

Coatings for advanced dental technology

High precision is required for producing dental prostheses. The coating experts at Balzers, a surface technology brand of the Switzerland-based Oerlikon Group, not only develop coatings for microtools that allow productive machining of highly abrasive materials in dental technology. Precision components, such as abutments, also obtain high-quality wear protection – with aesthetics included.

The machining of high-performance materials for dental technology poses a big challenge for the tool industry. Machining, in which microtools with a diameter of 0.1 to 1 millimetre machine materials with tightest manufacturing tolerances, is exceptionally demanding. Today, dental laboratories are equipped with highly productive, automated production systems. The arising tool wear and associated production costs can be significantly reduced by applying advanced coatings.

BALDIA COMPACT and BALDIA COMPACT DC for high-strength dental ceramics

The diamond coatings BALDIA COMPACT and BALDIA COMPACT DC have been developed especially for the machining of compacted and sintered powder materials as well as dental ceramics. The latter achieves even tightest tolerances, both in terms of tool diameter and coating thickness, in order to ensure the highest production accuracies while maintaining a constant tool lifetime. When it comes to microtools in particular, these properties are crucial when machining these highly abrasive materials. For the reliable machining of high-performance dental ceramics, such as zirconium oxide, BALDIA COMPACT withstands abrasive wear thanks to its extremely high hardness, which considerably extends the service life of these tools. The combination of higher wear resistance and low friction reduces heat input, thus enabling dental laboratories to achieve high surface quality even at higher cutting speeds. The end result is that the surface finish of high-quality dental ceramics is improved appreciably, so that patients benefit from optimum dental care.



(Image: Shutterstock)

High-performance dental ceramics such as zirconium oxide place tough requirements on the microtool. These materials can be machined reliably and productively with the diamond coatings BALDIA COMPACT and BALDIA COMPACT DC, which have been specially developed for highly abrasive materials.

BALINIT TISAFLEX: optimum machining quality for dental prostheses made from titanium, noble metals and non-ferrous alloys

In addition to ceramics, also titanium, noble metals and alloys from non-ferrous metals, such as chromium, cobalt and molybdenum, are used in dental technology. As these materials are difficult to machine, they also quickly take the microtools of dental laboratories to the limits of their performance capability. These materials tend to form built-up edges, which promote adhesive wear, thus requiring premature tool replacement. The BALINIT TISAFLEX coating developed by Oerlikon offers exceptional wear protection for this application. This high-end coating also boasts outstanding thermal stability and oxidation resistance. The multi-layer structure counteracts the wear mechanisms and enables a longer service life, which has been proven in tests both in the company's own laboratory and by manufacturers.

Dental laboratories have to provide short lead times, which demands meticulous production planning. Today, they use highly efficient and automated production systems to reduce time and costs and to optimize the production process for high-end dental prostheses. This coating is particularly suitable for machining cobalt-chromium alloy, which is frequently used in dental technology, as it protects the substrate from high temperatures and against adhesive wear.



(Image: Mack Dentaltechnik GmbH)

Non-ferrous alloys are difficult to machine and quickly take the microtools of dental labs to the limits of their performance capability. Specifically developed coatings from Oerlikon offer exceptional wear protection, outstanding thermal stability and oxidation resistance to significantly improve the service life of microtools in dental technology.

Advanced coatings for abutments in gingival rosé

Oerlikon offers its customers in dental technology not only coatings for microtools for machining materials. For almost thirty years, the experts at Balzers have been collaborating with clinics and laboratories on coating the surfaces of surgical and dental instruments to provide wear-resistance and antimicrobial properties. The PVD coatings of its BALIMED series, especially developed for medical and dental applications, meet the most stringent requirements and offer significant benefits for patients' well-being.

