

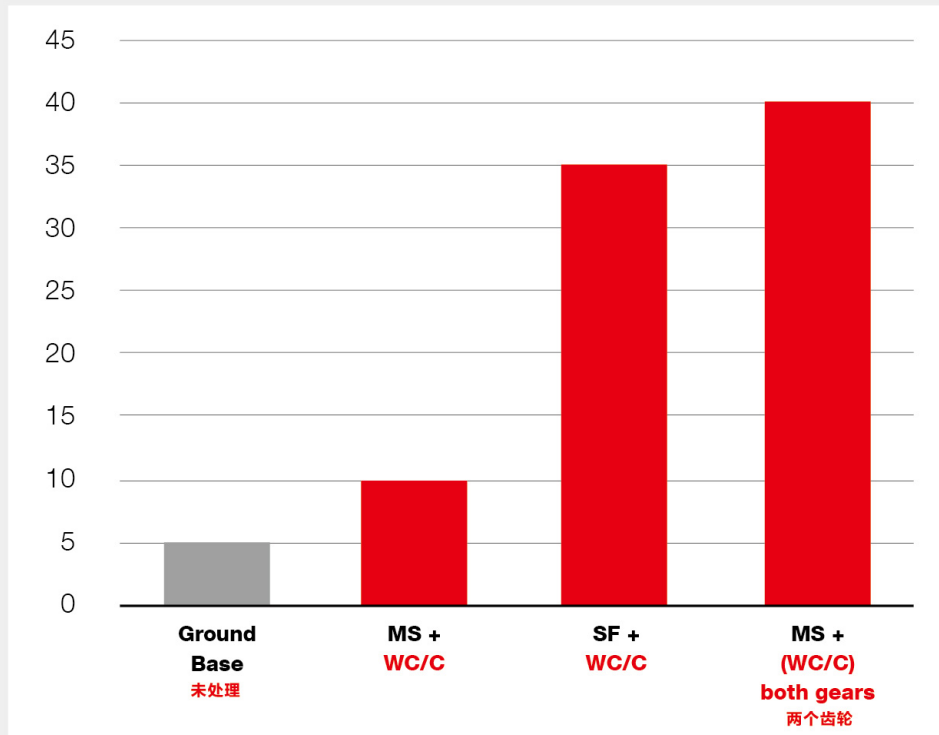
## The coating as a design element – Increased service life due to higher wear resistance 涂层从设计角度 – 提高耐磨性从而延长使用寿命

BALINIT® hard coatings are frequently only employed after completion of product development when it is discovered that there is too much wear (acute problem solving). However, the coating itself is more and more playing a role as a design element during development to achieve improved performance. A recent example of this is the use of the BALINIT® C coating in combination with special pre-treatments designed to increase the load capacity of gears.

BALINIT® 硬质涂层经常是在产品研发完成后被发现存在不可避免的严重磨损（急需解决方案）才被大家所想到。但是，涂层本身在研发设计阶段为了达到更好的性能扮演着重要的角色。近期的一个例子就是将BALINIT® C涂层与预处理结合在一起以达到提高齿轮负载能力的目的。

### Cycles x10<sup>8</sup> to pitting failure

周期x10<sup>8</sup>至点蚀失效

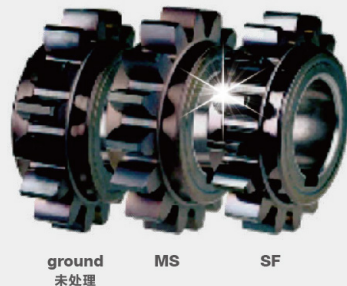


**800% increased pitting life**  
延长点蚀疲劳寿命

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

BALINIT® C (WC/C)涂层、微喷砂以及超精研磨都可以提高点蚀疲劳寿命。在一个齿轮上将BALINIT® C与超精加工结合在一起或是将两个齿轮进行微喷砂加BALINIT® C涂层处理可以最大化延长使用寿命。

**MS** Microblasting 微喷砂  
**SF** Super Finish 超精研磨  
**WC/C** **BALINIT® C coating**  
**BALINIT® C涂层**



**oerlikon**  
balzers

# Resist 防护

With innovative PVD coating solutions for high-performance precision components  
高性能精密零部件的创新PVD涂层解决方案



### Benefit from high-performance BALINIT coatings Contact us now!

受益于BALINIT涂层的超高性能  
即刻与我们联系!

