

CONTOURING, FINISHING AND POLISHING IS MORE THAN JUST "THE ICING ON THE CAKE"

Abrasives: The Surface Quality of Ceramic Dental Restorations Is Best Improved Using a Systematic Approach

Dr Markus Th. Firla

The final, intraoral use of abrasives to anatomically and functionally improve the surface quality of all-ceramic dental workpieces is not easy for dentists, especially in the case of CAD/CAM restorations milled from "industrially prefabricated" zirconia or lithium disilicate blocks. Efficient extraoral finishing of such restorations in dental laboratories should not be underestimated either.

The objective of both steps is to give ceramic restorations occlusal surfaces which are as smooth as possible, in harmony with natural occlusion, and anatomically and functionally correct.

Today, experts agree that all-ceramic CAD/CAM restorations, particularly single and partial crowns, veneers, and bridges, are best finished with diamond rotary instruments, even though – depending on the CAM system used – laboratories frequently rely on carbide instruments in the basic fabrication process. In contrast to the milling of all-ceramic dental workpieces from prefabricated blocks, the subsequent finishing procedures performed



Fig. 1: The ZILMaster Adjustment Kit CA, designed for use in dental practices: The Dura-Green DIA diamond stones, the diamond-impregnated ZILMaster silicone polishers, and the metal shanks can easily be disinfected (with wipes) and sterilised.

Photo: Shofu Dental GmbH



Fig. 2: A maxillary molar (tooth 26) had to be restored with a monolithic all-zirconia crown.

in laboratories and, mostly intraorally, in dental practices are designed to reduce material in the submillimetre or micrometre range. For this minimal treatment, diamond finishers and polishers are the tools of choice; they remove material gently, but efficiently, because instruments coated or impregnated with coarse, medium or fine diamond particles ensure uniform material reduction with continuous and accurate control.

Diamonds are the only instrument type allowing users to achieve surface roughness values comparable to those of glaze-fired ceramics, from the contouring step, which creates the final shape of the workpiece, to the finishing step, which determines the surface texture, and the pre-polishing and high-gloss polishing steps, which complete the process.

In addition, the use of diamond rotary instruments to contour, finish and polish dental ceramics substantially reduces the risk of causing microscopic or macroscopic cracking, or even chipping.

The smoothness of a ceramic surface is not only crucial to its gloss, and therefore to the aesthetic result; it also has a second effect, which is equally important. The smoother the ceramic surface, the less likely the occurrence of negative mechanical influences



Fig. 3: Since the tooth structure defects were relatively large and the patient wished to have all the amalgam removed before crown placement, extensive preparation was necessary.

on the ceramic material caused by the antagonist. Likewise, a smooth ceramic surface minimises the abrasive loss of natural enamel of the tooth opposing the restoration.

These phenomena need to be considered when working with all-ceramic restorations, especially if they are made of zirconia or lithium disilicate, because the desired hardness of these materials, and also their brittleness, should not be neglected.

The dental manufacturer Shofu has recently launched the ZILMaster system, comprising two kits of instruments specially designed for contouring, finishing and polishing all-ceramic



Fig. 4: The all-zirconia crown, prepared for final shade individualisation and intraoral functional improvement of the occlusal surface (contouring, finishing, polishing) with Dura-Green DIA stones and coarse, medium and fine ZILMaster silicone polishers.

Contouring, Finishing and Polishing Is More than Just "the Icing on the Cake" ... continued...



Fig. 5: The finalised all-zirconia crown (BruxZir, Glidewell Europe GmbH) was stained, glaze-fired, and then adhesively bonded using a resin cement system (ResiCem, Shofu Dental GmbH).

Photos 2 to 5: Dr Markus Firla/WeCoMed GmbH

restorations made of zirconia or lithium disilicate. The kits are coded CA (contra-angle) for intraoral use by dentists and HP (handpiece) for extraoral use by dental technicians. For both kits, selected shapes of Shofu's comprehensive and time-tested range of *Dura-Green DIA* diamond stones have been combined with various shapes of newly designed diamond-impregnated silicone polishers.

The different – directly and specifically matched – diamond grits of the *Dura-Green DIA* instruments and the coarse, medium and fine *ZiLMaster* polishers excellently complement each other in the contouring, finishing and high-gloss polishing procedures, ensuring a very quick and easy workflow.



Author

Dr Markus Th. Firla
Hauptstrasse 55, D-49205
Hasbergen-Gaste, Germany
E-Mail: Dr.Firla@t-online.de

