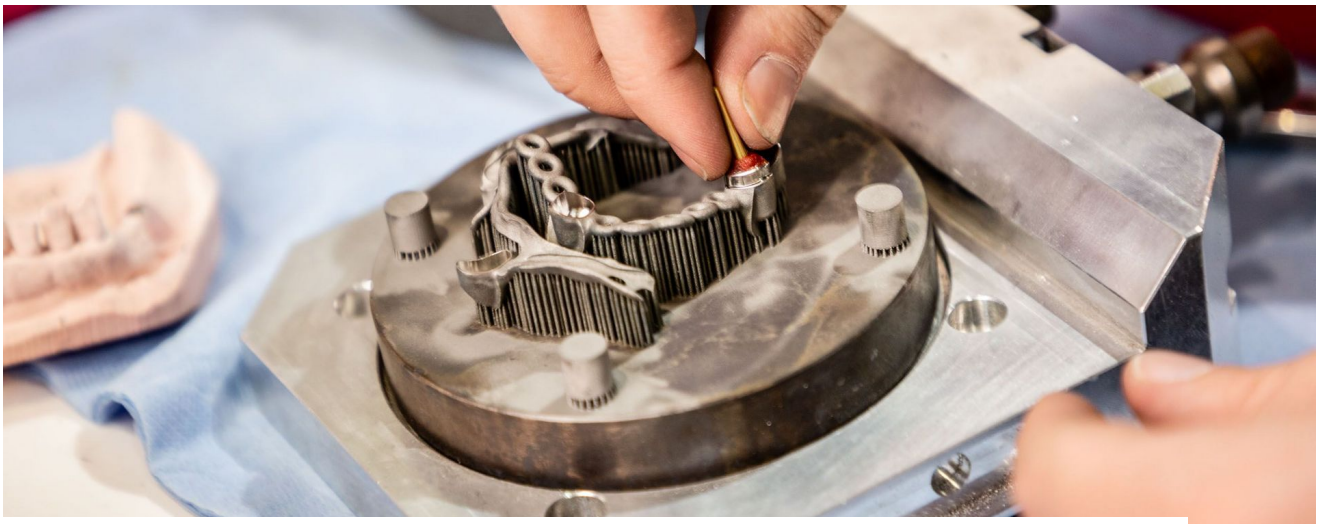


RAMONA HÖNL

Smart solution for precision-fit dental crowns

Fabricating precision-fit telescopic crowns is a challenging task for even the most experienced dental technician. The dental specialists at German company Teamziereis have developed a process for manufacturing these complex dental prostheses with maximum precision. The secret to their success lies in an all-digital workflow plus a smart combination of milling and 3D printing.

Bright and beautiful teeth are an attractive asset. But not everyone is lucky enough to be blessed with a perfect set of teeth – and even the healthiest teeth don't last forever. Fortunately, advances in dentistry provide all sorts of ways to keep your teeth in good shape. And dental prostheses offer the perfect solution when teeth are lost.

All-digital dental technology

Ralph Ziereis is the managing director of the company Teamziereis GmbH based in Engelsbrand in south-west Germany. True to his belief that modern dentistry should embrace cutting-edge processes and technologies, he took a bold step in 2008 by radically reorganizing his company to use exclusively digital products and services: "It was already becoming clear that skilled workers were getting harder and harder to find. We realized that the only way to guarantee successful patient care in the future was by harnessing digital workflows. It was a rocky path to get to where we are today, but the fact that we now make some 90 percent of our turnover from digital products and services shows we made the right decision."



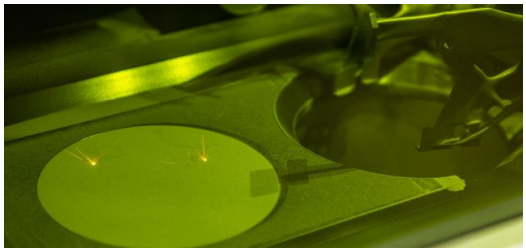
Niclas Ziereis (right) joined his father's company two years ago as a senior manager and head of sales. To meet the challenges that lie ahead, they are expanding their production facilities, increasing the size of their customer support team and investing in additional 3D printers. (Picture: Steffen Müller-Klenk)



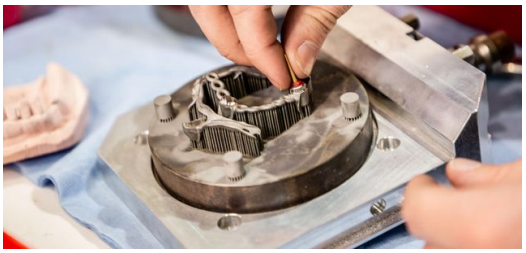
Switching to all-digital processes for dental technology has put Ralph Ziereis firmly on the road to success. His customers can choose between individual machines or turnkey fabrication processes. (Picture: Steffen Müller-Klenk)



Ralph Ziereis spotted the potential of 3D printing and believes this technology marks a permanent change to manufacturing processes in the dental industry. (Picture: Steffen Müller-Klenk)