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HQ205EN (1608)

General Engineering





## Oerlikon Balzers' BALINIT coatings boost performance

### 欧瑞康巴尔查斯BALINIT涂层提升性能

Mechanical engineering components frequently operate under extreme conditions: high loads, high sliding speeds or poor lubricating conditions can lead to wear or excessive friction and thus reduced lifetime and/or efficiency.

机械工程零部件经常需要在极端的环境下运作：高负荷、高速滑动或者润滑条件差都可能导致磨损或过度摩擦，从而减少使用寿命和降低效率。相信硬质涂层全球技

Trust BALINIT® wear protective coatings from Oerlikon Balzers - a global technology leader in hard coatings. BALINIT® coatings provide a wide range of matchless advantages that push components to peak performance and unmatched reliability.

术领导者- 欧瑞康巴尔查斯的BALINIT®耐磨涂层。BALINIT®涂层具有诸多优势，可以实现零部件的最佳性能和卓越的可靠性。



## Equipment for low-friction and wear resistant coatings with Oerlikon Balzers' RS50 coating system

### 欧瑞康巴尔查斯RS50涂层设备打造低摩擦、耐磨损涂层



## BALINIT COATINGS

### BALINIT 涂层

GOOD TO KNOW! 好消息!

From planning, through installation and applications-specific training to your own production, you profit from the decades of our coating equipment experience.

从前期规划、整体安装应用还有针对性的专业培训，您可以受益于我们在涂层设备上数十年的丰富经验。

## Highest level wear protection

### 最高等级磨损保护



#### BALINIT® for tribosystem BALINIT®摩擦学系统分析

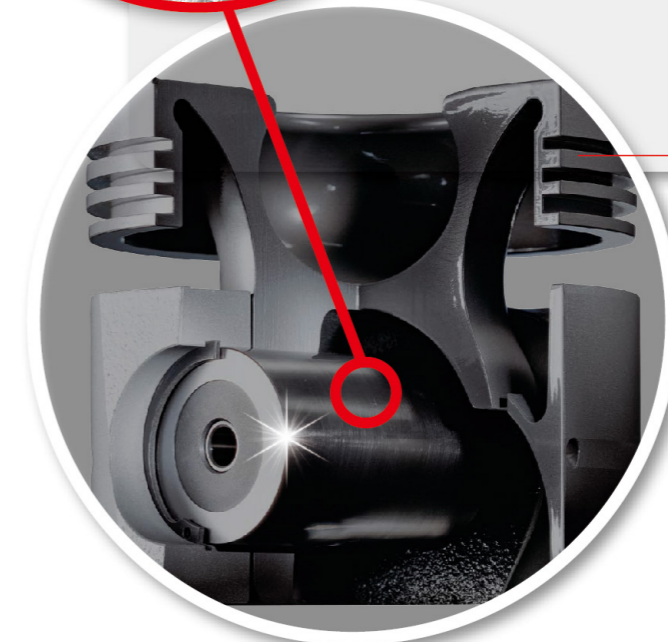
**Environment:** Lubricant, temperature, atmosphere  
**环境:** 润滑, 温度, 大气氛围

**Coating:** PVD and DLC coatings  
**涂层:** PVD和DLC涂层

**Surface:** Surface preparation  
**表面:** 表面预处理

**Substrate:** Material advice  
**基质:** 材料建议

**Counterpart:**  
**Surface recommendation**  
**对应面:** 表面建议



To find a proper solution, our Oerlikon Balzers surface engineers are starting with an analysis of the whole tribosystem: the parts and their materials, hardnesses and surface finish, the environment and wear mechanism.

The analysis results enable Balzers surface engineers to select the appropriate coatings. Experienced job coating centers apply well proven, standardized procedures which are moreover ISO, and in many cases also QS 9000 or NADCAP certified. Sophisticated after-test analyses complete the solution.