Functionalising surfaces with biocompatible, wear-resistant coatings has become an indispensable part of modern dental technology. Treatment with implants is also subject to strict quality requirements and

biocompatibility regulations. BALIMED TICANA is an innovative coating from Oerlikon, which even exceeds these strict requirements. It is applied to abutments, the intermediate piece between the artificial root and the crown of a tooth. It has the same colour as human gums and is therefore discreet and aesthetic. Abutments are usually made from titanium, aluminium oxide ceramic or zirconium oxide ceramic.

BALIMED TICANA excels not only in terms of aesthetics, but also due to numerous functional properties that have been thoroughly tested. For example, its corrosion-resistance protects against the influence of oral hygiene products and saliva. In tests, BALIMED TICANA was submerged in a 25% sodium chloride (NaCl) solution, with its colour being completely retained even after over one month. Minimal abrasion and low wear allow for the implant to be fixed with stability, thus ensuring a long service life.



(Image: Oerlikon Balzers)

Aesthetics and function combined: specially developed for dental abutments and instruments, the rosé-coloured BALIMED TICANA PVD coating offers not only an aesthetic appearance, but also functional properties.

Experience and knowledge in the development of application-specific solutions for medical technology are based on many years of cooperation with medical experts, universities and university clinics.

Oerlikon Balzers' PVD coating solutions can improve patient treatment outcomes and generate economic added value for healthcare products. Thanks to standardised processes, these solutions can be offered worldwide.

As a leading global provider of surface technologies, for over 75 years the technology brand Oerlikon Balzers has developed coating solutions and systems, provided expert consultation for its customers and coats millions of tools and components every year. With over 110 customer centres in 35 countries across Europe, North and South America and Asia, Oerlikon is closer to its customers than any other coating provider and has more than 1,300 thin-film coating systems in use.

For further information please contact:

Petra Ammann
Head of Communications, Oerlikon Balzers
T +423 388 7500
petra.ammann@oerlikon.com
www.oerlikon.com/balzers

About Oerlikon

Oerlikon (SIX: OERL) is a global innovation powerhouse for surface engineering, polymer processing and additive manufacturing. The Group's solutions and comprehensive services, together with its advanced materials, improve and maximise the performance, functionality, design and sustainability of its customers' products and manufacturing processes in key industries. Having developed pioneering technology for decades, everything Oerlikon does is guided by its passion to help its customers achieve their goals and to foster a sustainable world. The Group is headquartered in Pfäffikon, Switzerland, and operates its business in two divisions: Surface Solutions and Polymer Processing Solutions. It has a global footprint of more than 11 800 employees at 207 locations in 38 countries. In 2021, Oerlikon generated CHF 2.6 billion in sales and invested CHF 105 million in R&D.

About the Balzers technology brand

Oerlikon Balzers is worldwide recognised for its leading surface technologies that significantly improve the performance and durability of precision components as well as tools for the metal and plastics processing industries. Extremely thin and exceptionally hard coatings, marketed under the BALINIT and BALIQ product names, reduce friction and wear. BALITHERM opens up a broad range of heat treatment services, whereas BALTONE comprises coatings that are available in a full range of elegant colours, perfectly suited for decorative applications. BALIMED ThinFilm coatings, with wear-resistant, biocompatible, antimicrobial and chemically inert properties, have been developed especially for medical applications. Under the BALIFOR product family, Oerlikon Balzers has introduced technologies which provide tailor-made solutions for the automotive market, while ePD allows the metallisation of plastic parts with a chrome look.

Worldwide, more than 1'300 thin-film coating systems are in operation at Oerlikon facilities and its customers. Equipment engineering and assembly of Oerlikon Balzers coating systems are processed in Liechtenstein, in Langenthal (Switzerland) and in Bergisch Gladbach (Germany). Oerlikon operates a dynamically growing network of more than 110 thin-film coating centres in 35 countries in Europe, the Americas and Asia. Oerlikon Balzers is – together with Oerlikon Metco and Oerlikon AM – part of the Surface Solutions Division of the Switzerland-based Oerlikon Group (SIX: OERL).