The pulsed laser in TRUMPF's TruPrint 1000 is an excellent choice for creating high-quality surfaces. Its multi-laser capabilities enable highly productive manufacturing processes. (Picture: Steffen Müller-Klenk)



The telescopic crown is built up layer by layer from the powder bed. After this step, the crowns match the geometry of the primary coping almost perfectly, apart from a minimal amount that has to be milled off the inner surfaces. (Picture: Steffen Müller-Klenk)



The primary coping (bottom) is cemented to the existing, prepped tooth stumps. The secondary crown, or female part, is connected to splints for the replacement teeth and placed on the primary coping. (Picture: Steffen Müller-Klenk)

Demand for smart solutions

Teamziereis takes a traditional approach to selling its products and services to large laboratories, independent dental technicians and dentists. It offers a wide range of equipment including oral scanners, lab scanners, milling machines and 3D printers, all sourced from brand manufacturers such as the high-tech company TRUMPF. Unlike its competitors, however, Teamziereis also offers dental labs the chance to purchase end-to-end digital manufacturing set-ups. By providing the right combination of machines, interfaces and process expertise, Teamziereis helps customers find the simplest way to manufacture their own top-quality, complex dental prostheses on site – all within just one week of getting the machines up and running. Teamziereis also has a team of service technicians who provide ongoing remote support via Teamviewer. For smaller labs that are not ready to make such a major investment, Teamziereis offers an in-house dental prosthesis manufacturing service.

» There's so much amazing craftsmanship in dental technology. But if we want to be sure of being able to provide patients with the care they need in the future, we need to embrace digital processes and new

technologies such as 3D printing.

Ralph Ziereis, Executive Manager, Teamziereis

3D printing transforms manufacturing

To develop its innovative fabrication process for telescopic crowns, Teamziereis spent nine months working with five partners, one of whom was TRUMPF: "We tried out laser melting for the first time back in 2018, but we weren't happy with the surface quality of the printed parts," says Ziereis. "Nonetheless, we saw that the technology had lots of potential, so we were excited when TRUMPF presented their TruPrint 1000 with its pulsed laser technology – and even more excited when we became the first customer in the world to try it out! I'm totally convinced by this new technology's merits. There's no doubt in my mind that additive methods will revolutionize manufacturing in the dental industry."

The toughest challenge in dental technology

Dentists make a clear distinction between fixed and removable dental prostheses. Telescopic crowns fall in the latter category, and the level of precision required to fabricate them is one of the toughest tasks faced by dental technicians. The telescope consists of primary copings, also known as male parts, that are cemented to prepped tooth stumps in the patient's mouth. The secondary crown, or female part, is then connected to the removable prosthesis and placed on the primary coping. "Patients need the confidence to be able to eat and talk normally, so dental prostheses shouldn't be too loose," says Ziereis. "But of course they mustn't be too tight, either, because it's important that they can be easily removed for cleaning. The surfaces of the primary and secondary crowns are designed to create exactly the right amount of friction to join them firmly together, but that only works if you have extremely tight tolerances."

Modeling and casting the crowns is the traditional analog approach, but this is both costly and time-consuming. It also requires outstanding craftsmanship – not something that is easy to find when skilled workers are in such short supply. "Even the most experienced dental technician won't necessarily get the level of precision you need," says Ziereis, noting that the new method developed by Teamziereis makes all these problems a thing of the past.

Perfect combination of subtractive and additive manufacturing

Instead of the traditional method of taking a dental impression using impression material placed inside the mouth, today's dentists can use intraoral scanners to capture a digital scan of all the tissues. Based on this scan, the dental technician designs a crown on the screen and creates a CAD data set. Telescopic crowns can then be printed on the TRUMPF TruPrint 1000. Thanks to its multi-laser capabilities, the system can manufacture several objects on a single build platform in a relatively short space of time while achieving extremely high levels of accuracy. The final steps to make the crowns the perfect size are then carried out on the milling machine. "That's why it's so important to synchronize the TruPrint 1000's build platform with the milling machine's component fixture," says Ziereis. "By aligning the two machines, you can import reference points to the milling machine's build platform using a coordinate measuring system." The cutter head can then use these coordinates to remove excess material from the inner surfaces of the female parts to ensure the primary and secondary crowns slide together and make a perfect fit. "That leaves no space for anything between them apart from saliva, which helps keep the telescopic crowns firmly in place," says Ziereis.

Optimal solutions thanks to dental expertise and machine know-how

With all-round dental expertise from Teamziereis – plus in-depth knowledge of the right machines and interfaces from its

partners – customers can be confident they will be able to fabricate telescopic crowns at a consistent standard of precision and quality. "This joint project between Teamziereis and TRUMPF has been hugely productive and very enjoyable," says Ralph Ziereis, keen to emphasize that this is just the start of a close partnership between the two companies. Work is now underway to expand his production facilities, acquire additional 3D printers and hire additional service technicians to prepare for future developments in the dentistry market. "We're already seeing major new developments in other dental applications. So far we've only used subtractive manufacturing methods in those areas, but we will gradually shift toward additive manufacturing over the weeks and months ahead."



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SPOKESPERSON FOR MACHINE TOOLS