为了找到合适的解决方案，我们欧瑞康巴尔查斯表面工程师正在进行一项整体摩擦学系统分析：零部件和材料、硬度和表面光洁度、环境和磨损机理。

巴尔查斯表面工程师会根据分析结果做出恰当的涂层选择。经验丰富的涂层中心提供标准化的生产流程，我们不仅拥有ISO认证，很多涂层中心符合QS 9000或NADCAP认证。同时提供全面的测试后分析。



#### Oerlikon Surface Solutions

##### 欧瑞康表面处理

Oerlikon Balzers not only offers PVD- and DLC thin coatings, but also special nitriding solutions. Oerlikon Balzers has e.g. the world's largest plasma nitriding equipment for parts up to 40 t weight, 10 m in length and 3 m in diameter.

欧瑞康巴尔查斯不仅提供PVD和DLC薄膜涂层，同时也可以提供专门的渗氮解决方案。欧瑞康巴尔查斯拥有全世界最大的等离子渗氮设备，该设备可以容纳长为10米，直径3米的工具，最大承重量可高达40吨。

### oerlikon balzers

Oerlikon Metco, also part of the Oerlikon Surface Solutions segment, is also a leading supplier of thermal spray materials, equipment and job coating service for thick abrasion and erosion resistant coatings such as WC-Cobalt or oxides e.g. for turbine blades.

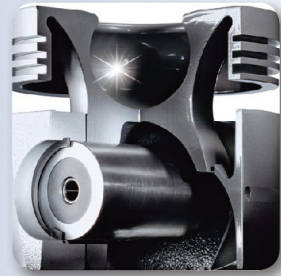
欧瑞康美科，也是欧瑞康表面处理事业板块的一部分。是热喷涂材料、设备以及耐磨损抗腐蚀厚膜涂层如WC-钴或涡轮叶片氧化物等的全球领先供应商。

### oerlikon metco



## Main applications of wear-resistant and low-friction BALINIT coatings

耐磨损、低摩擦BALINIT涂层的主要应用



**Engines**  
发动机



**Motorcycles**  
摩托车



**Racing**  
赛车



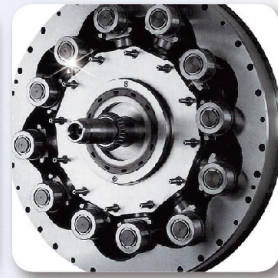
**Gears**  
齿轮



**Roller bearings**  
滚动轴承



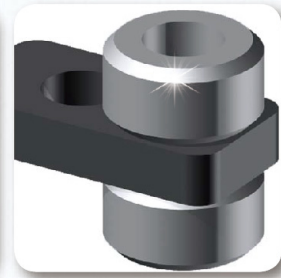
**Food processing**  
食品加工



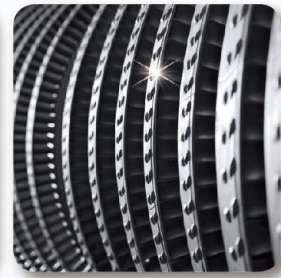
**Hydraulics**  
液压设备



**Compressors**  
压缩机



**Sub sea valves**  
海底阀



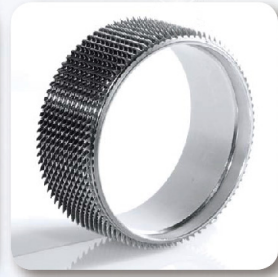
**Water- and steam-turbines**  
水轮机和汽轮机



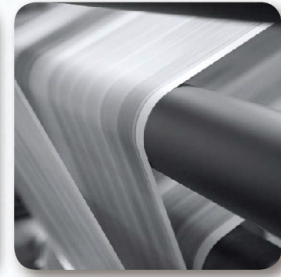
**Machine tools**  
机械工具



**Linear guides and ball screw drives**  
直线导轨和滚珠丝杠传动



**Textile spinning and weaving**  
纺织



**Printing**  
印刷



**Packaging**  
包装

## Further applications

更多应用



**Leisure and domestic appliances**  
家用电器



**Ceramic discs for faucets**  
水龙头陶瓷片



**Medical instruments**  
医疗器具



**Medical devices**  
医疗器械

## More decorative coatings & heat treatment by Oerlikon Balzers

更多装饰性涂层&欧瑞康巴尔查斯热处理

### BALTONE

As well as hard and wear resistant coatings, Oerlikon Balzers also offers decorative BALTONE™ coatings in a broad range of colours which are applied using specialized coating machines for very economic decorative treatment.

