Strumenti rotanti per la protesi digitale: preparazione, finitura e lucidatura

Bologna 25/01/2019

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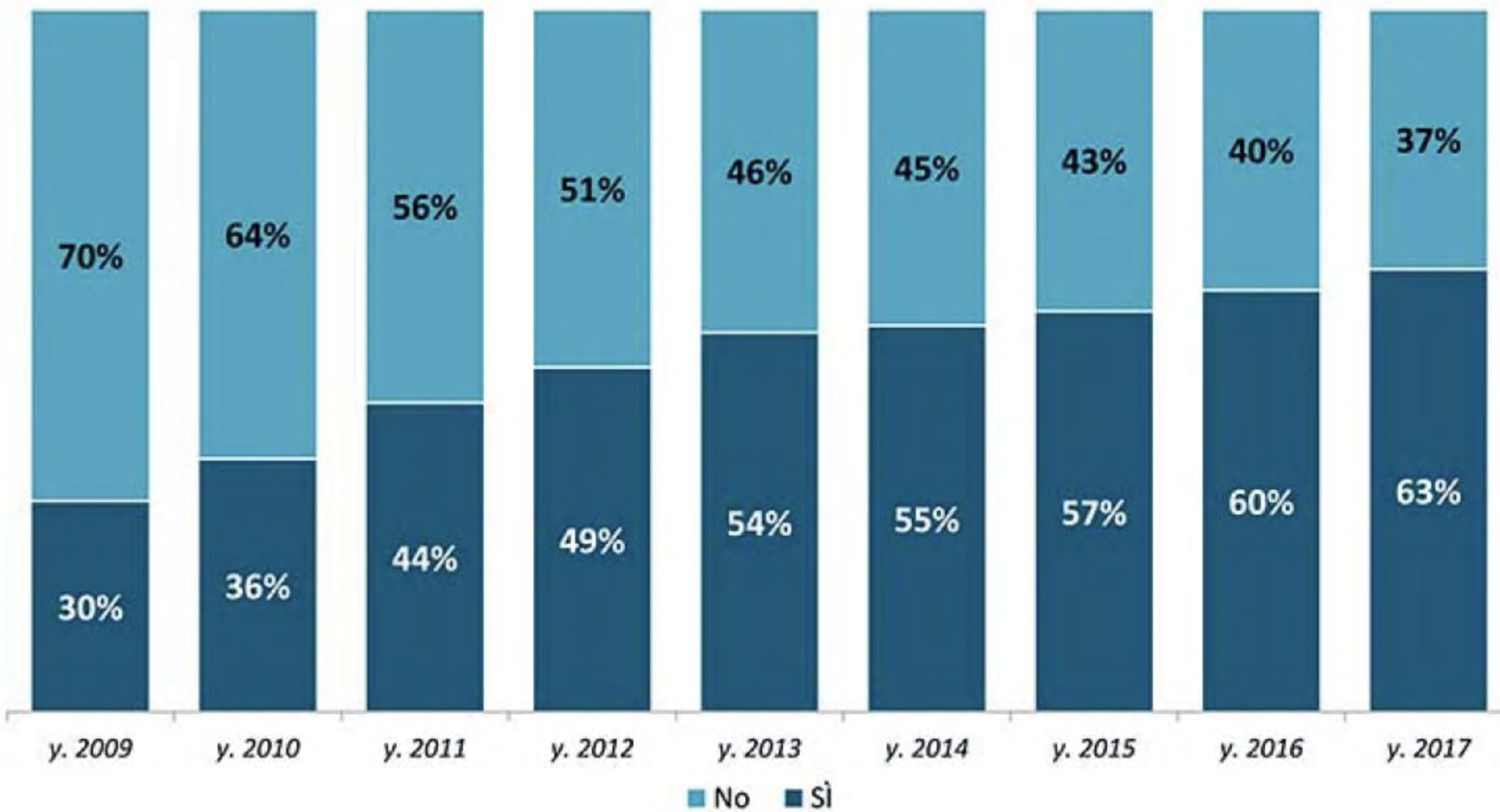
Protesi digitale:
metodo per la realizzazione di protesi attraverso la tecnologia CAD/CAM

CAD-CAM: uso della tecnica nella realizzazione di protesi fissa



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DENTAL MONITOR KEY-STONE

Il flusso di lavoro, che sfrutta la tecnologia digitale, prevede necessariamente la conoscenza di diversi aspetti della protesi:

- tipologia di restauro
- scelta del materiale
- preparazione
- tecnica di scansione
- software di progettazione
- fresaggio
- finitura e lucidatura
- cementazione
- ritocchi

Tipologia del restauro

a. Singolo
   1. Parziale
   2. Totale
      - elemento naturale
      - impianto

b. Più elementi uniti
   - elementi naturali
   - impianti

Scelta del materiale

- Per temporaneo - PMMA, composito
- Per definitivo - composito, ceramica ibrida, ceramica, ossido di zirconia, soluzioni ibride.

Quale tipo di preparazione?

Ci sono indicazioni cliniche per preparazioni orizzontali ed altre per quelle verticali.

NON BISOGNA SEGUIRE LE MODE

Scelta una metodica, bisogna seguirne il protocollo clinico e tecnico, differente l’uno dall’altro.
Non è consigliabile eseguire metodiche ibride

Linee guida per le preparazioni

IVOCLARVIVADENT - IPS e.max CAD

Indicazioni per la preparazione

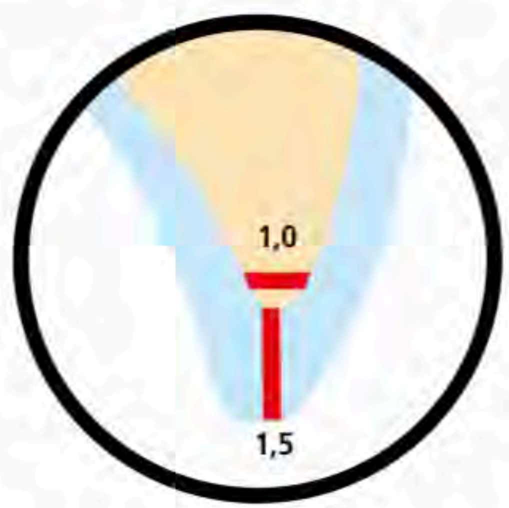
Una lavorazione di successo con IPS e.max CAD è realizzabile soltanto rispettando le direttive e gli spessori sotto riportati.

Regole generali per la preparazione di restauri in ceramica integrale

- assenza di angoli e spigoli
- preparazione a spalla con bordo interno arrotondato rispettiv. preparazione a Chamfer
- le dimensioni indicate rispecchiano le dimensioni minime del restauro IPS e.max CAD
- il raggio dei bordi del moncone preparato, in particolare in caso di denti anteriori, deve ammontare a min. 1,0 mm (geometria dello strumento di rifinitura) per garantire un'ottimale fresatura attraverso l'unità CAD/CAM.

Preparazione a spalla

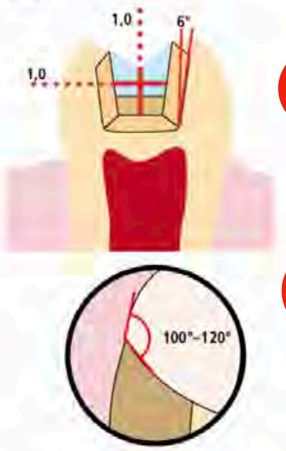
Preparazione a Chamfer



Se non vengono rispettati gli **spessori minimi delle pareti** e le **sezioni delle connessioni** indicati, si può arrivare all'insuccesso clinico, come p.e. incrinature, distacchi o frattura del restauro.

IVOCLARVIVADENT - IPS e.max CAD

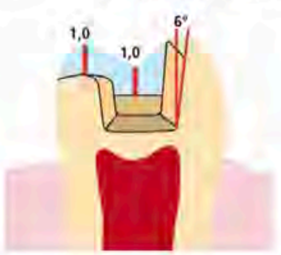
Inlay



- Considerare i contatti antagonisti statici e dinamici.
- Non realizzare i bordi della preparazione nei contatti centrici con l'antagonista.
- In zona delle fessure, prevedere min. 1,0 mm di profondità di preparazione e min. 1,0 mm di larghezza dell'istmo.
- Realizzare l'incassettatura prossimale in modo leggermente divergente (angolazione di preparazione 6°), angolo di 100°–120° fra le pareti cavitarie prossimali e le superfici prossimali prospettive dell'inlay.
- In caso di superfici prossimali convesse accentuate, senza sufficiente supporto del gradino prossimale, non realizzare contatti delle creste marginali sull'inlay.
- Arrotondare i bordi interni e le zone di passaggio, per evitare concentrazioni di tensione nella ceramica.
- Non effettuare preparazioni Slice-cut o a finire.

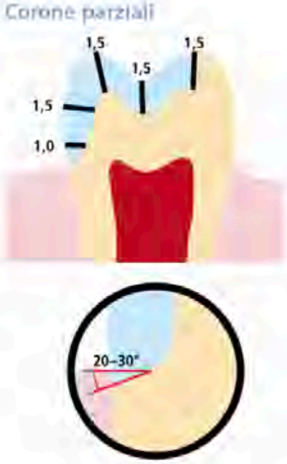
Onlay

- Considerare i contatti antagonisti statici e dinamici.



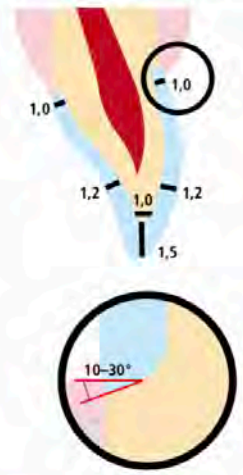
- Non realizzare i bordi della preparazione nei contatti centrici con l'antagonista.
- In zona delle fessure, prevedere min. 1,0 mm di profondità di preparazione e min. 1,0 mm di larghezza dell'istmo.
- Realizzare l'incassettatura prossimale in modo leggermente divergente (angolazione di preparazione 6°), angolo di 100°–120° fra le pareti cavitarie prossimali e le superfici prossimali prospettive dell'onlay.
  In caso di superfici prossimali convesse accentuate, senza sufficiente supporto del gradino prossimale, non realizzare contatti delle creste marginali sull'onlay.
- Arrotondare i bordi interni e le zone di passaggio, per evitare concentrazioni di tensione nella ceramica.
- Non effettuare preparazioni Slice-cut o a finire.
- In zona dell'incappucciamento delle cuspidi considerare uno spazio di almeno 1,0 mm.

Corone parziali



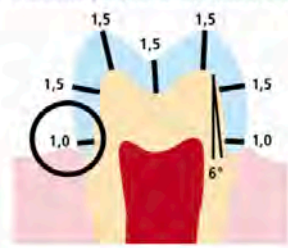
- Considerare i contatti antagonisti statici e dinamici.
- Non realizzare i bordi della preparazione nei contatti centrici con l'antagonista.
- In zona dell'incappucciamento delle cuspidi considerare uno spazio di almeno 1,5 mm.
- Preparazione a spalla con bordo interno arrotondato rispettiv. preparazione a Chamfer in angolazione di ca. 20°-30°. Larghezza della spalla/Chamfer min. 1,0 mm.

Corona anteriore/pilastro del ponte nei settori anteriori



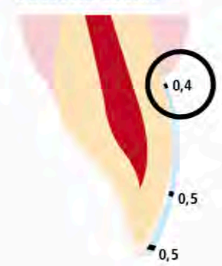
- Ridurre la forma anatomica rispettando gli spessori minimi indicati. Preparazione a spalla con bordo interno arrotondato rispettiv. preparazione a Chamfer in angolazione di ca. 10°–30°. Larghezza della spalla / Chamfer circolare min. 1,0 mm.
- Riduzione del terzo coronale – occlusalmente/incisalmente – di min. 1,5 mm.
- Riduzione in zona vestibolare rispettiv. orale di min. 1,2 mm.
- Per la cementazione convenzionale rispettiv. autoadesiva, la preparazione deve presentare superfici ritentive ed una sufficiente altezza del moncone.

Corona posteriore/Pilastro di ponte nei settori premolari



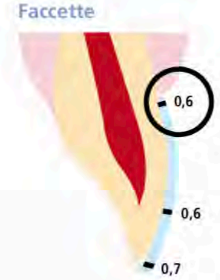
- Ridurre la forma anatomica rispettando gli spessori minimi indicati. Preparazione a spalla con bordo interno arrotondato rispettiv. preparazione a Chamfer in angolazione di ca. 10°–30°. Larghezza della spalla / Chamfer circolare min. 1,0 mm. Angolazione della preparazione 6°.
- Riduzione del terzo coronale occlusalmente di min. 1,5 mm.
- Riduzione in zona vestibolare rispettiv. orale di min. 1,5 mm.
- Per la cementazione convenzionale rispettiv. autoadesiva, la preparazione deve presentare superfici ritentive ed una sufficiente altezza del moncone.

Faccetta sottile



- La preparazione deve possibilmente avvenire nello smalto.
- Non apportare i limiti di preparazione incisali nelle superfici di abrasione e delle occlusioni dinamiche.
- Lo spessore minimo della faccetta sottile in zona cervicale e labiale è di 0,4 mm. Per il bordo incisale è necessario prevedere uno spessore del restauro di 0,5 mm.
- In caso di sufficiente spazio è possibile anche rinunciare ad una preparazione.

Faccette



- La preparazione deve possibilmente avvenire nello smalto.
- Non apportare i limiti di preparazione incisali nelle superfici di abrasione e delle occlusioni dinamiche.
- Ridurre in zona cervicale rispettiv. labiale di min. 0,6 mm ed il bordo incisale di min. 0,7 mm.

IVOCLARVIVADENT - IPS e.max ZirCAD

Indicazioni per la preparazione

Prima di iniziare con la ricostruzione vera e propria, prestare attenzione ad una preparazione idonea per la ceramica. Una lavorazione di successo con IPS e.max ZirCAD è realizzabile soltanto rispettando le direttive e gli spessori sotto riportati.

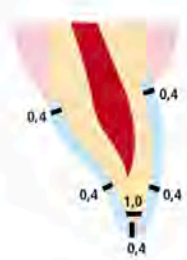
Regole generali per la preparazione di restauri in ceramica integrale

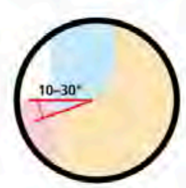
Preparazione a spalla

Preparazione a Chamfer

- nessuna preparazione di angoli e spigoli
- la preparazione ideale è una preparazione a spalla con bordo interno arrotondato, rispettivamente unra preparazione a Chamfer.
- Le dimensioni indicate rispecchiano le dimensioni minime del restauro IPS e.max ZirCAD
- Il diametro dei bordi del moncone preparato deve essere di almeno 1 mm (geometria dello strumento di rifinitura), per garantire un'ottimale lavorazione da parte dell'unità CAM.

