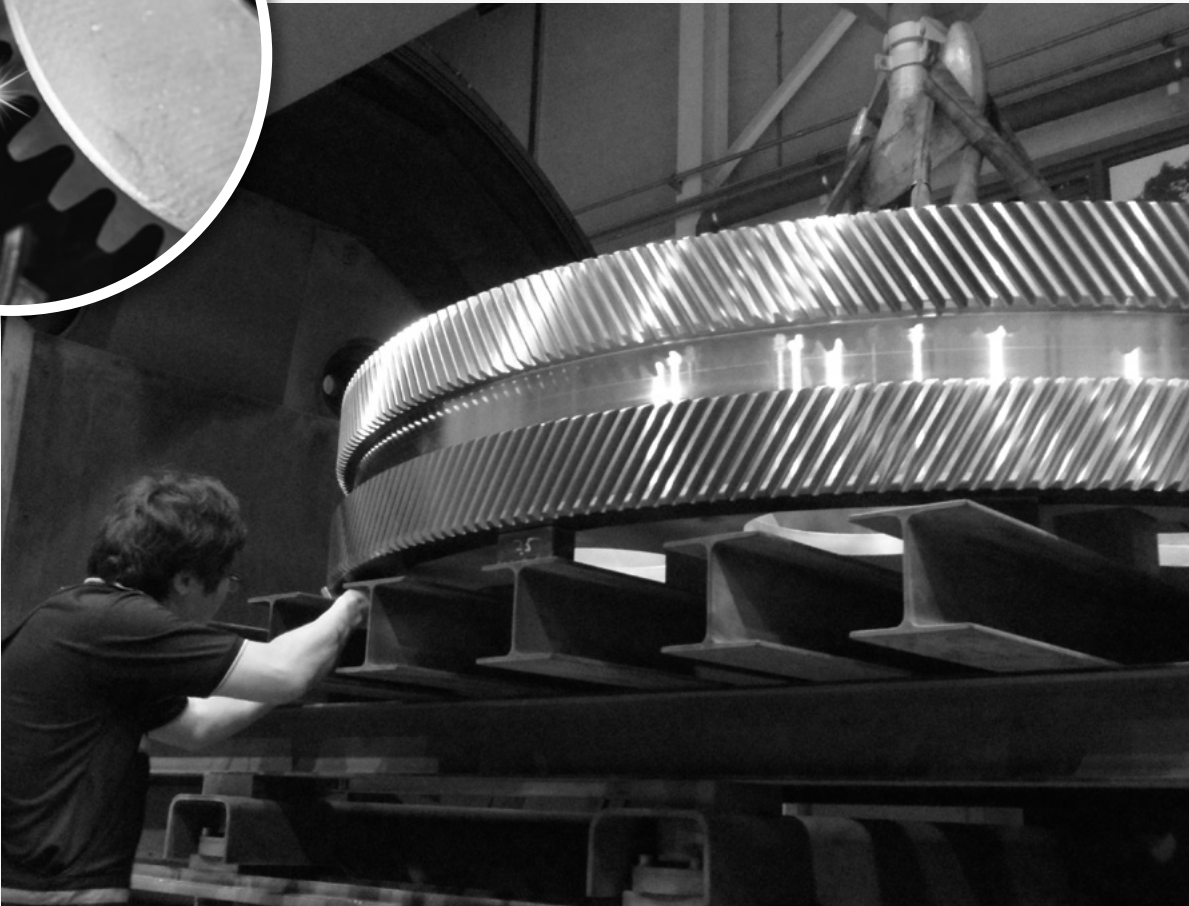
Marine gears for ship engines demand high resistance against wear, friction and bearing pressures. Surface fatigue with pitting appears and reduces the lifetime of untreated

gears. BALITHERM® IONIT treatments enhance the surface resistance against pitting and increase significantly the lifetime of marine gears.