References

1. Dierkes, S. et al.: Einfluss der Oberflächenaktivierung auf den Haftverbund von Verblendkeramik auf Zirkonoxid. *Quintessenz Zahntechnik* 2014; 40 (8): 966-978.
2. Janyavula, S. et al.: The wear of polished and glazed zirconia against enamel. *J Prosthet Dent* 2013; 109 (1): 22-29.
3. Kimmel, K.: Rauhtiefen – ein unterschätztes Qualitätskriterium. *Zahnärztl Mitt* 1998; 88 (14): 1796-1798.
4. Komet / Gebr. Brasseler GmbH: Rotierende Werkzeuge in der Zahntechnik. – Fachvorträge zum Thema. Jahrestagung der Arbeitsgemeinschaft der Lehrer an Zahntechnik-Fachklassen. 21.-23. Mai 1992, Lemgo.
5. Lang, Ch.: Spezifische Oberflächenbearbeitung keramischer Restaurationen. *Quintessenz Zahntechnik* 2014; 40 (10): 1268-1279.
6. Miller, M. B., Castellanos I. R.: Reality – The information source for esthetic dentistry. Volume 22. Reality Publishing Co., Houston, USA, 2012.
7. Preis, V.: Pin-on-Block Verschleißverhalten von Dentalkeramiken. 25. DGZMK/BZÄK/DENTSPLY Förderpreis. Frankfurt, 2011
8. Pröbster, L., Kern, M.: ZrO₂-Monolithen – ein Faszinosum? Der Trend zu vollanatomischen Oxidkeramik-Kronen. *DZZ* 2012; 67 (12): 777-782.
9. Shofu Dental GmbH: Abrasives – Schleifkörper, Polierer und Poliersysteme. Ratingen, Deutschland, 2010.
10. Shofu Inc.: ZiLMaster Product Information. PowerPoint Präsentation. Kyoto, Japan, 2015.
11. Wehnert, L. et al.: Einfluss von mechanischen Oberflächenbearbeitungsverfahren auf den Verbund von Y-TZP zu vier Verblendkeramiken. *Quintessenz Zahntechnik* 2011; 37 (3): 342-356.

Figs. 6-9: Systematic improvement of an all-ceramic, lithium disilicate restoration surface in a dental laboratory, shown step by step. Thanks to gentle and efficient contouring, pre-polishing and high-gloss polishing with the *ZiLMaster* kit, final glaze-firing of the workpiece was not necessary.

Photos 6 to 9: Dental-Labor Kock, Wallenhorst

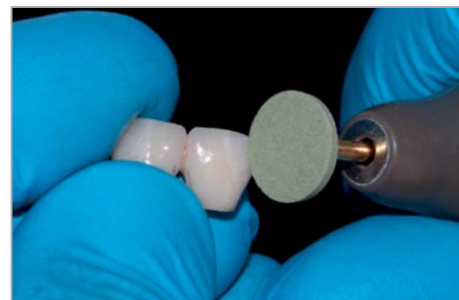


Fig. 6

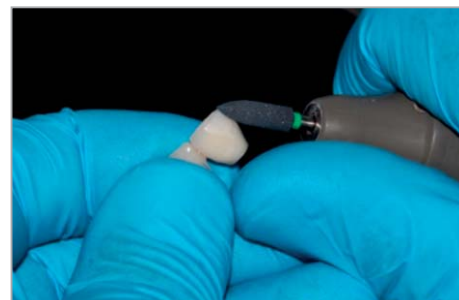


Fig. 7

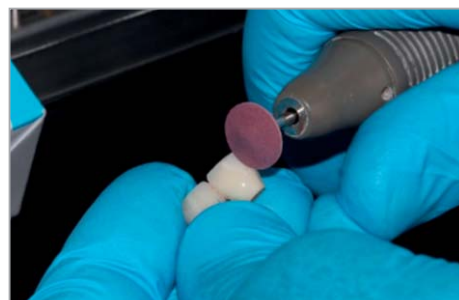


Fig. 8



Fig. 9

KEEP IN TOUCH WITH DTA ON FACEBOOK & TWITTER



On Facebook:

● @DentalTechnologists Association



On Twitter:

● @The DTA



The Technologist

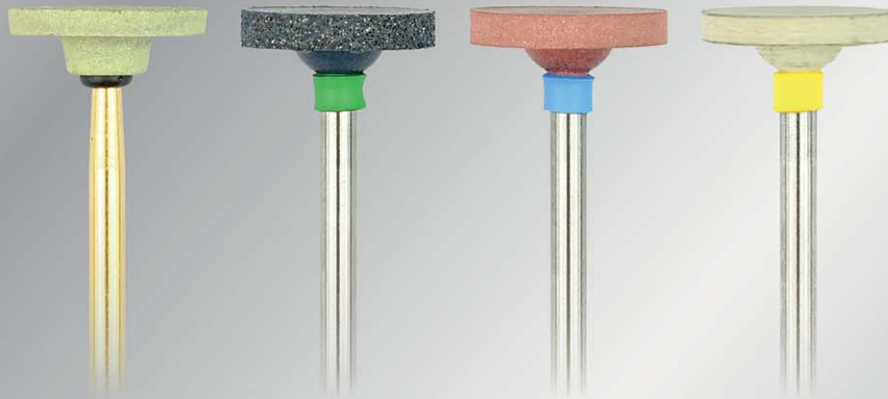
● To access the next issue: [click here](#)

IN NEXT MONTH'S THE TECHNOLOGIST ...

- Leadership
- Consent for Dentures
- Delroy Reeves

ZiLMaster

Adjustment Kits



Time-efficient adjusting, finishing and polishing kits
for zirconia and lithium disilicate



CA kit for intra-oral use



HP kit for extra-oral use

Shapes available separately.



www.shofu.co.uk