Linee guida per la preparazione per corone singole - ponti di 3 elementi





- Ridurre uniformemente la forma anatomica rispettando gli spessori minimi indicati per le pareti.
- La preparazione ideale è una preparazione a spalla con bordi interni arrotondati, rispettivamente una preparazione a Chamfer con 0,6 mm di larghezza della spalla/Chamfer per una corona latero-posteriore e 0,4 mm per una corona anteriore.
- Incisalmente/occlusalmente la corona latero-posteriore deve essere ridotta di almeno 0,6 mm e la corona anteriore di almeno 0,4 mm.
- La riduzione in area labiale/linguale dovrebbe essere di min. 0,4 mm per corone anteriori e di 0,6 mm per le corone latero-posteriori.
- Per la cementazione convenzionale rispettivamente autoadesiva devono essere create superfici ritentive (altezza del moncone min. 4mm).
- angolazione della preparazione:
  4 – 8° con cementazione convenzionale ed autoadesiva, >6° con cementazione adesiva

Criteri per la conformazione

Il design del restauro è la chiave di successo per restauri in ceramica integrale di lunga durata.
Quanta più attenzione viene riposta nella conformazione, tanto migliore sarà il risultato finale ed il successo clinico.

Gli **spessori minimi** riportati qui di seguito devono essere rispettati per ottenere il colore dentale della scala colori e per soddisfare i **requisiti delle direttive per la preparazione**.
Gli spessori minimi si riferiscono agli spessori di IPS e.max ZirCAD.

IVOCLARVIVADENT - Tetric CAD

Indicazioni per la preparazione

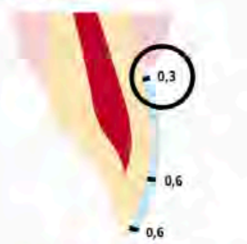
Una lavorazione di successo con Tetric CAD è realizzabile soltanto rispettando le direttive e gli spessori per la preparazione sotto riportati.

Regole generali per la preparazione di restauri in composito

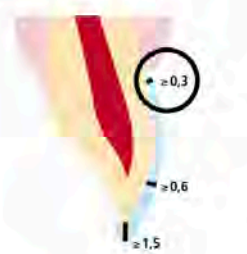
Preparazione a spalla

Preparazione a Chamfer

Faccette

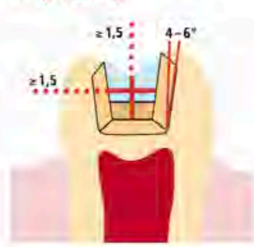


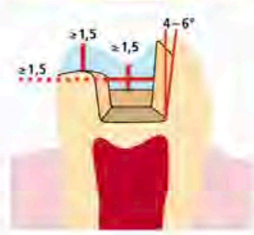
- La preparazione deve possibilmente avvenire nello smalto.
- Non apportare i limiti di preparazione incisali nelle superfici di abrasione e delle occlusioni dinamiche.
- Ridurre in zona cervicale di min. 0,3 mm, in zona labiale di min. 0,6 mm ed il bordo incisale di min. 0,6 mm.



- Nella preparazione con incassettatura oro-incisale del bordo incisale (riduzione labiale/incisale) la profondità di preparazione in zona cervicale ammonta a min. 0,3 mm ed in zona labiale a min. 0,6 mm.
- Il bordo incisale deve essere ridotto di 1,5 mm.
- Lo spessore della riduzione incisale, dipende dalla traslucenza desiderata dello smalto da ricostruire.
- Tanto più trasparente deve essere l'effetto del bordo incisale della faccetta, e tanto maggiore dovrà essere la riduzione. Denti decolorati devono eventualmente essere rifiniti maggiormente.

Inlay / Onlay





- Considerare i contatti antagonisti statici e dinamici.
- Non realizzare i bordi della preparazione nei contatti centrici con l'antagonista.
- In zona delle fessure, prevedere min. 1,5 mm di profondità di preparazione e min. 1,5 mm di larghezza dell'istmo.
- Realizzare l'incassettatura prossimale in forma leggermente divergente (angolo di preparazione 4–6°)
- In caso di superfici prossimali convesse accentuate, senza sufficiente supporto del gradino prossimale, non realizzare contatti delle creste marginali sull'inlay/onlay.
- Arrotondare i bordi interni e le zone di passaggio, per evitare concentrazioni di tensione nel restauro.
- Non effettuare preparazioni Slice-cut o a finire.
- Per gli onaly, in zona dell'incappucciamento delle cuspidi min. 1,5 mm

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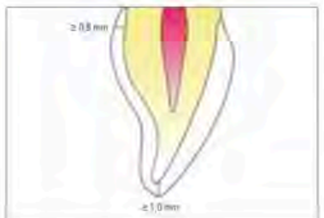
VITA ENAMIC® Spessori e direttive per la preparazione

Spessori e direttive per la preparazione

Per assicurare il successo clinico di restauri in VITA ENAMIC, vanno osservati i seguenti **spessori minimi**:

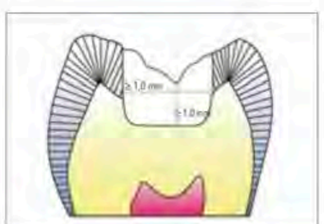


Corone frontali

Incisale: **min. 1,0 mm**
Circolare: **min. 0,8 mm**

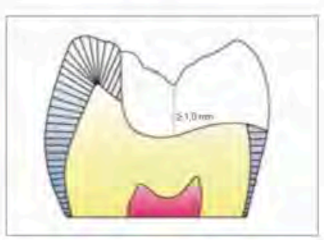
Corone posteriori

Occlusale: **min. 1,0 mm**
Circolare: **min. 0,8 mm**



Inlays

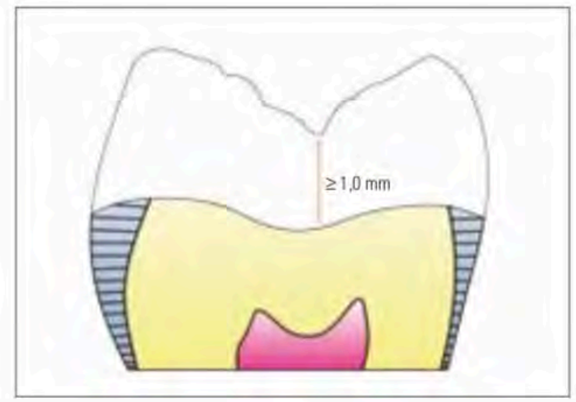
Occlusale: **min. 1,0 mm**
Zona dell'istmo: **min. 1,0 mm**



Onlays

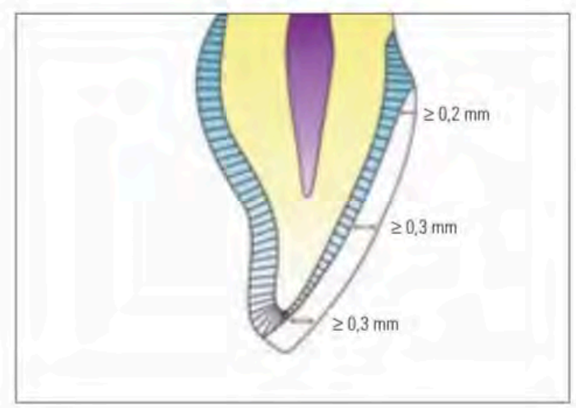
Occlusale: **min. 1,0 mm**

VITA ENAMIC® Spessori e direttive per la preparazione



Tavolati occlusali

Occlusale: **min. 1,0 mm**



Faccette

Incisale: **min. 0,3 mm**
Labiale: **min. 0,3 mm**
Cervicale: **min. 0,2 mm**

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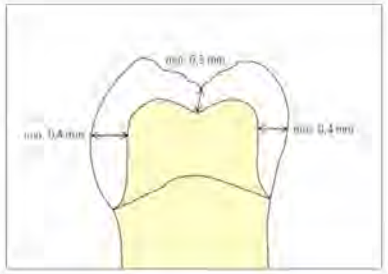
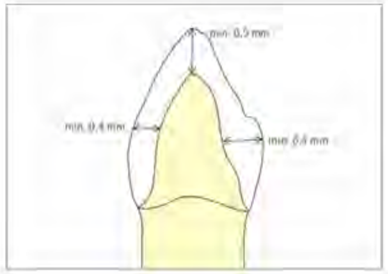
Per garantire un successo clinico di lungo periodo dei restauri in VITA YZ T e VITA YZ HT attenersi assolutamente agli spessori minimi delle pareti sia per restauri completamente anatomici che ridotti.
Evitare spigoli vivi sulle strutture.

Configurazione della struttura per restauri con rivestimento estetico

- Forma anatomica ridotta
- Sostegno della cuspide (seguendo l'andamento anatomico)
- Spessore del rivestimento estetico max. 2 mm

Configurazione di restauri completamente anatomici





La preparazione può essere effettuata con becco di flauto o a spalla con angolo interno arrotondato. L'angolo di preparazione verticale deve essere di min. 3°.
Tutti i passaggi dalle superfici assiali a quelle occlusali o incisali devono essere arrotondati.
Sono auspicabili superfici uniformi e lisce.

Per ulteriori indicazioni sulle direttive per la preparazione consultare la brochure „Aspetti clinici" Nr. 1696.

Preparazione a spalla o a becco di flauto

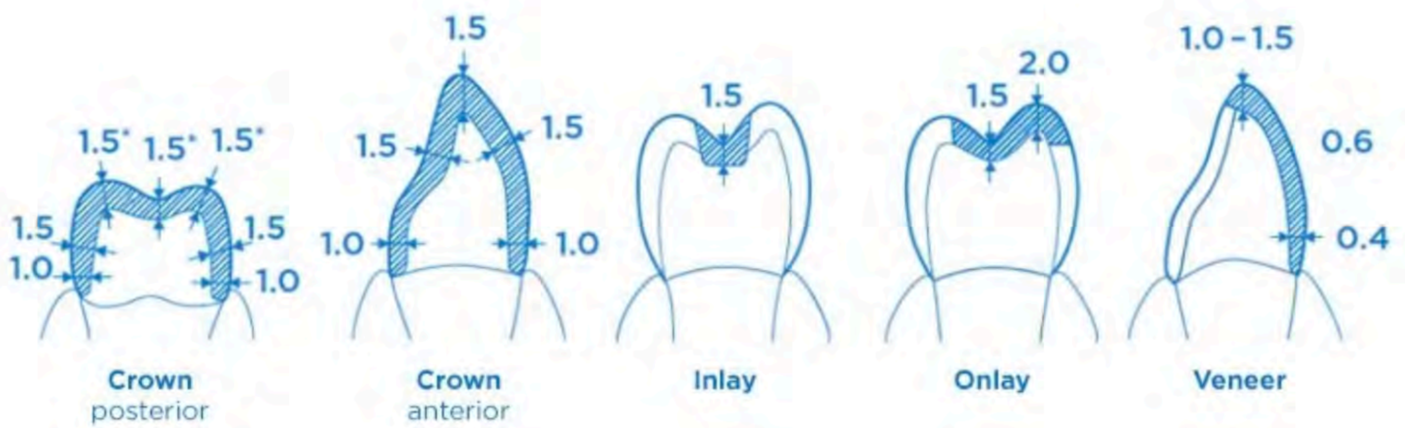
Preparazione tangenziale - controindicata

Preparazione a becco di flauto scorretta - controindicata

Dentsply Sirona - Celtra Duo

Preparing Celtra Duo (ZLS)

The preparation requirements of Celtra Duo (ZLS) are similar to other all-cermic restorations. Clinicians should aim for 1.5mm to 2mm of occlusal reduction with at least 1mm of axial reduction.

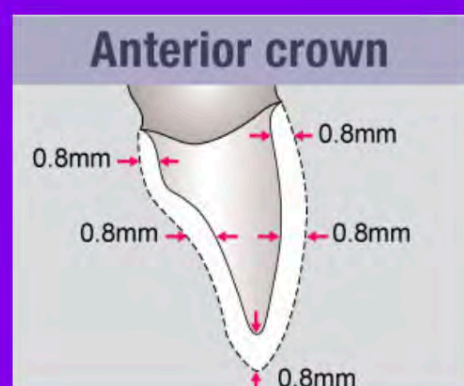


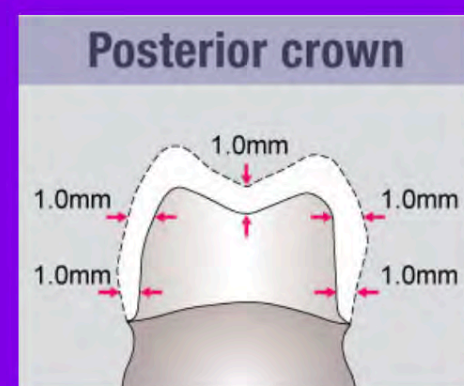
As with all CEREC restorations, the margins are the most critical part of the preparation and should be smooth and polished. Any milled restoration requires smooth polished margins so that the milling unit can adequately mill Celtra Duo (ZLS) restorations with ease.

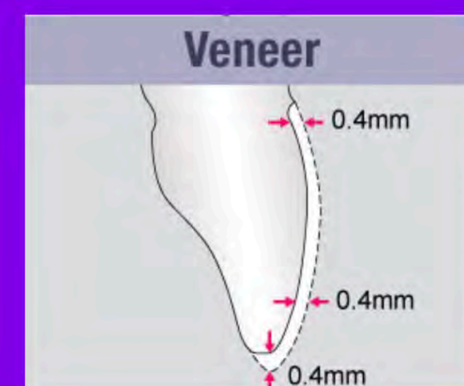
KATANA™ Zirconia Block

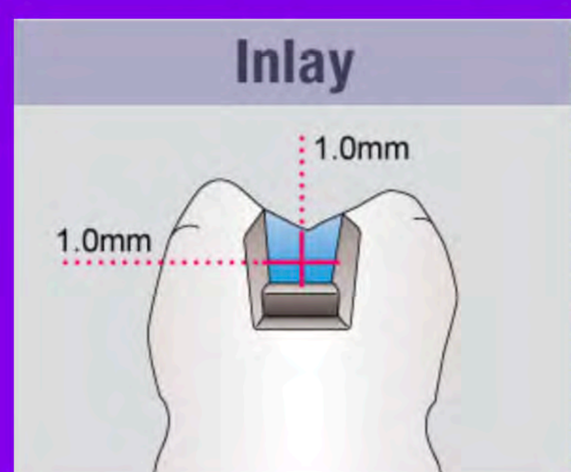
MINIMIZING WALL THICKNESS

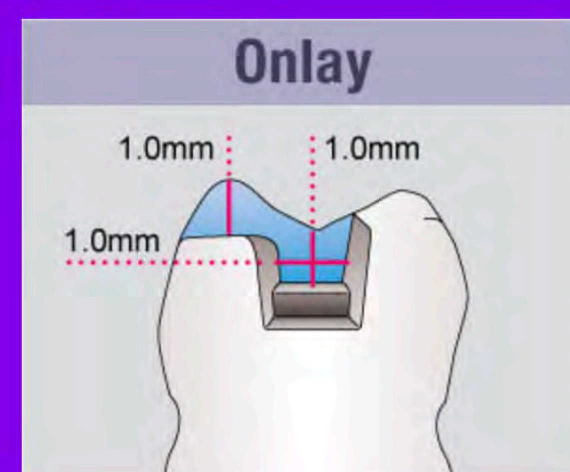
As an all-ceramic option, zirconia has excellent mechanical properties. KATANA™ Zirconia Block, a highly translucent form of zirconia, has better mechanical properties than LS glass. This means that it is possibly by using KATANA™ Zirconia Block to design a thinner restoration than those that can be fabricated using LS glass. This results in both great mechanical properties and beautiful esthetics, with no compromise!