Marine gear

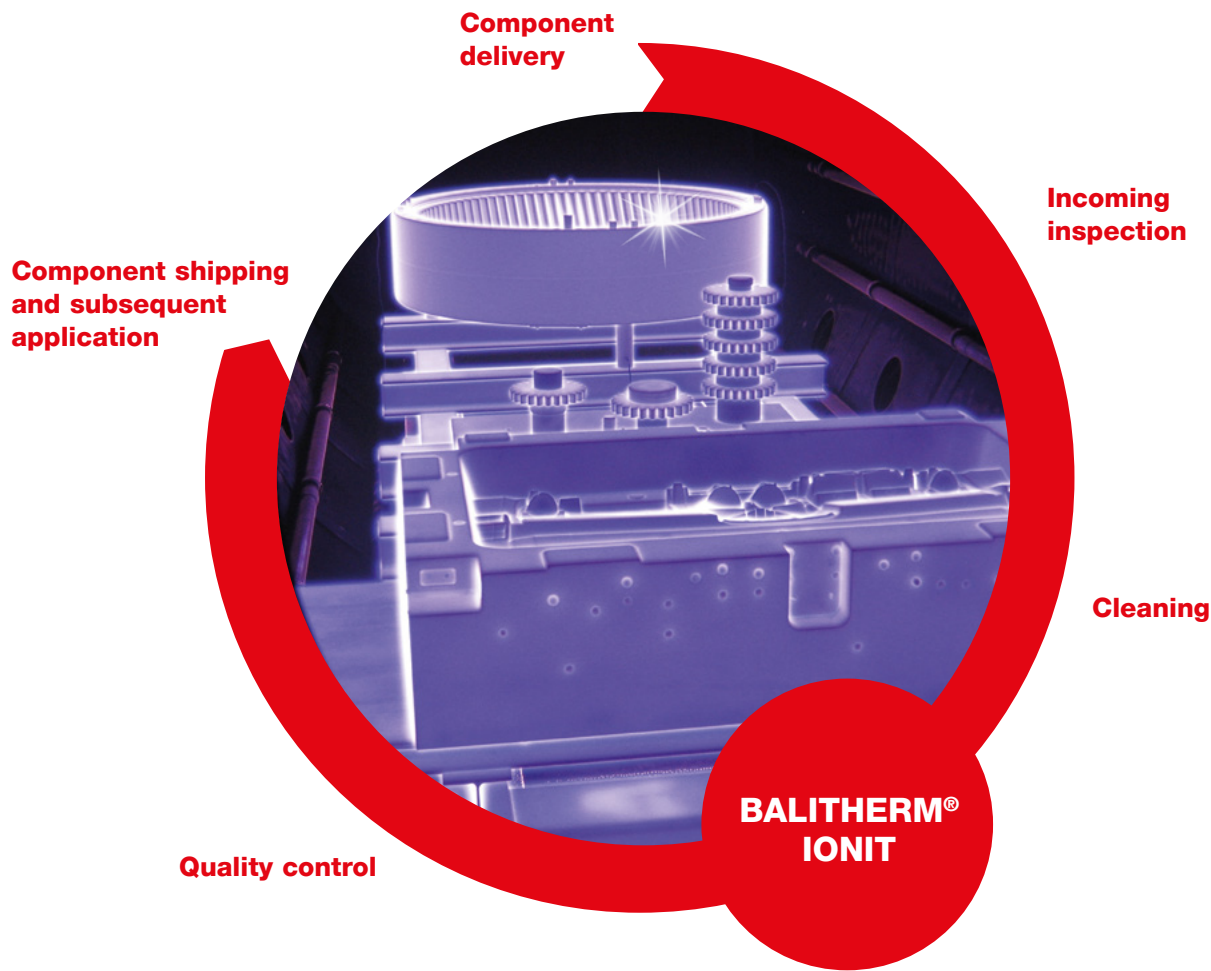
Size: Ø 3000 mm, Weight: around 5 t



The special BALITHERM® IONIT ST (Stainless Steel) process increases the cavitation resistance of propellers made of stainless steel (e.g. 17-4 PH, 10-20 µm diffusion depth, 900 HV hardness).

All given data are approximate values, they depend on application, environment and test conditions.

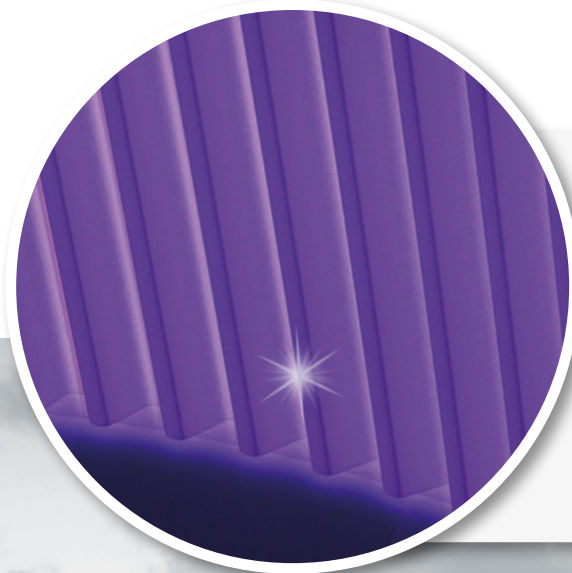
**Our service process:
the decisive advantage for more efficiency**



 Our INAURA systems are developed for the treatment of huge components. They provide a loading capacity of d3 x 10 metres and 40 tonnes. The fully automated process ensures a stable and controlled wear-protection treatment procedure. The combination of hydrogen, nitrogen and electricity means that BALITHERM® IONIT operates entirely without the use of poisonous gases and chemicals.



**BALITHERM IONIT – with respect for the environment **



BALITHERM® IONIT is an environmentally friendly treatment.

Compared to gas nitriding:

- 10-20 times less consumption of treatment gas.
- Ammonia is replaced by ordinary nitrogen, therefore no post-combustion is needed and no CO₂ and NO_x will be emitted.