除了硬质耐磨涂层，欧瑞康巴尔查斯同样也提供色域广阔的BALTONE™装饰性涂层。该涂层适用于在专门的涂层设备上进行经济性的装饰化处理。



### BALITHERM IONIT

The low temperature heat treatment process creates a wear resistant and durable surface on large components. No harmful chemicals or gases are used in the IONIT process. This means that IONIT is the environmentally-friendly and efficient alternative to conventional nitriding methods.

低温热处理工艺可以在大型零部件上实现持久耐磨的表面。整个IONIT工艺过程不使用任何有害化学物质或气体。该工艺环保且高效，相对于传统的渗氮工艺这无疑是一个更好的选择。





## Coating properties at a glance

### 涂层性能一览表

	Coating material 涂层材料	Process technology 工艺	Coating hardness $H_{IT}$ (GPa) 涂层硬度	Typical coating thicknesses ( $\mu\text{m}$ ) 标准涂层厚度	Friction against steel, dry running 对钢的摩擦系数 (干式运行)	Coating temperature ( $^{\circ}\text{C}$ ) 涂层温度	Max. service temperature ( $^{\circ}\text{C}$ ) 最高适用温度	Max. treatable dimensions [mm] D x L 最大处理尺寸
<b>BALINIT® C</b>	WC/C	Sputter	8 - 12 / 12 - 15	1 - 4	0.1 - 0.2	< 250	300	250 x 1,000
<b>BALINIT® DLC</b>	a-C:H	PACVD	~15 - 25	1 - 3	0.1 - 0.3	< 250	300	250 x 1,000
<b>BALINIT® DLC STAR</b>	CrN/a-C:H	PACVD	~15 - 25	2 - 5	0.1 - 0.2	< 250	300	250 x 1,000
<b>BALINIT® CAVIDUR</b>	a-C:H	PACVD	~25 - 35	2 - 4	0.1 - 0.2	< 250 - 350	350	320 x 665
<b>BALINIT® CNI</b>	CrN	Sputter	18 +/- 3	1 - 20	0.5	< 250	700	250 x 1000
<b>BALINIT® CROMA PLUS</b>	CrN	Arc	25 +/- 3	4 - 10	0.3 - 0.5	250 / 400	700	700 x 1,450 600 x 4,500 1,200 x 1,200
<b>BALINIT® A</b>	TiN	Arc	30 +/- 3	1 - 4	0.4	250 / 400	600	700 x 1,450
<b>BALINIT® ALCRONA PRO</b>	AlCrN	Arc	36 +/- 3	2 - 6	0.35	< 500	1000	700 x 1,450
<b>BALINIT® DYLYN</b>	a-C:H:Si	PACVD	~20 - 25	1 - 3	0.1 - 0.2	180 - 220	300	330 x 900
<b>BALINIT® DYLYN PLUS</b>	a-C:H:Si	PACVD	~17 - 23	1 - 3	0.05 - 0.1	180 - 220	350	330 x 900
<b>BALINIT® DYLYN PRO</b>	a-C:H:Si	PACVD	~15 - 20	1 - 3	0.05 - 0.1	180 - 220	350	330 x 900

All given data are approximate values, they depend on application, environment and test condition.  
以上所有数据仅供参考，取决于具体应用、环境以及测试条件。

## Coating description and recommended applications

### 涂层介绍以及应用推荐

**BALINIT® C:** The standard coating for sliding and rolling elements under poor lubricating conditions, counteracts seizure and galling (e.g. roller bearings, gears).

**BALINIT® C:** 适用于不良润滑环境下滑动和旋转运动部件的标准涂层，降低磨损（譬如滚珠轴承、齿轮）。

**BALINIT® DLC:** Harder than BALINIT® C and therefore used to withstand higher levels of abrasive wear and high sliding speeds. Standard for diesel injection, engine valve train and piston pins.