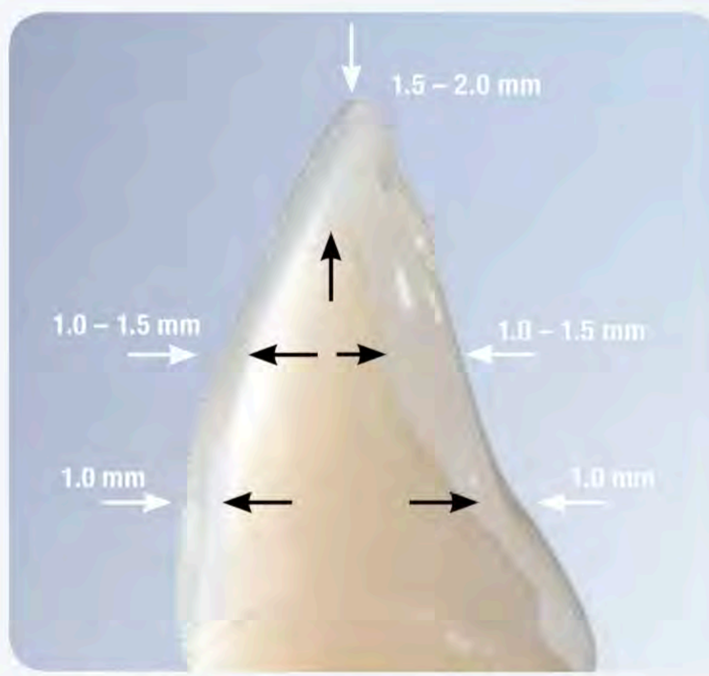
3m Lava

La preparazione ideale: a spalla o a chamfer?

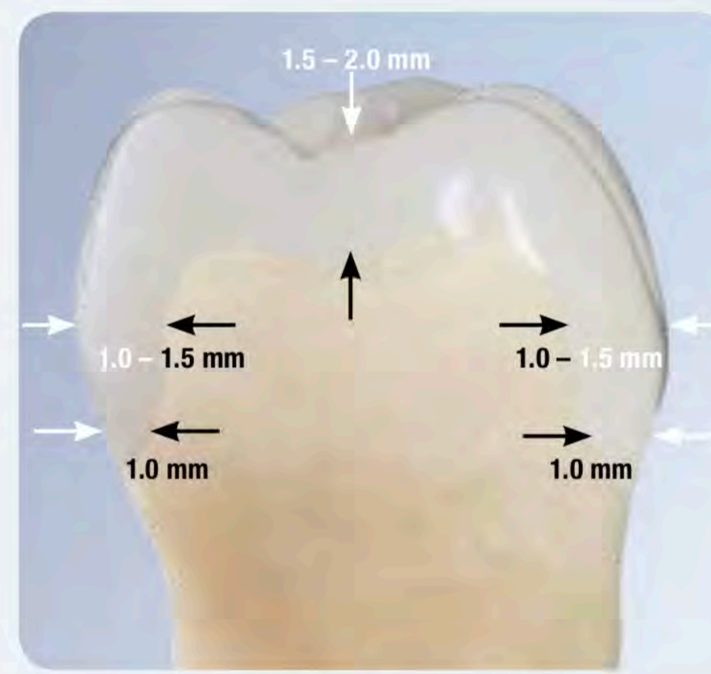
È sufficiente una riduzione della struttura dentale basata sulle dimensioni indicate di seguito. Raccomandiamo una matrice della situazione clinica iniziale al fine di controllare il progredire della preparazione del dente. Idealmente, la preparazione include una spalla arrotondata o un chamfer con angolo orizzontale di almeno 5°. L'angolo di preparazione verticale dovrebbe essere di almeno 4°. L'angolo interno della preparazione a spalla deve avere un contorno arrotondato. Tutti i bordi occlusali e incisali devono essere arrotondati.

L'estremità marginale della preparazione ha bisogno di essere continua e chiaramente visibile. Si deve evitare il bisello.

Fotografia creata da
Dr. Carlos Eduardo Sabrosa,
Rio de Janeiro, Brasile.



Preparazione raccomandata per denti anteriori.



Preparazione raccomandata per denti posteriori.

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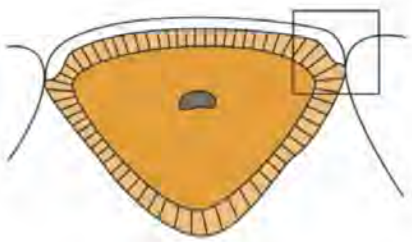
Labiale

- Riduzione labiale media: 0,5mm
- Rispettare l'andamento vestibolare del contorno dei denti

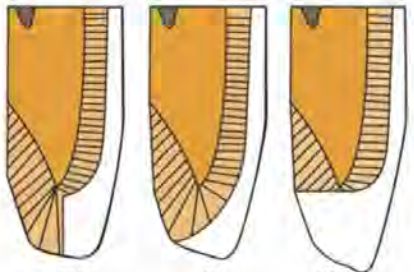
Cervicale

- Spalla leggermente arrotondata o scanalatura parallela al bordo gengivale, andamento sopragengivale



Prossimale

- Tendere ai margini prossimali nel senso di una scanalatura
- Cingere il dente con andamento "a forma di sella"
- Se possibile, mantenere i punti di contatto naturali



Incisale

- "Scanalatura" labiale-incisale senza prolungamento (1)
- Una leggera riduzione consente uno strato in ceramica più spesso per una caratterizzazione maggiormente personalizzata (2)
- Per il "prolungamento" spianare il bordo incisale e arrotondare il bordo (3)

Requisiti di un restauro per impronta ottica

Visibile

Asciutto

Con margini netti e puliti

E' comunque importante sottolineare che tutti gli scanner intraorali oggi disponibili sul mercato "registrano ciò che vedono". L'impronta ottica prevede quindi la gestione dei tessuti molli e l'eliminazione dei liquidi orali (sangue, saliva, fluido crevicolare) esattamente come accade per l'impronta tradizionale.

L'IMPRONTA OTTICA IN PROTESI
Accademia Italiana di Odontoiatria Protesica (AIOP) Dott. Carlo Monaco & Dott. Giacomo Ori

Importanza della finitura e lucidatura

- **Usura dell'antagonista**
- **Accumulo di placca**
- **Alterazione del colore e/o translucenza del restauro**
- **Distacco del restauro (perdita di adesione)**
- **Resistenza alla frattura del restauro**
- **Discomfort**

Int J Prosthodont. 2006 Nov-Dec;19(6):547-8

The effect of glazed and polished ceramics on human enamel wear.

Oliveira AB[1], Matson E, Marques MM

Author information

Abstract

This in vitro study compared the effect of glazed and polished dental ceramic on the wear of human enamel. Five ceramics were tested under standard load after 150,000 and 300,000 simulated chewing cycles. Wear was determined from collected digital data and analyzed before and after loading. Statistical comparisons were analyzed. Polished ceramics produced less enamel wear. The amount of enamel wear for opposing IPS Empress ceramic was significantly higher ($P < .001$) than wear provoked by the other ceramics. The enamel wear rate was higher at the first 150,000 cycles, and polishing increased ceramic roughness, except for the IPS Empress ceramic. Polishing of dental ceramics at the contact area produces less antagonistic enamel wear.

PMID: 17165291

[Indexed for MEDLINE]

J Clin Periodontol. 1995 Jan;22(1):1-14.

The influence of surface roughness and surface-free energy on supra- and subgingival plaque formation in man. A review of the literature.

Quirynen M[1], Bollen CM.

Author information

Abstract

In the oral cavity, an open growth system, bacterial adhesion to the non-shedding surfaces is for most bacteria the only way to survive. This adhesion occurs in 4 phases: the transport of the bacterium to the surface, the initial adhesion with a reversible and irreversible stage, the attachment by specific interactions, and finally the colonization in order to form a biofilm. Different hard surfaces are available in the oral cavity (teeth, filling materials, dental implants, or prostheses), all with different surface characteristics. In a healthy situation, a dynamic equilibrium exists on these surfaces between the forces of retention and those of removal. However, an increased bacterial accumulation often results in a shift toward disease. 2 mechanisms favour the retention of dental plaque: adhesion and stagnation. The aim of this review is to examine the influence of the surface roughness and the surface free energy in the adhesion process. Both in vitro and in vivo studies underline the importance of both variables in supragingival plaque formation. Rough surfaces will promote plaque formation and maturation, and high-energy surfaces are known to collect more plaque, to bind the plaque more strongly and to select specific bacteria. Although both variables interact with each other, the influence of surface roughness overrules that of the surface free energy. For the subgingival environment, with more facilities for microorganisms to survive, the importance of surface characteristics dramatically decreases. However, the influence of surface roughness and surface-free energy on supragingival plaque justifies the demand for smooth surfaces with a low surface-free energy in order to minimise plaque formation, thereby reducing the occurrence of caries and periodontitis.

PMID: 7706534

[Indexed for MEDLINE]

BMC Oral Health. 2018 Mar 13;18(1):40. doi: 10.1186/s12903-018-0508-4.

Effect of surface finishing on the colour stability and translucency of dental ceramics.

Sarıkaya I[1], Yerliyurt K[2], Hayran Y[2]

Author information

Abstract

BACKGROUND: The purpose of this study was to investigate the effects of staining solutions and surface finishing on the colour stability and translucency of hybrid ceramic (HC) and resin nanoceramic (RNC) materials.

METHODS: Twenty four groups consisting of 10 specimens (240 specimens in total) were created out of HC and RNC, including six groups to be stored in distilled water served as the controls groups. The Vita Enamic technical set, Shofu polishers, medium and fine rubber wheels and Sof-Lex polishing discs were used as polishing instruments. Cola, tea, and coffee were used as staining solutions. The colour differences (ΔE^*) and translucency parameter (TP) were evaluated by a spectrophotometer. Data were analysed by a One-way Analysis of Variance (ANOVA) and Mann-Whitney U test.

RESULTS: There was a statistically significant difference between the ΔE^* values of the HC specimens in the coffee groups and the ΔE^* values of the other HC groups ($p < 0.05$). The ΔE^* values of the RNC specimens in the coffee and tea groups were not different from the specimens in the cola groups ($p > 0.05$). The TP values of the polished groups were higher than the Sof-Lex groups and the Shofu groups on both HC and RNC materials ($p < 0.05$).

CONCLUSIONS: Increased ΔE^* values were observed in HC specimens stored in a coffee solution compared to the specimens stored in a tea or cola solution. Both of the RNC specimens stored in coffee and tea had higher ΔE^* values than the RNC specimens stored in the cola. The TP values of both HC and RNC specimens stored in the coffee solution decreased.

KEYWORDS: Ceramic; Colour stability; Surface finishing; Translucency

PMID: 29534712 PMCID: PMC5851095 DOI: 10.1186/s12903-018-0508-4

[Indexed for MEDLINE] Free PMC Article

Dent Mater J. 2018 Dec 1. doi: 10.4012/dmj.2017-391. [Epub ahead of print]

Effect of finishing condition on fracture strength of monolithic zirconia crowns.

Yin R[1], Lee MH[1], Bae TS[1], Song KY[2].

Author information

1 Department of Dental Biomaterials, School of Dentistry, Chonbuk National University.

2 Department of Dental Prosthodontics, School of Dentistry, Chonbuk National University.

Abstract

This study was to evaluate the load bearing capacity of monolithic dental zirconia crowns, and the effect of surface finishing on fracture strength. (1) The zirconia plates were divided into 5 groups and polished by various types of polishing bur, every specimen was analyzed by surface roughness testing, and X-ray diffraction (XRD). (2) The zirconia crowns were classified into 4 groups corresponding to different surface treatments and thickness. All the crowns were cemented and subjected to a load of 7 kg for 5 min. Stored in distilled water at 37°C for 24 h. Observe the typical surface using field emission scanning electron microscopy (FE-SEM). The cycling and fracture tests were carried out. The data was statistically analyzed. The groups had better fracture strength after polishing. This suggests the monoclinic phase can be eliminated by optimizing the polishing process. Moreover, the fracture strength increased with occlusal thickness ($p<0.05$).

KEYWORDS: Fracture strength; Monoclinic phase; Polishing; Surface roughness; Zirconia crown

PMID: 30504890 DOI: 10.4012/dmj.2017-391

J Prosthodont. 2014 Dec;23(8):593-601. doi: 10.1111/jopr.12167. Epub 2014 Jun 24.

In vitro wear behavior of zirconia opposing enamel: a systematic review.

Passos SP[1], Torrealba Y, Major P, Linke B, Flores-Mir C, Nychka JA.

Author information

1 School of Dentistry, University of Alberta, Edmonton, Canada.

Erratum in

J Prosthodont. 2014 Dec;23(8):681.

Abstract

PURPOSE: The aim of this systematic review was to assess enamel wear on teeth opposing zirconia restorations and to evaluate factors related to the wear of natural teeth opposing zirconia restorations.

MATERIALS AND METHODS: Five electronic databases were searched through May 2013 without limitations. The terms "antagonist*," "enamel," "wear," and "zirconi*" were used. Titles and abstracts were initially screened, and those that fulfilled the inclusion criteria were selected for a full-text assessment. Studies that evaluated only the material wear were not included.

RESULTS: The database search strategy retrieved 142 potentially eligible studies. After the duplicate studies were removed, 62 studies were obtained. Titles and abstracts that fulfilled the inclusion criteria were selected for a full-text assessment (25). Seven laboratory studies met the inclusion criteria. In addition, reference lists from the finally selected studies were also screened.

CONCLUSIONS: There was a large variation in relation to wear test method quantification, applied force, lateral movement, number and frequency of cycles, number of specimens, and enamel specimen preparation. In all studies, enamel wear rates were lower against polished zirconia. Differences in the test methods did not allow for comparisons of wear rates among the studies.

CLINICAL SIGNIFICANCE: Polishing the surface is recommended for a full-contour zirconia restoration because polished zirconia presents favorable wear behavior opposing natural teeth.

KEYWORDS: Tooth wear; antagonist; enamel; zirconia

PMID: 24957613 DOI: 10.1111/jopr.12167

[Indexed for MEDLINE]

J Prosthodont. 2018 Aug;27(7):624-635. doi: 10.1111/jopr.12727. Epub 2017 Dec 13.

The Effect of Surface Treatment on Shear Bond Strength between Y-TZP and Veneer Ceramic: A Systematic Review and Meta-Analysis.

de Mello CC[1], Bitencourt SB[1], Dos Santos DM[1], Pesqueira AA[1], Pellizzer EP[1], Goiato MC[1].

Author information

1 Department of Dental Materials and Prosthodontics, Aracatuba Dental School, UNESP - Univ Estadual Paulista, Campus of Aracatuba, Sao Paulo, Brazil.

Abstract

PURPOSE: The objective of this systematic review with meta-analysis was to evaluate surface treatment in yttria-stabilized tetragonal zirconia polycrystal ceramic (Y-TZP) on the shear bond strength (SBS) values between Y-TZP (core ceramic) and veneer ceramic, compared to untreated specimens.

MATERIALS AND METHODS: This review was registered at PROSPERO platform under the number CRD42016036493. The systematic review of the extracted publications was performed to compare the effect of surface treatment on SBS between Y-TZP ceramic and veneering ceramic. A comprehensive review of the literature from the earliest available dates through January 2017 was performed in the PubMed/Medline, Embase, Scopus, and Cochrane Library databases.

RESULTS: A total of 15 studies were identified for the inclusion of data, with only in vitro studies. A random-effect model found statistically significant differences between untreated and treated surfaces of Y-TZP ($p < 0.00001$; MD: 2.84; 95% CI: 2.19 to 3.49). In another analysis, a random-effect model found statistically significant differences between the groups that only performed the associations of treatments and control group ($p < 0.00001$; MD: 3.19; 95% CI: 2.11 to 4.28).

CONCLUSIONS: Surface treatment in Y-TZP improved the values of SBS between the Y-TZP and veneer ceramic. The associations between two or more treatments also showed positive effect on the bond strength due the cumulative effect of the treatments.

KEYWORDS: Dental prosthesis; Y-TZP ceramic; meta-analysis

PMID: 29236295 DOI: 10.1111/jopr.12727

Dent Mater. 2017 Mar;33(3):294-308. doi: 10.1016/j.dental.2016.12.004. Epub 2017 Jan 12.

Grinding damage assessment for CAD-CAM restorative materials.

Curran P[1], Cattani-Lorente M[2], Anselm Wiskott HW[2], Durual S[2], Scherrer SS[3].

Author information

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3 Division of Fixed Prosthodontics-Biomaterials, University of Geneva, University Clinic of Dental Medicine, Geneva, Switzerland. Electronic address: susanne.scherrer@unige.ch.

Abstract

OBJECTIVES: To assess surface/subsurface damage after grinding with diamond discs on five CAD-CAM restorative materials and to estimate potential losses in strength based on crack size measurements of the generated damage.

METHODS: The materials tested were: Lithium disilicate (LIT) glass-ceramic (e.max CAD), leucite glass-ceramic (LEU) (Empress CAD), feldspar ceramic (VM2) (Vita Mark II), feldspar ceramic-resin infiltrated (EN) (Enamic) and a composite reinforced with nano ceramics (LU) (Lava Ultimate). Specimens were cut from CAD-CAM blocs and pair-wise mirror polished for the bonded interface technique. Top surfaces were ground with diamond discs of respectively 75, 54 and 18μm. Chip damage was measured on the bonded interface using SEM. Fracture mechanics relationships were used to estimate fracture stresses based on average and maximum chip depths assuming these to represent strength limiting flaws subjected to tension and to calculate potential losses in strength compared to manufacturer's data.

RESULTS: Grinding with a 75μm diamond disc induced on a bonded interface critical chips averaging 100μm with a potential strength loss estimated between 33% and 54% for all three glass-ceramics (LIT, LEU, VM2). The softer materials EN and LU were little damage susceptible with chips averaging respectively 26μm and 17μm with no loss in strength. Grinding with 18μm diamond discs was still quite detrimental for LIT with average chip sizes of 43μm and a potential strength loss of 42%.

SIGNIFICANCE: It is essential to understand that when grinding glass-ceramics or feldspar ceramics with diamond discs surface and subsurface damage are induced which have the potential of lowering the strength of the ceramic. Careful polishing steps should be carried out after grinding especially when dealing with glass-ceramics.

KEYWORDS: CAD-CAM; Ceramics; Composite; Damage; Fractograph; Grinding; Strength

PMID: 28089394 DOI: 10.1016/j.dental.2016.12.004

[Indexed for MEDLINE]

Dent Mater. 2018 Sep;34(9):e225-e235. doi: 10.1016/j.dental.2018.05.015. Epub 2018 May 28.

Internal adjustments decrease the fatigue failure load of bonded simplified lithium disilicate restorations.

Rodrigues CDS[1], Guilardi LF[2], Follak AC[1], Prochnow C[2], May LG[1], Valandro LF[3].

Author information

Abstract

OBJECTIVE: To investigate the effect of intaglio surface adjustment of simplified lithium disilicate ceramic restorations adhesively cemented to a dentin-like material on its fatigue behavior.

METHODS: Ceramic discs (IPS e.max CAD) were prepared and an in-Lab simulation of machining roughness was performed by grinding with SiC paper (#60). Ceramic discs were divided into 4 groups according to the internal adjustment of the cementation surface: no adjustments (CTRL); adjustment with a medium (M), fine (F), or extra fine (FF) diamond bur. Dentin-like material discs were also produced. Ceramic disc intaglio surfaces were etched (5% hydrofluoric acid; 20s) and received a silane coating. Dentin-like material discs were etched (10% hydrofluoric acid; 1min) and received a primer coating. Pairs of ceramic/dentin-like material were adhesively cemented (Multilink Automix), and fatigue failure load tests were performed using the Staircase approach (250,000 cycles; 20Hz). Roughness, topographic and fractographic analyses were performed. Statistical analyses were carried out through ANOVA tests.

RESULTS: All ground groups (M=521.3 N; F=536.9 N; FF=676.2 N) presented lower fatigue failure load values than the control (1241.6 N). M diamond bur created a rougher surface than F (Ra and Rz parameters). However, FF was similar to F and M for Ra, and similar to F for Rz.

SIGNIFICANCE: Bur adjustments on the intaglio surface of simplified lithium disilicate ceramic restorations greatly decreased the fatigue failure load even using an extra-fine diamond bur. Care should be taken when internal adjustments are needed.

KEYWORDS: Accelerated fatigue; CAD/CAM simulation; Clinical adjustment; Mechanical behavior; Monolithic restorations; Staircase method

PMID: 29853196 DOI: 10.1016/j.dental.2018.05.015

Clin Oral Investig. 2018 May 16. doi: 10.1007/s00784-018-2473-3. [Epub ahead of print]

Polishing effects and wear performance of chairside CAD/CAM materials.

Matzinger M[1], Hahnel S[2], Preis V[2], Rosentritt M[2].

Author information

Abstract

OBJECTIVES: To investigate the surface roughness of CAD/CAM materials immediately after milling and after different chairside and labside polishing procedures. A two-body wear test was performed to compare the different wear characteristics of the materials and the corresponding antagonists.

MATERIALS AND METHODS: Specimens (n = 12 per series) from different CAD/CAM materials (three composites: Lava Ultimate, Cerasmart, BRILLIANT Crios; one hybrid ceramic: VITA Enamic; three ceramics: Celtra Duo, VITA Suprinity, IPS Emax.CAD) were polished according to the manufacturer's instructions. The effect of different polishing procedures was investigated by comparing surface roughness (R_a, R_{max}) after labside polishing and after chairside polishing. Wear behavior (mean, volume, and maximum wear) of specimens and antagonists as well as changes in surface roughness were determined in a pin-on-block wear test. Statistical analysis was performed with a one-way analysis of variance (ANOVA)/Bonferroni multiple-comparison post hoc test and a multifactorial ANOVA/Tukey's significant difference post hoc test ($\alpha = 0.05$). SEM micrographs were used for the qualitative evaluation of surfaces and wear traces.

RESULTS: After chairside high-gloss polishing, ceramics and composites exhibited R_a values between 0.08 ar 0.10 μm and between 0.11 and 0.13 μm, respectively. After labside high-gloss polishing, values varied betwee 0.02 and 0.09 μm for ceramics and between 0.06 and 0.16 μm for resin composites. No significant differences were found between labside and chairside pre- and high-gloss polishing. For the ceramics, lower mean wear depths (between - 132.2 ± 19.9 and - 137.0 ± 19.0 μm) were identified compared to the resin composites (whic exhibited wear depths between - 159.1 ± 19.4 and - 176.3 ± 23.9 μm). For maximum wear depth and volume, a different ranking of the materials was found. Antagonistic wear varied between 12.0 ± 6.4% and 30.6 ± 9.9% ar was higher for the ceramic materials and Lava Ultimate. For all materials, a smoothing between 0.20 and 2.70 μm (R_a) was identified after wear simulation.

CONCLUSIONS: Chairside polishing is as effective as labside polishing, although surfaces were directly adjust (roughened) only before the chairside polishing. Wear was lowest for ceramics, followed by the resin-infiltratec material and the resin composites.

CLINICAL RELEVANCE: Polishing after milling or adjustment is essential to guaranteeing optimal clinical performance. Chairside polishing after adjustment leads to comparably smooth surfaces as labside polishing after milling and grinding. Ceramics are expected to exhibit lower wear than resin composites under clinical conditions.

KEYWORDS: CAD/CAM; Ceramic; Damage; Defect; Lithium silicate; Lithum disilicate; Polishing; Resin composite; Resin-basec material; Roughness; Wear; Zirconia-reinforced-ceramic

PMID: 29770977 DOI: 10.1007/s00784-018-2473-3

J Mech Behav Biomed Mater. 2017 Nov;75:512-520. doi: 10.1016/j.jmbbm.2017.06.016. Epub 2017 Jun 15.

Fatigue strength of yttria-stabilized zirconia polycrystals: Effects of grinding, polishing, glazing, and heat treatment.

Zucuni CP[1], Guilardi LF[2], Rippe MP[3], Pereira GKR[4], Valandro LF[5].

Author information

Abstract

This study aimed to evaluate and compare the effect of different surface post-processing treatments (polishing, heat treatment, glazing, polishing + heat treatment and polishing + glazing) on the superficial characteristics (micromorphology and roughness), phase transformation and fatigue strength of a Y-TZP ceramic ground with diamond bur. Discs of Y-TZP ceramic were manufactured (ISO:6872-2015; final dimensions of 15mm in diameter and 1.2 ± 0.2mm in thickness) and randomly allocated according to the surface condition: Ctrl - as-sintered; Gr - ground with coarse diamond bur; Gr+HT - ground and subjected to the heat treatment; Gr+Pol - ground and polished; Gr+Pol+HT - ground, polished and heat treated; Gr+Gl - ground and glazed; Gr+Pol+Gl - ground, polished and glazed. The following analyses were performed: roughness (n = 25), surface topography (n = 2), phase transformation (n = 2) and fatigue strength by staircase method (n = 20). All treatments influenced to some extent the surface characteristics of Y-TZP, being that polishing reduced the surface roughness, the m-phase content and improved the fatigue strength; glazing led to the lowest roughness values (Ra and Rz), although it showed the worst fatigue strength; heat treatment showed limited effect on surface roughness, led to complete reversion of the existing m-phase content to t-phase, without enhancing fatigue performance. Thus, a polishing protocol after clinic adjustment (grinding) of monolithic restorations based on polycrystalline zirconia material is mandatory for surface characteristics and fatigue performance improvements.

KEYWORDS: Annealing; Dental ceramics; Glazing; Grinding; Zirconium oxide partially stabilized by yttrium

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[Indexed for MEDLINE]

Eur J Oral Sci. 2017 Aug;125(4):310-313. doi: 10.1111/eos.12353. Epub 2017 Jun 9.

Fracture resistance of zirconia-based all-ceramic crowns after bur adjustment.

Rues S[1], Schwindling FS[1], Meyer A[1], Rammelsberg P[1], Schmitter M[2].

Author information

1 Department of Prosthetic Dentistry, University Hospital Heidelberg, Heidelberg, Germany.
2 Department of Prosthetic Dentistry, University Hospital Würzburg, Würzburg, Germany.

Abstract

Intra-oral grinding is often required to optimize occlusion of all-ceramic restorations. The effect of burs of different grit size on the fracture resistance of veneered zirconia crowns was investigated in this study. Forty-eight standardized zirconia copings were produced. The ceramic veneer was designed with a positive ellipsoidal defect on the palatal aspect of the crowns. To simulate adjustment of dental restorations by burs, this palatal defect was removed by use of three different diamond-coated burs with grit sizes 46, 107, or 151 μm (fine, medium, or coarse, respectively). Each different grit size of bur was used to grind 16 crowns. All crowns were then polished and surface roughness was measured. Half of the specimens underwent thermomechanical aging (10,000 thermocycles between 6.5°C and 60°C) and 1.2 million cycles of chewing simulation (F = 108 N). A linear regression model was computed to test the effect of aging and grinding grit size at a level of significance of $\alpha = 0.05$. Fracture loads increased with decreasing grit size. Grit size and aging had a significant effect on the fracture resistance of the crowns. Use of fine and coarse burs for intra-oral adjustments resulted in different fracture resistance of veneered zirconia crowns. Coarse burs should be avoided in the final stage of grinding before polishing.

KEYWORDS: all-ceramic crowns; dental crown; fracture behavior; occlusal adjustment; zirconia

PMID: 28597985 DOI: 10.1111/eos.12353

[Indexed for MEDLINE]

Int J Oral Sci. 2014 Dec;6(4):241-6. doi: 10.1038/ijos.2014.34. Epub 2014 Jul 25.

Surface roughness of zirconia for full-contour crowns after clinically simulated grinding and polishing.

Hmaidouch R[1], Müller WD[2], Lauer HC[1], Weigl P[3].

Author information

Abstract

The aim of this study was to evaluate the effect of controlled intraoral grinding and polishing on the roughness of full-contour zirconia compared to classical veneered zirconia. Thirty bar-shaped zirconia specimens were fabricated and divided into two groups (n=15). Fifteen specimens (group 1) were glazed and 15 specimens (group 2) were veneered with feldspathic ceramic and then glazed. Prior to grinding, maximum roughness depth (Rmax) values were measured using a profilometer, 5 times per specimen. Simulated clinical grinding and polishing were performed on the specimens under water coolant for 15 s and 2 N pressure. For grinding, NTI diamonds burs with grain sizes of 20 μm, 10 μm, and 7.5 μm were used sequentially. The ground surfaces were polished using NTI kits with coarse, medium and fine polishers. After each step, Rmax values were determined. Differences between groups were examined using one-way analysis of variance (ANOVA). The roughness of group 1 was significantly lower than that of group 2. The roughness increased significantly after coarse grinding in both groups. The results after glazing were similar to those obtained after fine grinding for non-veneered zirconia. However, fine-ground veneered zirconia had significantly higher roughness than venerred, glazed zirconia. No significant difference was found between fine-polished and glazed zirconia, but after the fine polishing of veneered zirconia, the roughness was significantly higher than after glazing. It can be concluded that for full-contour zirconia, fewer defects and lower roughness values resulted after grinding and polishing compared to veneered zirconia. After polishing zirconia, lower roughness values were achieved compared to glazing; more interesting was that the grinding of glazed zirconia using the NTI three-step system could deliver smooth surfaces comparable to untreated glazed zirconia surfaces.

PMID: 25059249 PMCID: PMC5153588 DOI: 10.1038/ijos.2014.34

[Indexed for MEDLINE] Free PMC Article

Dent Mater. 2012 Aug;28(8):909-18. doi: 10.1016/j.dental.2012.04.010. Epub 2012 May 18.

Wear behavior of dental Y-TZP ceramic against natural enamel after different finishing procedures.

Mitov G[1], Heintze SD, Walz S, Woll K, Muecklich F, Pospiech P.

Author information

Abstract

OBJECTIVE: The aim of this in vitro study was to evaluate the influence of different finishing procedures on the wear behavior of zirconia against natural enamel.

METHODS: 64 quadratic specimens (10 mm × 10 mm × 2 mm) were cut from a commercial hipped dental Y-TZP ceramic. Four different groups with 16 specimens each were formed according to the following finishing procedures: PZ (polished), RR (fine-grit diamond), GZ (coarse-grit diamond), GZ (glazed). Polished specimens of a leucite-reinforced glass ceramic (Empress CAD) were used as a control (GC). The materials were subjected to the Ivoclar wear method (Willytec chewing simulator, 120,000 cycles, 5kg weight) with 80 natural caries-free cusps of first upper molars as antagonists. Wear was analyzed for both the enamel cusps and test specimens by measurement of the vertical substance loss with a laser scanner. Surface roughness was measured by means of a white-light interferometer.