**BALINIT® DLC:** 比BALINIT® C硬度高，因此惯用于对抗更高的滑动速度和更高层次的磨料磨损。标准应用如：柴油喷射系统，发动机阀门和活塞销。

**BALINIT® DLC STAR:** Tribological performance like DLC, but enhanced with a very ductile CrN base layer for additional high loads.

**BALINIT® DLC STAR:** 摩擦学性能与DLC类似，但是韧性极好的氮化铬基层可以承载更高的负荷。

**BALINIT® CAVIDUR:** Very hard and smooth DLC coating. The standard for highly loaded racing parts such as camshafts and finger followers.

**BALINIT® CAVIDUR:** 硬度高且光滑的DLC涂层。适用于高负荷赛车件如凸轮轴和指形随动件的标准涂层。

**BALINIT® CNI:** Chromium nitride is very ductile and highly oxidation resistant and is therefore used in high temperature applications requiring high wear resistance (e.g. piston rings, exhaust valves).

**BALINIT® CNI:** 氮化铬延展性极好且高度抗氧化，因此常用于对耐磨性要求极高的高温环境应用上(譬如活塞环、排气阀)。

**BALINIT® CROMA PLUS:** Similar to CNI with higher hardness and a special top layer for reduced friction.

**BALINIT® CROMA PLUS:** 与CNI类似，但硬度更高，并拥有低摩擦系数的特殊顶层。

**BALINIT® A:** The historical first coating for tools and components, impressive golden color. Used therefore in long-lasting specification industries such as aerospace or for colouring and designation purposes.

**BALINIT® A:** 最早使用于工具和零部件上的涂层，令人醒目的金色。因此常用于航空航天等对零部件要求持久耐用的领域或用于装饰性和指示等用途。

**BALINIT® ALCRONA PRO:** Extremely oxidation resistant and therefore used in high temperature and abrasive environments (e.g. for turbocharger parts or exhaust valves).

**BALINIT® ALCRONA PRO:** 极度抗氧化，因此常用于高温和高磨损环境下（譬如涡轮增压器部件或排气阀）。

**BALINIT® DYLYN:** Silicon-enriched DLC coatings for lower friction, higher corrosion resistance and good release properties (e.g. plastic moulds).

**BALINIT® DYLYN:** 低摩擦、高度耐腐蚀以及易脱模的富硅DLC涂层（譬如应用于塑料模具领域）。

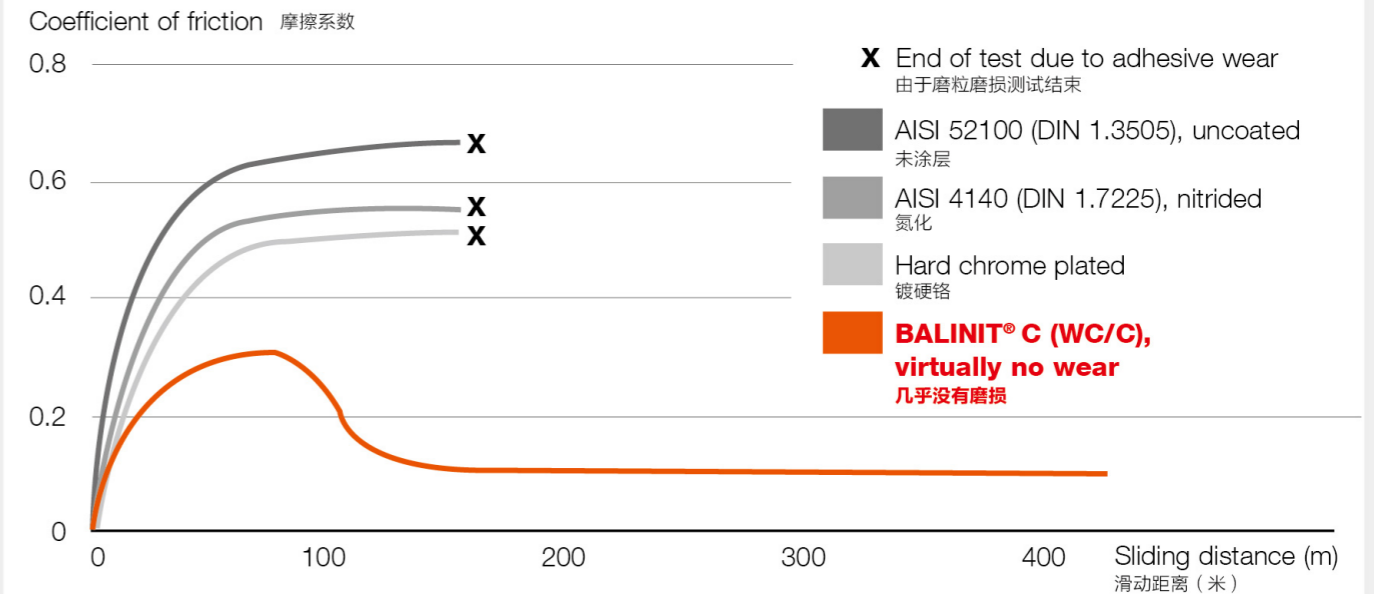
## Harness the main advantages of carbon-based coatings: low friction and low sliding wear