RESULTS: The surface roughness was significantly different among the polished, diamond-finished, and glazed ceramic specimens (ANOVA, post hoc Bonferroni p<0.05). The results of the one-way ANOVA indicated that the finishing technique significantly affected enamel wear (p<0.05). The post hoc test indicated that the specimens finished with the coarse diamond caused significantly higher antagonist wear than the polished ones. Polished zirconia showed the lowest wear of the antagonist enamel, with a mean value of 171.74 (SD = 121.68), and resulted in enamel wear that was not significantly different from that of the glass ceramic control group. No significant linear correlation could be found between pre-testing surface roughness and abrasive wear.

SIGNIFICANCE: If zirconia is used without veneering material for crowns and fixed dental prostheses (FDPs), the surface must be well-polished if occlusal adjustments with coarse diamonds are performed. The polishing step reduces the wear of the opposing enamel.

PMID: 22608163 DOI: 10.1016/j.dental.2012.04.010

J Prosthet Dent. 2014 Nov;112(5):1151-5. doi: 10.1016/j.prosdent.2013.12.021. Epub 2014 May 16.

Three-body wear potential of dental yttrium-stabilized zirconia ceramic after grinding, polishing, and glazing treatments.

Amer R[1], Kürklü D[2], Kateeb E[3], Seghi RR[4].

Author information

Abstract

STATEMENT OF PROBLEM: Zirconia complete-coverage crowns are being widely used as restorations because of their improved esthetic characteristics. Data about the enamel wear potential of this ceramic after chair side adjustments are sparse.

PURPOSE: The purpose of this study was to investigate the 3-body wear of enamel opposing 3 types of ceramic (dense sintered yttrium-stabilized zirconia; Crystal Zirconia; DLMS) (Z), a lithium disilicate (IPS e-max CAD; Ivoclar Vivadent) (E), and a conventional low-fusing feldspathic porcelain (VitaVMK-Master; Vita Zahnfabrik) (P), treated to impart a rough, smooth, or glazed surface.

MATERIAL AND METHODS: Twenty-four specimens of each of the zirconia and the lithium disilicate ceramic were sectioned from computer-aided design and computer-aided manufacturing blocks into rectangular plates (15×12×2 mm). Twenty-four specimens of the feldspathic porcelain were formed into disks (12 mm diameter) from powders compressed in a silicone mold. All specimens (n=72) were prepared according to the manufacturers' recommendations. Specimens of each ceramic group were placed into 1 of 3 groups: group R, rough surface finish; group S, smooth surface finish; and group G, glazed surface finish. A total of 9 groups with 8 specimens each were placed in a 3-body wear simulator, with standardized enamel specimens (n=72) acting as the substrate. The wear of the enamel specimens was evaluated after 50,000 cycles. The data were analyzed with 2-way ANOVA and the Tukey HSD multiple comparison test (α=.05).

RESULTS: The data showed that the smooth zirconia group (ZS) was associated with the least amount of enamel wear (1.26 ±0.55 mm(2)). The most antagonistic enamel wear was associated with the glazed groups ZG (5.58 ±0.66 mm(2)), EG (3.29 ±1.29 mm(2)), and PG (4.2 ±1.27 mm(2)).

CONCLUSIONS: The degree of enamel wear associated with monolithic zirconia was similar to conventional feldspathic porcelain. Smoothly polished ceramic surfaces resulted in less wear of antagonistic enamel than glazing.

PMID: 24836531 DOI: 10.1016/j.prosdent.2013.12.021

[Indexed for MEDLINE]

Dent Mater. 2013 Jun;29(6):666-73. doi: 10.1016/j.dental.2013.03.008. Epub 2013 Apr 6.

Full-contour Y-TZP ceramic surface roughness effect on synthetic hydroxyapatite wear.

Sabrah AH[1], Cook NB, Luangruangrong P, Hara AT, Bottino MC.

Author information

1 Department of Restorative Dentistry (Graduate Operative), Indiana University School of Dentistry (IUSD), Indianapolis, IN 46202, USA.

Abstract

OBJECTIVE: To investigate the effects of polishing techniques on the surface roughness of Y-TZP ceramic and on the wear behavior of synthetic hydroxyapatite (HA).

METHODS: Thirty-two full-contour Y-TZP (Diazir(®)) sliders (φ=2 mm × 1.5 mm in height) were manufactured using CAD/CAM, embedded in acrylic resin using brass holders, and randomly allocated into four groups (n=8) according to the finishing/polishing procedure: G1-as-machined, G2-glazed, G3-diamond bur finishing and G4-G3+OptraFine(®) polishing kit. Thirty-two sintered HA disks (φ=13 mm × 2.9 mm in height) were similarly mounted in brass holders. Y-TZP sliders baseline surface roughness values (Ra and Rq, in μm) were recorded using a non-contact profilometer (Proscan 2000). A two-body pin-on-disc wear test was performed. HA height (μm) and volume (mm(3)) losses were measured. Y-TZP height loss was measured using a digital micrometer. One-way ANOVA was used to determine the effect of the polishing techniques on the surface roughness. Comparisons between groups for differences in antagonist height loss/volume, and slider height loss were performed using one-way ANOVA. Statistical significance was set at α=0.05.

RESULTS: Roughness measurements showed significant differences (p=0.0001) among the surface treatments with G1 (Ra=0.84, Rq=1.13 μm) and G3 (Ra=0.89, Rq=1.2 μm) being the roughest, and G2 (Ra=0.42, Rq=0.63 μm) the smoothest (p=0.0001). Y-TZP slider height loss was highest for the glazed group (35.39 μm), and was lowest for the polished group (6.61 μm) (p=0.0001). Antagonist volume and height losses for groups (G1-G3) were similar, while the polished group (1.3 mm(3), 14.7 μm) showed significant lower values (p=0.0001).

SIGNIFICANCE: Although glazed zirconia provides an initially smooth surface, significantly increased antagonis wear was observed compared to the polished Y-TZP zirconia surface.

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[Indexed for MEDLINE]

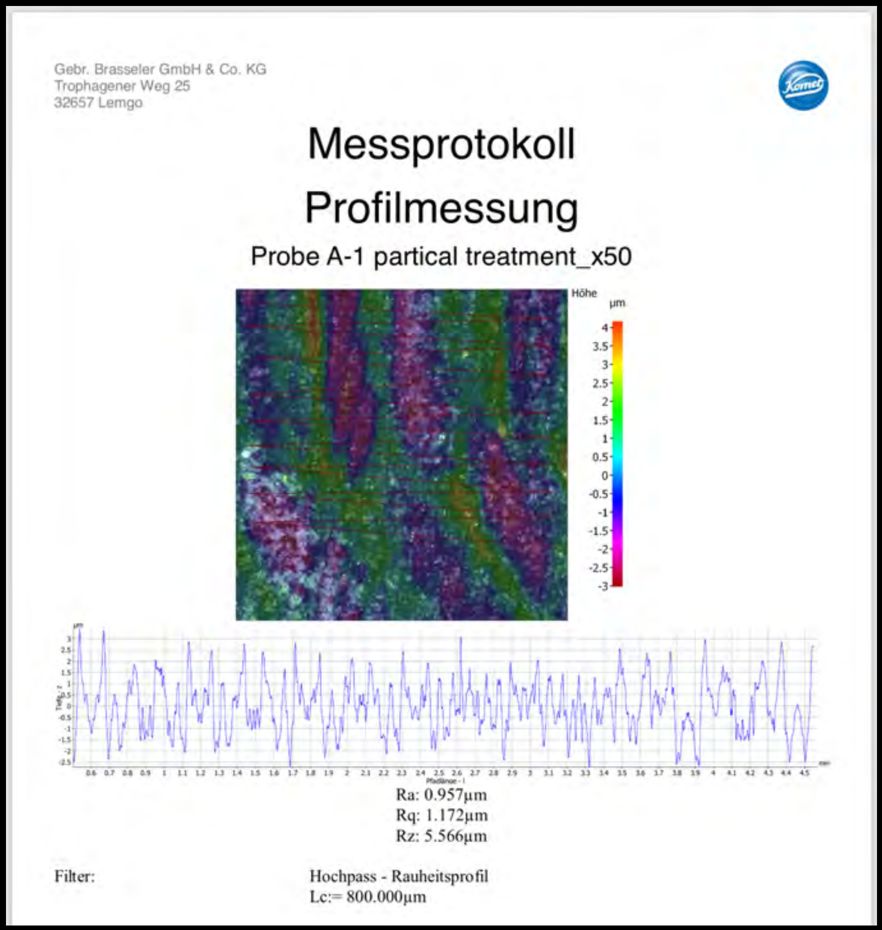
Materiali e metodi

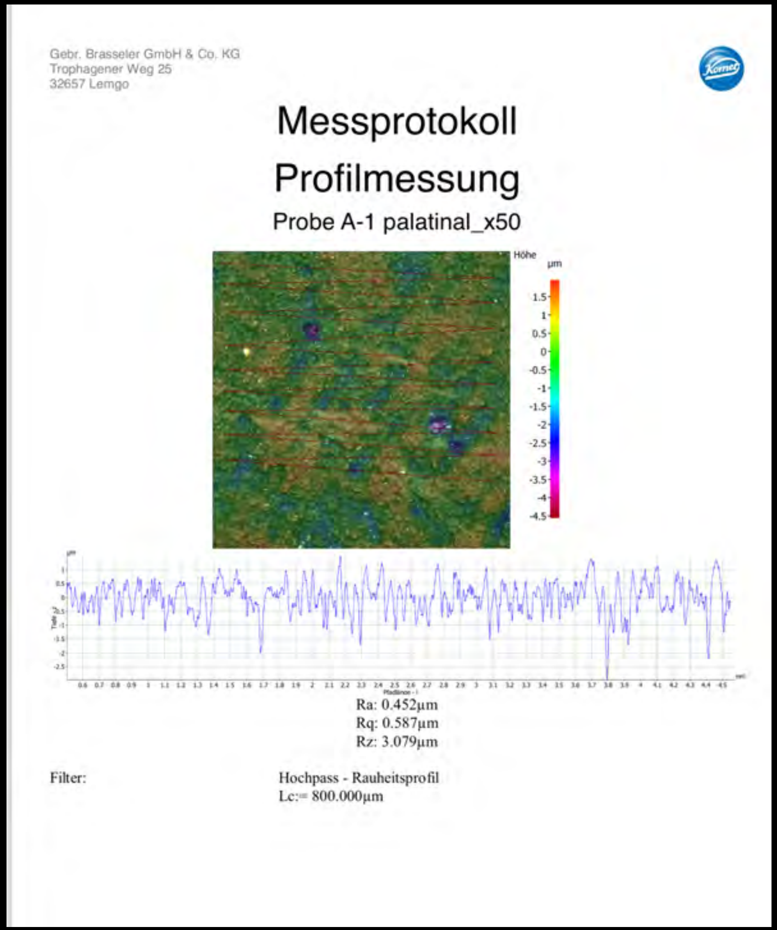
Sono stati fresati, con lo stesso progetto, sei differenti blocchetti. I campioni, trattati come da protocollo, sono stati divisi in tre parti: mesio-vestibolare, disto vestibolare e palatale. Le superfici sono state trattate con diverse frese e gommini. Le misurazioni sono state eseguite con un rugosimetro Alicona Infinite Focus, presso il laboratorio di Komet Dental a Lemgo in Germania

La parte disto-vestibolare è stata trattata utilizzando frese del commercio, in un singolo passaggio, cercando di utilizzare una granulometria quanto più adeguata al materiale in esame, mentre la parte mesio-vestibolare è stata trattata con il protocollo del Komet Digital Prosthetic Essential Kit (Ref. 4685).

La superficie palatale, non trattata con frese, è stata usata per il controllo.

Questo studio è stato realizzato in singolo cieco in quanto il laboratorio tedesco non era a conoscenza né dei materiali esaminati né di come fossero state trattate le superfici.


Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo
Messprotokoll
Profilmessung
Probe A-1 partical treatment_x50
Höhe
µm
Ra: 0.957µm
Rq: 1.172µm
Rz: 5.566µm
Filter:
Hochpass - Rauheitsprofil
Lc:= 800.000µm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Trophagener Weg 25
32657 Lemgo
Messprotokoll
Profilmessung
Probe A-1 palatinal_x50
Höhe
µm
Ra: 0.452µm
Rq: 0.587µm
Rz: 3.079µm
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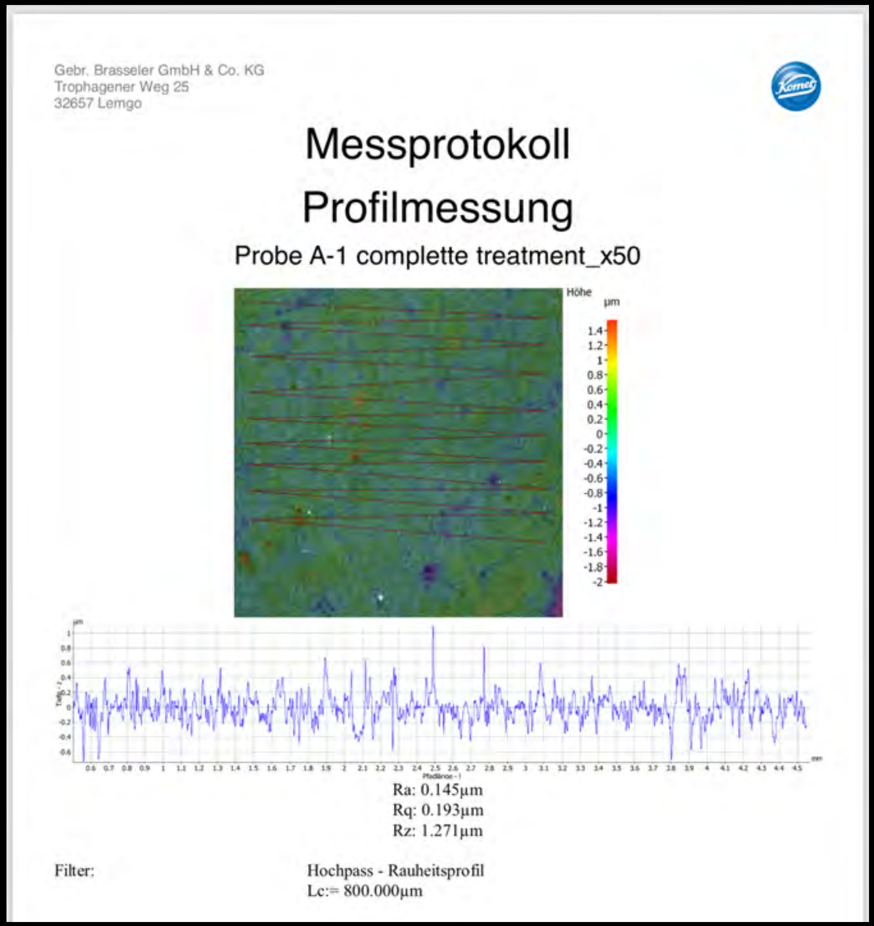
Lc:= 800.000µm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32657 Lemgo
Messprotokoll
Profilmessung
Probe A-1 complette treatment_x50
Höhe
µm
Ra: 0.145µm
Rq: 0.193µm
Rz: 1.271µm
Filter:
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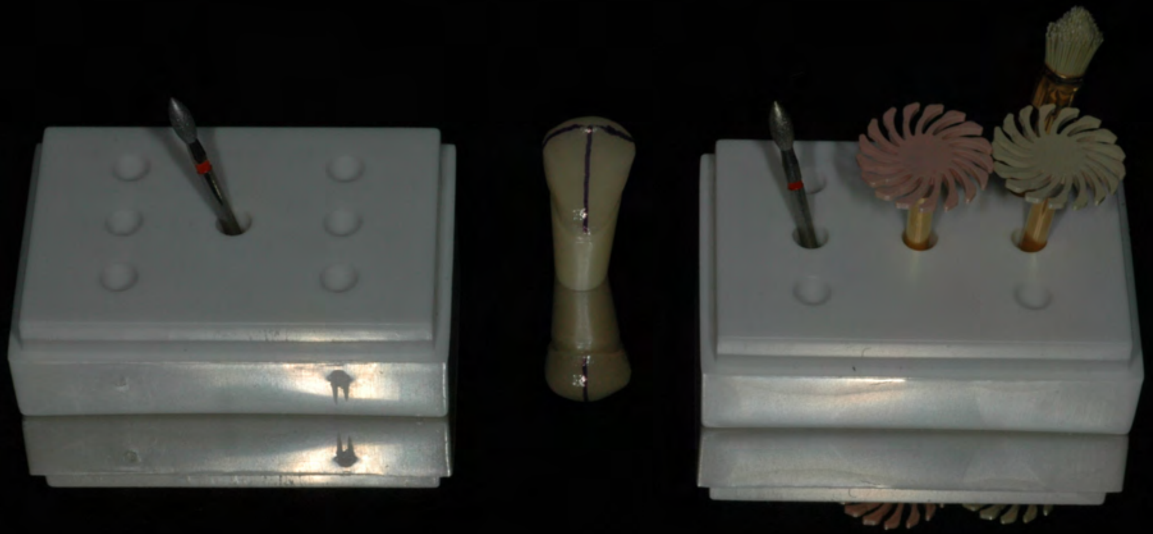
Lc:= 800.000µm

VITA Enamic

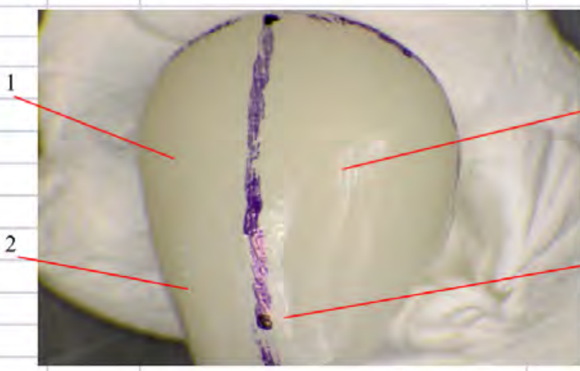


Probe A | Probe B | Probe C | Probe D | Probe E | Probe F

Probe A

Nr.	Benennung	Rz Ergebniss [µm]	Sonstiges
1	Probe A-1 partical treatment	5,6	grobe Oberfläche
2	Probe A-2 partical treatment	6,5	grobe Oberfläche
3	Probe A-1 complette treatment	1,3	-
4	Probe A-2 complette treatment	1,4	-
5	Probe A-1 palatinal	3,1	bearbeitete Fläche?
6	Probe A-2 palatinal	4,4	starker Glanz

1 3
2 4



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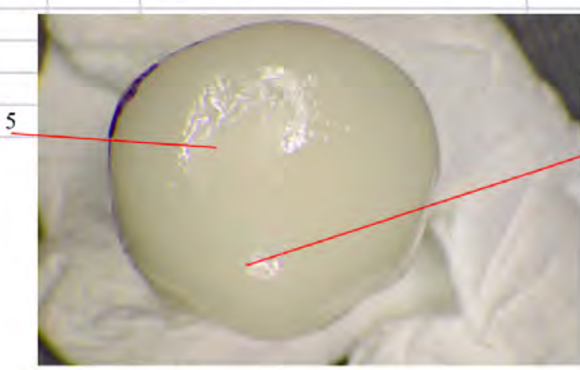
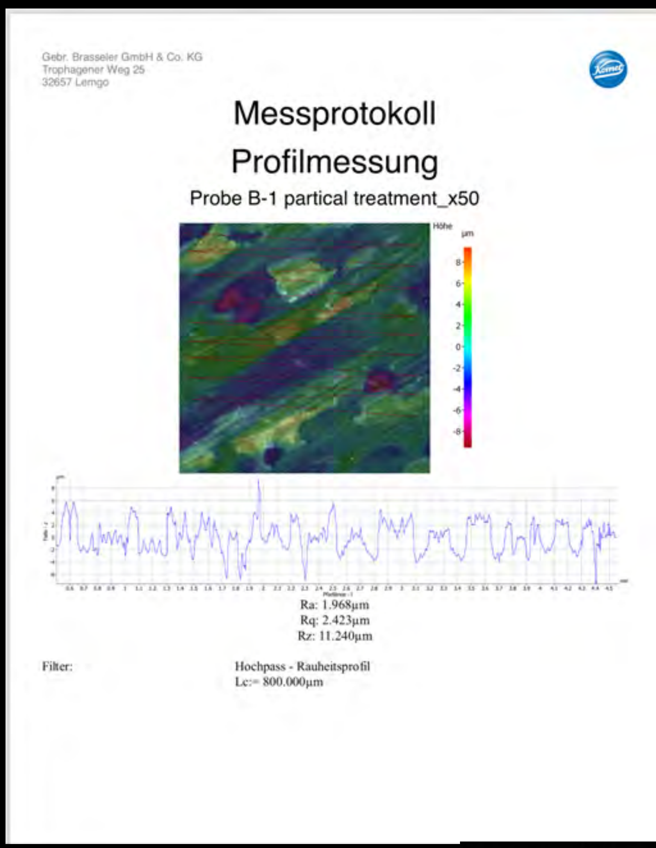
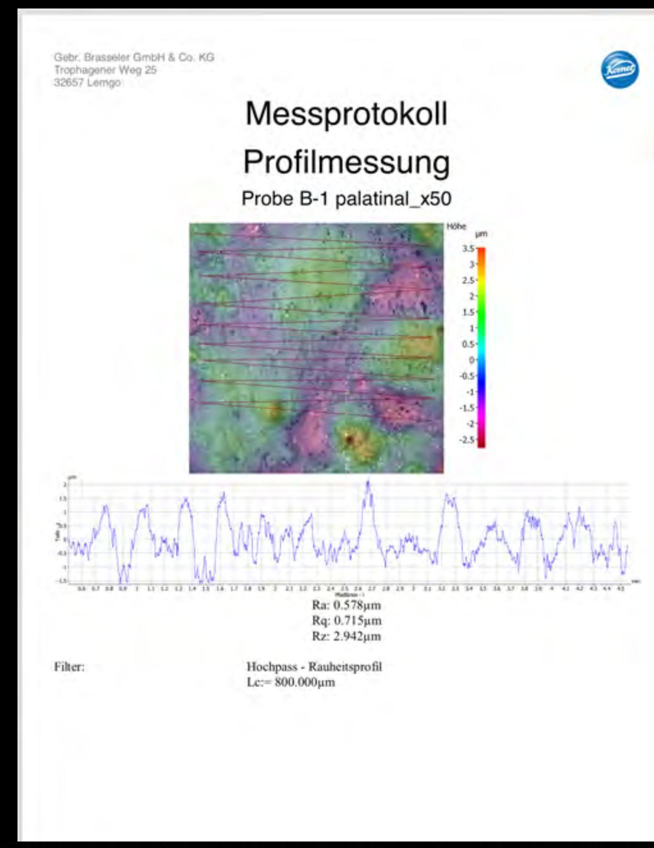



Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe B-1 partical treatment_x50

Ra: 1.968µm
Rq: 2.423µm
Rz: 11.240µm

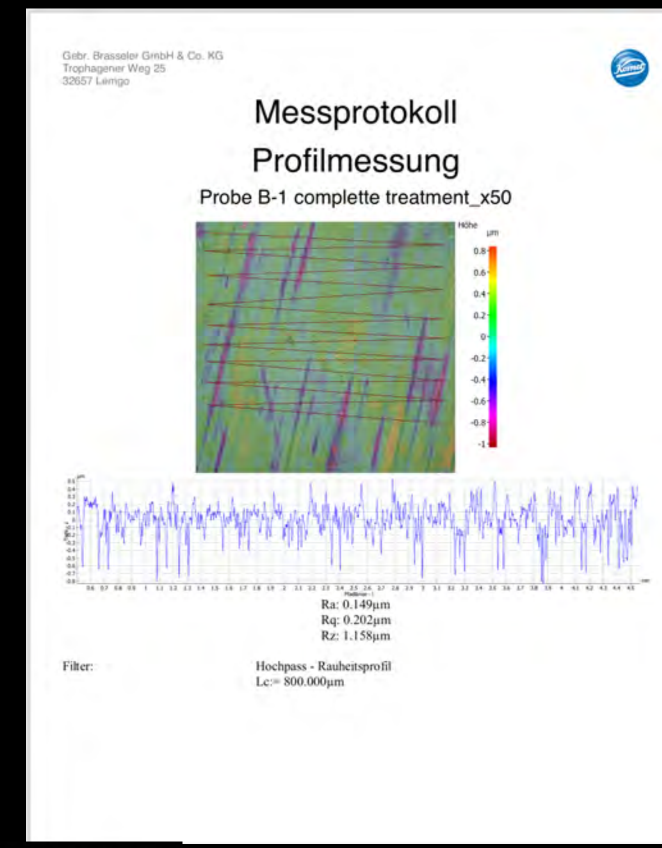
Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm


Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe B-1 palatinal_x50

Ra: 0.578µm
Rq: 0.715µm
Rz: 2.942µm

Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm


Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe B-1 complette treatment_x50

Ra: 0.149µm
Rq: 0.202µm
Rz: 1.158µm

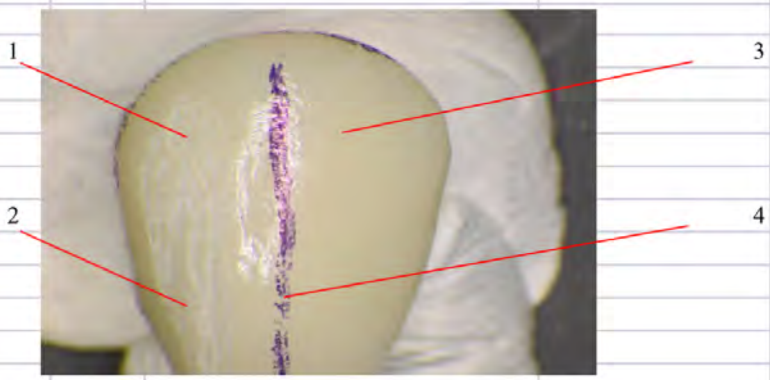
Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm

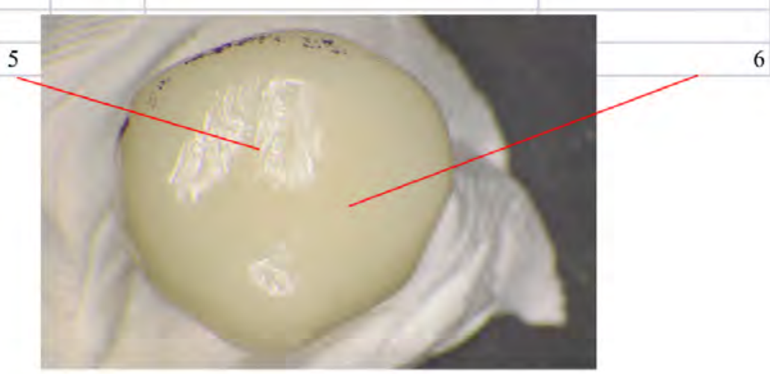
Ivoclar E.Max

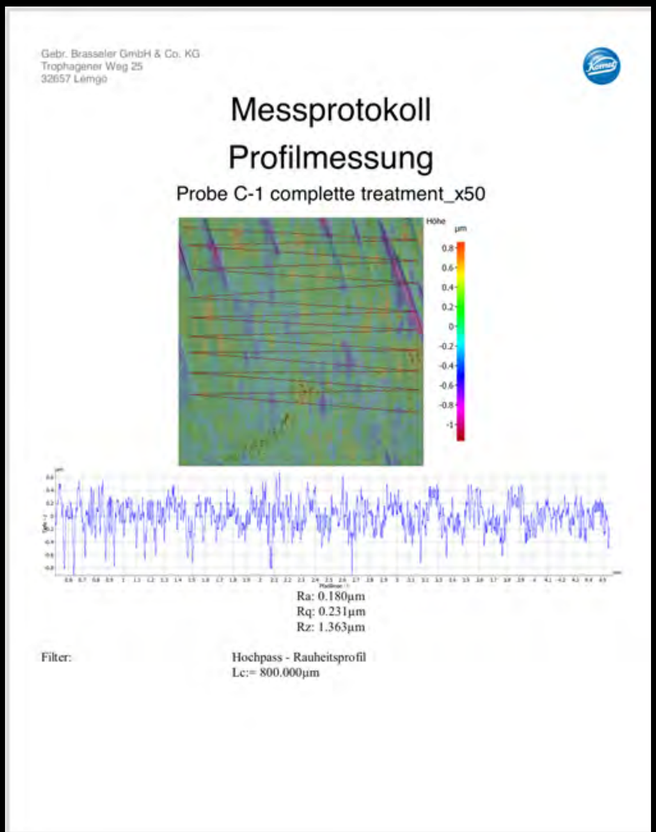
Probe A | **Probe B** | Probe C | Probe D | Probe E | Probe F

Probe B

Nr.	Benennung	Rz Ergebniss [µm]	Sonstiges
1	Probe B-1 partical treatment	11,2	grobe Oberfläche
2	Probe B-2 partical treatment	10,9	grobe Oberfläche
3	Probe B-1 complette treatment	1,2	-
4	Probe B-2 complette treatment	1,0	-
5	Probe B-1 palatinal	2,9	-
6	Probe B-2 palatinal	2,4	-



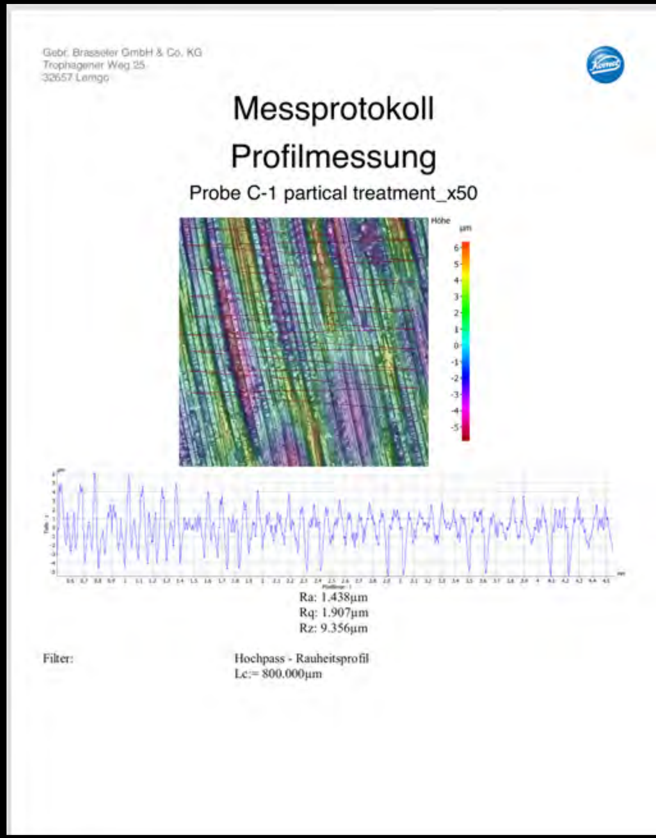



Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe C-1 complette treatment_x50