### 碳基涂层的主要优势：低摩擦和低滑动磨损

### 碳基涂层的主要优势：低摩擦和低滑动磨损

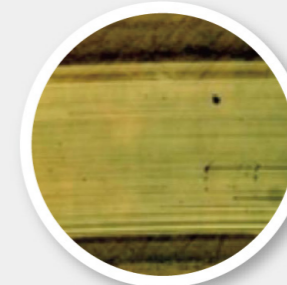
#### Pin-on-disc test to compare friction and wear of materials

销盘测试：对比材料磨损以及摩擦



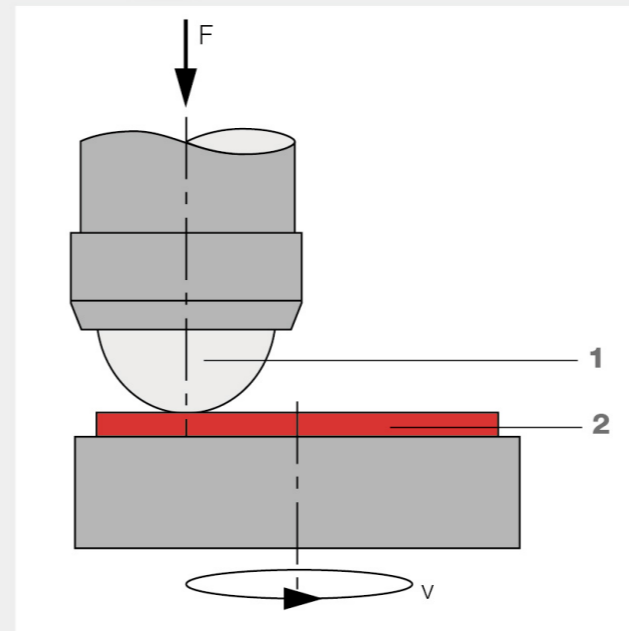
Wear track (30x) of nitrided ring, exhibits heavy galling after 150 m sliding distance

渗氮环磨损痕迹 (30x): 150米滑动距离后呈现出严重磨损



Wear track (30x) of BALINIT® C coated ring exhibits only slight running in (wear depth approx 0.2  $\mu\text{m}$ ) after 2000 m sliding distance

BALINIT® C涂层环磨损痕迹 (30x): 2000米滑动距离后呈现轻微磨损 (磨损深度约0.2  $\mu\text{m}$ )



#### Experimental method

测试方法

1. Ball, non-rotating 球体, 非旋转  
diameter 3mm 直径 3mm  
AISI 52100, DIN 1.3505 100Cr6  
60 HRC
2. Test ring 测试环  
AISI 52100, DIN 1.3505 100Cr6  
60 HRC  
Abrasive-blasted 喷砂处理或抛光  
or polished 涂层  
Coated

#### Test conditions

测试条件

F = 30 N  
v = 0.3 m/s  
Dry contact 干式