Ra: 0.180µm
Rq: 0.231µm
Rz: 1.363µm

Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm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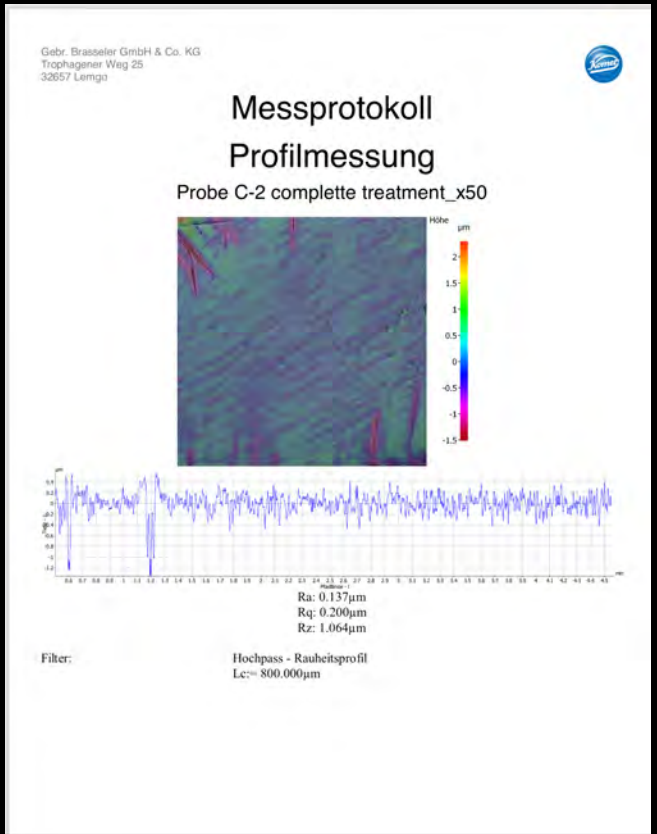
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe C-1 partical treatment_x50

Ra: 1.438µm
Rq: 1.907µm
Rz: 9.356µm

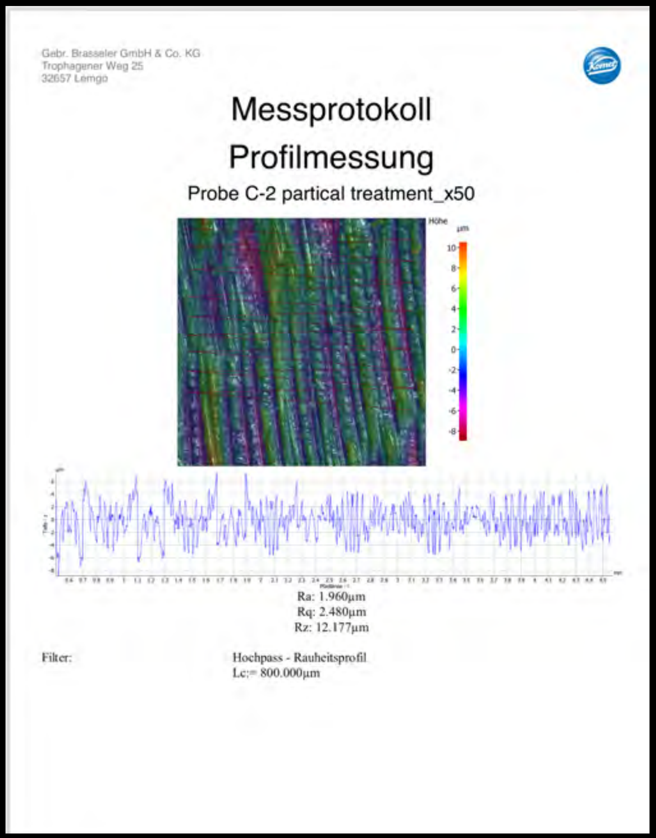
Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm


Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe C-2 complette treatment_x50

Ra: 0.137µm
Rq: 0.200µm
Rz: 1.064µm

Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm


Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe C-2 partical treatment_x50

Ra: 1.960µm
Rq: 2.480µm
Rz: 12.177µm

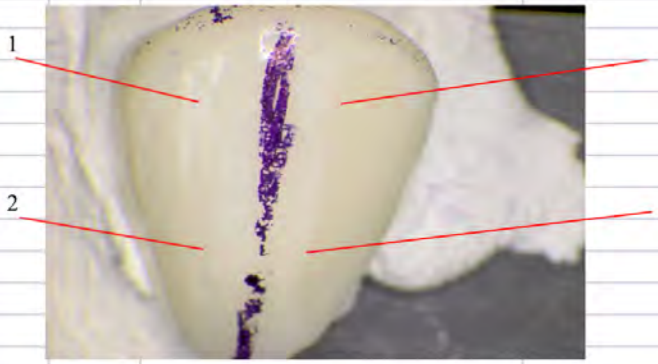
Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm

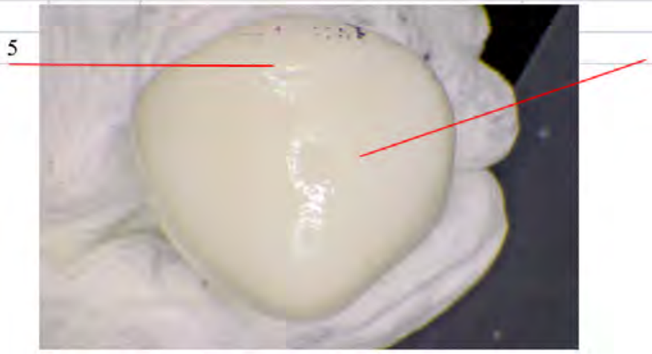
VOCLAR ZirCAD

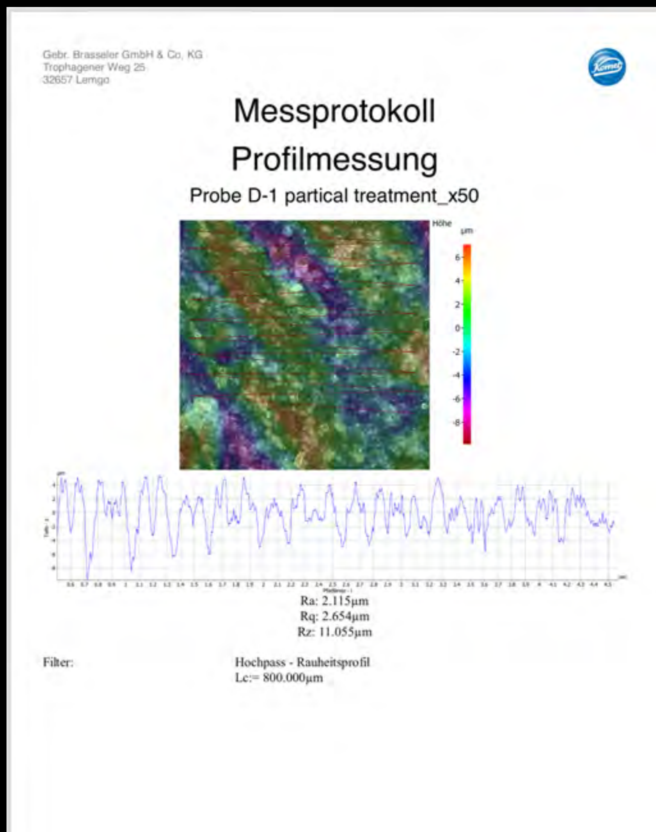
Probe A | Probe B | Probe C | Probe D | Probe E | Probe F

Probe C

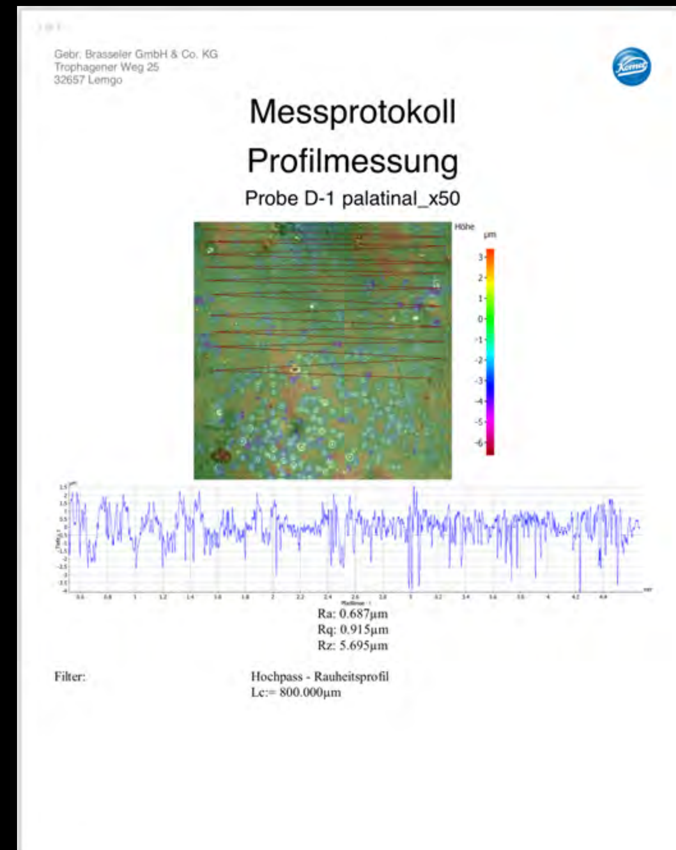
Nr.	Benennung	Rz Ergebniss [µm]	Sonstiges
1	Probe C-1 partical treatment	9,4	tiefe Rillen
2	Probe C-2 partical treatment	12,2	tiefe Rillen
3	Probe C-1 complette treatment	1,4	-
4	Probe C-2 complette treatment	1,1	-
5	Probe C-1 palatinal	nicht messbar	glänzende Oberfläche
6	Probe C-2 palatinal	nicht messbar	glänzende Oberfläche



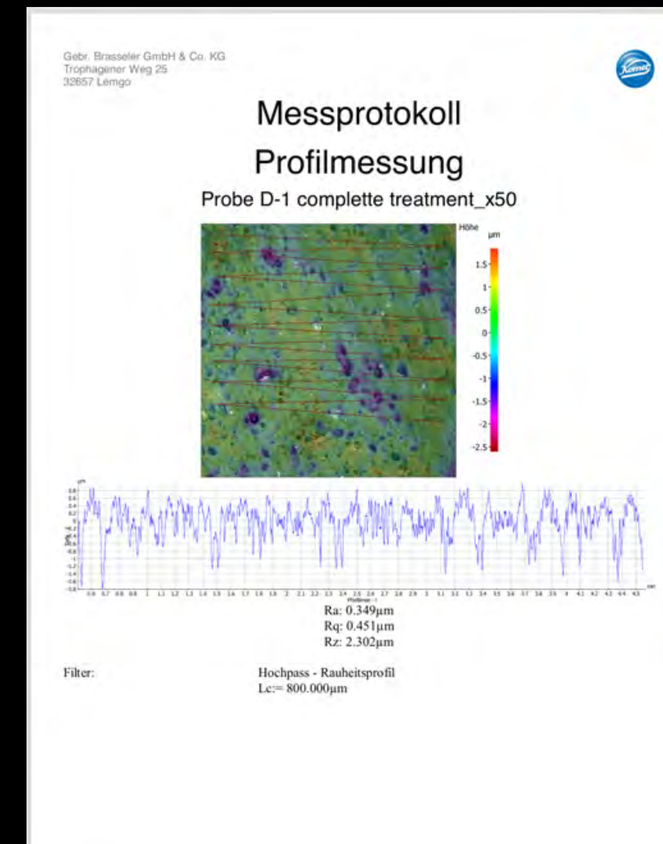




Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo
Messprotokoll
Profilmessung
Probe D-1 partical treatment_x50
Höhe
µm
Ra: 2.115µm
Rq: 2.654µm
Rz: 11.055µm
Filter:
Hochpass - Rauheitsprofil
Lc:= 800.000µm



Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo
Messprotokoll
Profilmessung
Probe D-1 palatinal_x50
Höhe
µm
Ra: 0.687µm
Rq: 0.915µm
Rz: 5.695µm
Filter:
Hochpass - Rauheitsprofil
Lc:= 800.000µm



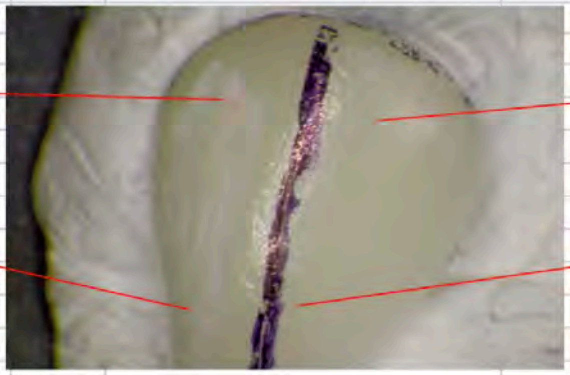
Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo
Messprotokoll
Profilmessung
Probe D-1 complette treatment_x50
Höhe
µm
Ra: 0.349µm
Rq: 0.451µm
Rz: 2.302µm
Filter:
Hochpass - Rauheitsprofil
Lc:= 800.000µm

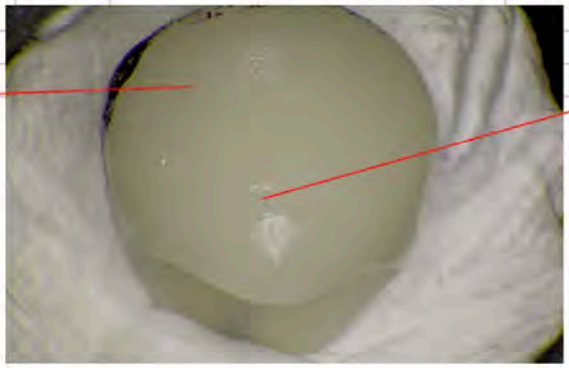
GC Initial

Probe A | Probe B | Probe C | **Probe D** | Probe E | Probe F

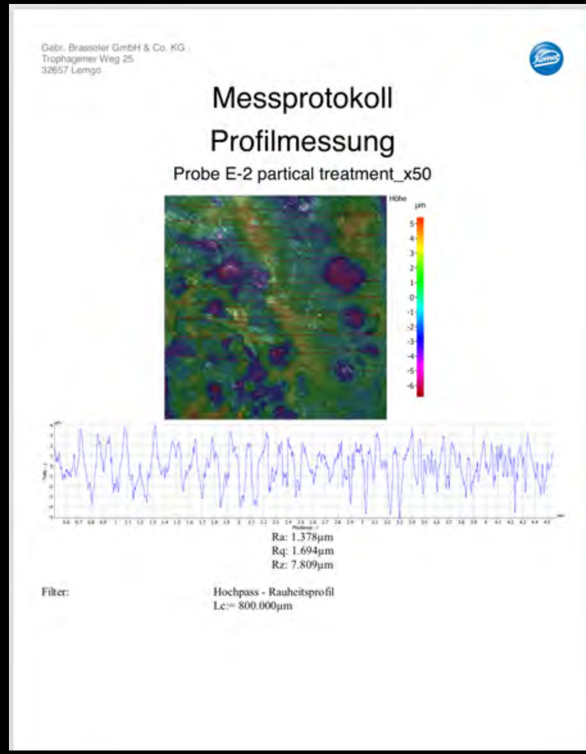
Probe D

Nr.	Benennung	Rz Ergebniss [µm]	Sonstiges
1	Probe D-1 partical treatment	11,1	tiefe Rillen
2	Probe D-2 partical treatment	12,8	grobe Oberfläche
3	Probe D-1 complette treatment	2,3	-
4	Probe D-2 complette treatment	2,0	-
5	Probe D-1 palatinal	5,7	-
6	Probe D-2 palatinal	5,1	-

1
3

2
4

5
6


VITA CADtemp



Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

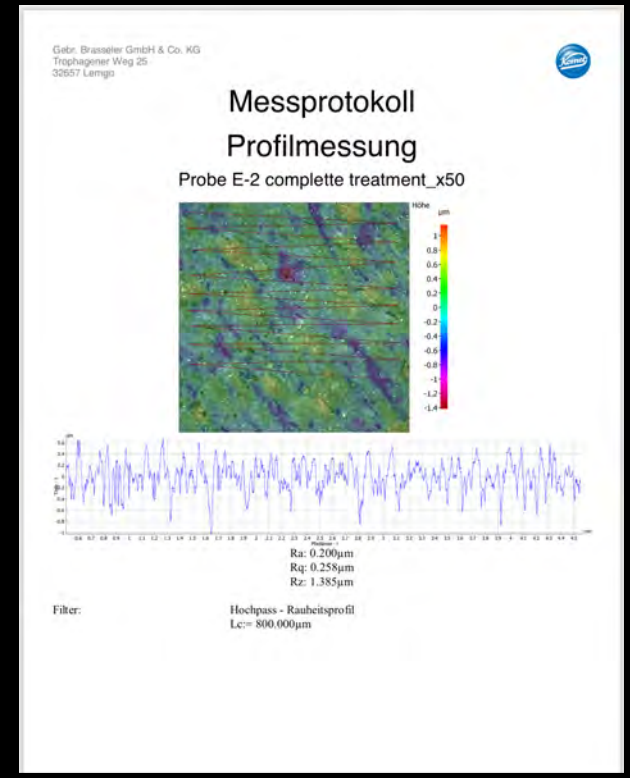
Messprotokoll

Profilmessung

Probe E-2 partical treatment_x50

Ra: 1.378µm
Rq: 1.694µm
Rz: 7.809µm

Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm



Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll

Profilmessung

Probe E-2 complette treatment_x50

Ra: 0.200µm
Rq: 0.258µm
Rz: 1.385µm

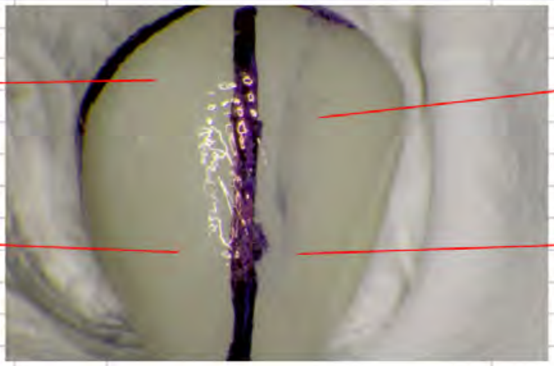
Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm

Probe A Probe B Probe C Probe D Probe E Probe F

Probe E

Nr.	Benennung	Rz Ergebniss [µm]	Sonstiges
1	Probe E-1 partical treatment	7,5	grobe Oberfläche
2	Probe E-2 partical treatment	7,8	grobe Oberfläche
3	Probe E-1 complette treatment	1,1	-
4	Probe E-2 complette treatment	1,4	-
5	Probe E-1 palatinal	nicht messbar	glänzende Oberfläche
6	Probe E-2 palatinal	nicht messbar	glänzende Oberfläche

1 3
2 4



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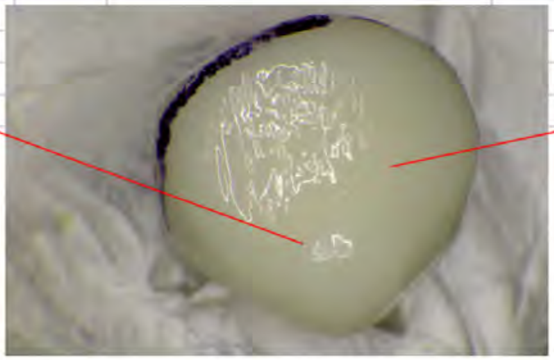

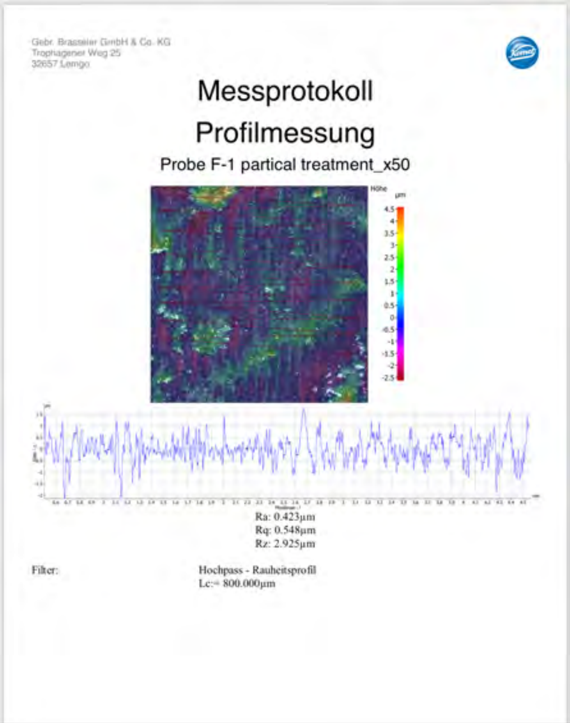

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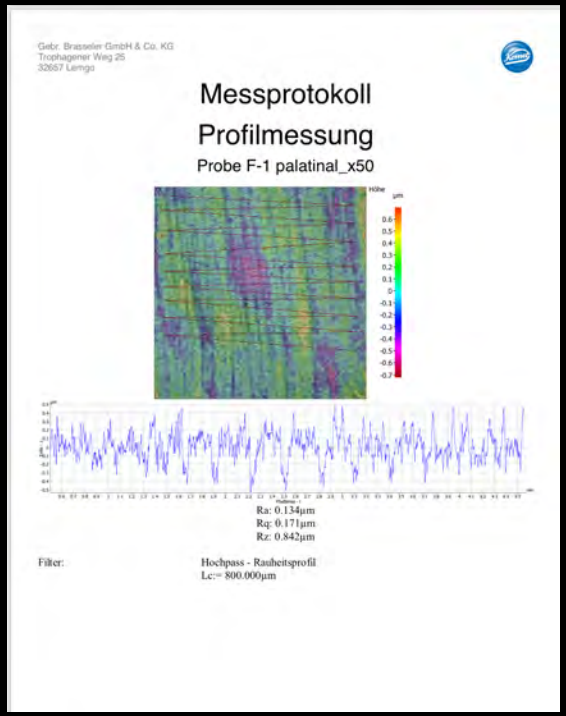
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe F-1 partical treatment_x50

Ra: 0.423µm
Rq: 0.548µm
Rz: 2.925µm

Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm



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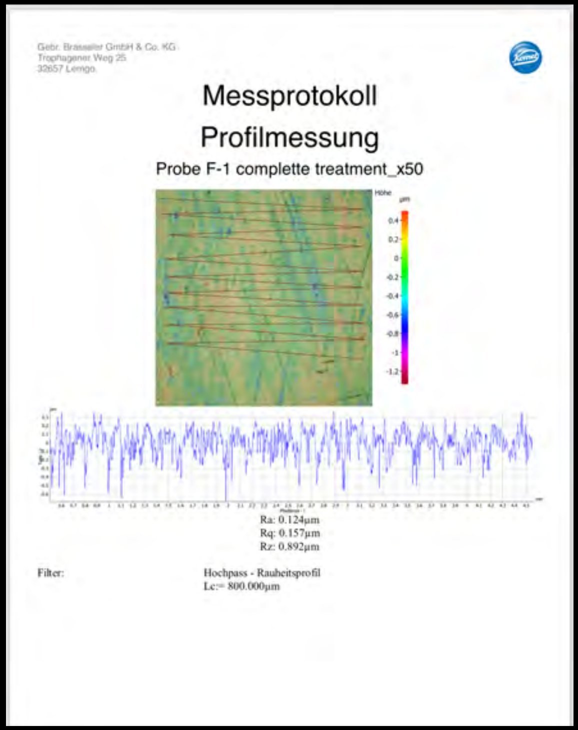
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe F-1 palatinal_x50

Ra: 0.134µm
Rq: 0.171µm
Rz: 0.842µm

Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm



Gebr. Brasseler GmbH & Co. KG
Trophagener Weg 25
32657 Lemgo

Messprotokoll
Profilmessung
Probe F-1 complette treatment_x50

Ra: 0.124µm
Rq: 0.157µm
Rz: 0.892µm

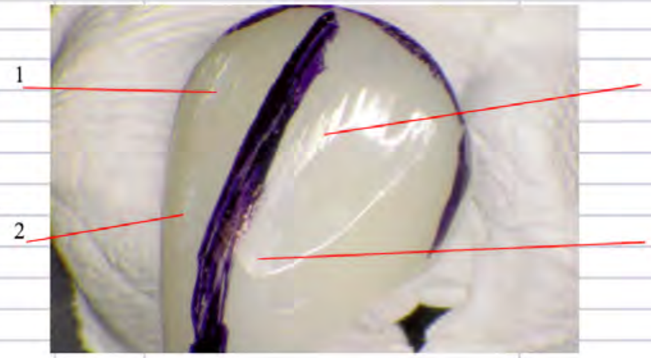
Filter: Hochpass - Rauheitsprofil
Lc:= 800.000µm

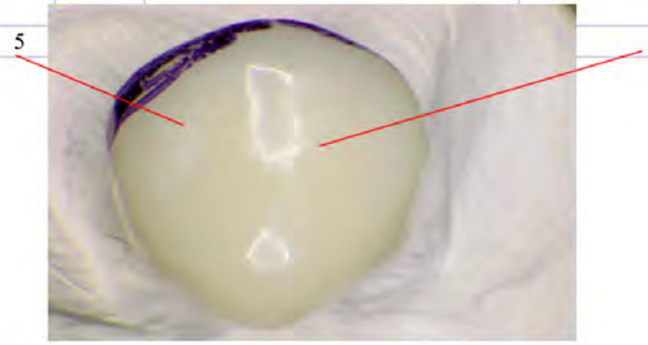
IVOCLAR Tetric

Probe A | Probe B | Probe C | Probe D | Probe E | **Probe F**

Probe F

Nr.	Benennung	Rz Ergebniss [µm]	Sonstiges
1	Probe F-1 partical treatment	2,9	-
2	Probe F-2 partical treatment	8,2	grobe Oberfläche
3	Probe F-1 complette treatment	0,9	-
4	Probe F-2 complette treatment	0,8	-
5	Probe F-1 palatinal	0,8	bearbeitete Fläche?
6	Probe F-2 palatinal	1,2	bearbeitete Fläche?





La misura della rugosità **Ra**, espressa in micron, è il valore medio aritmetico degli scostamenti (presi in valore assoluto) del profilo reale della superficie rispetto alla linea media.

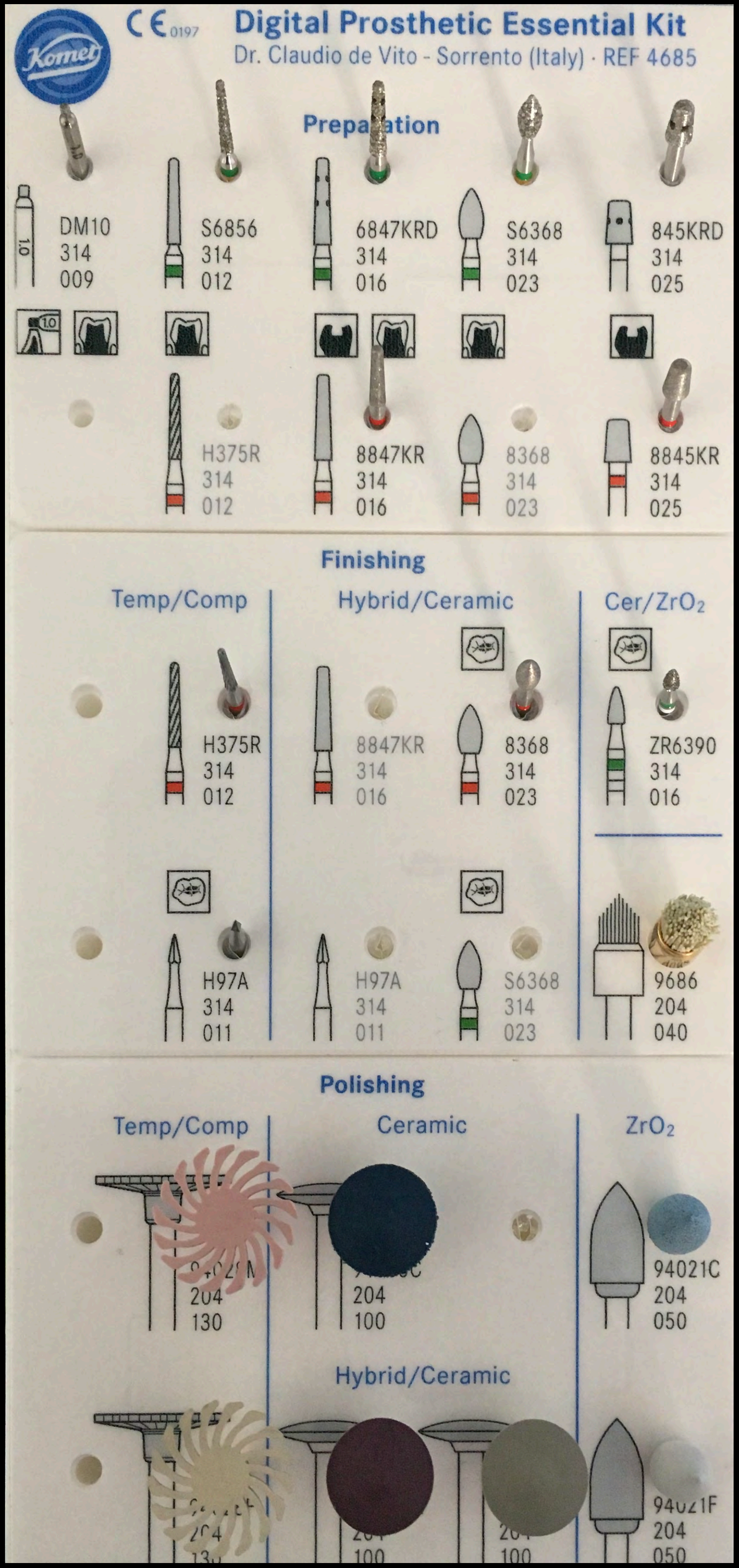
Rq, invece, rappresenta la media quadratica degli scostamenti dei punti del profilo dalla linea media; tale parametro, essendo una media quadratica è più sensibile ai bruschi scostamenti del profilo da un andamento regolare ed è in generale maggiore rispetto al valore Ra.

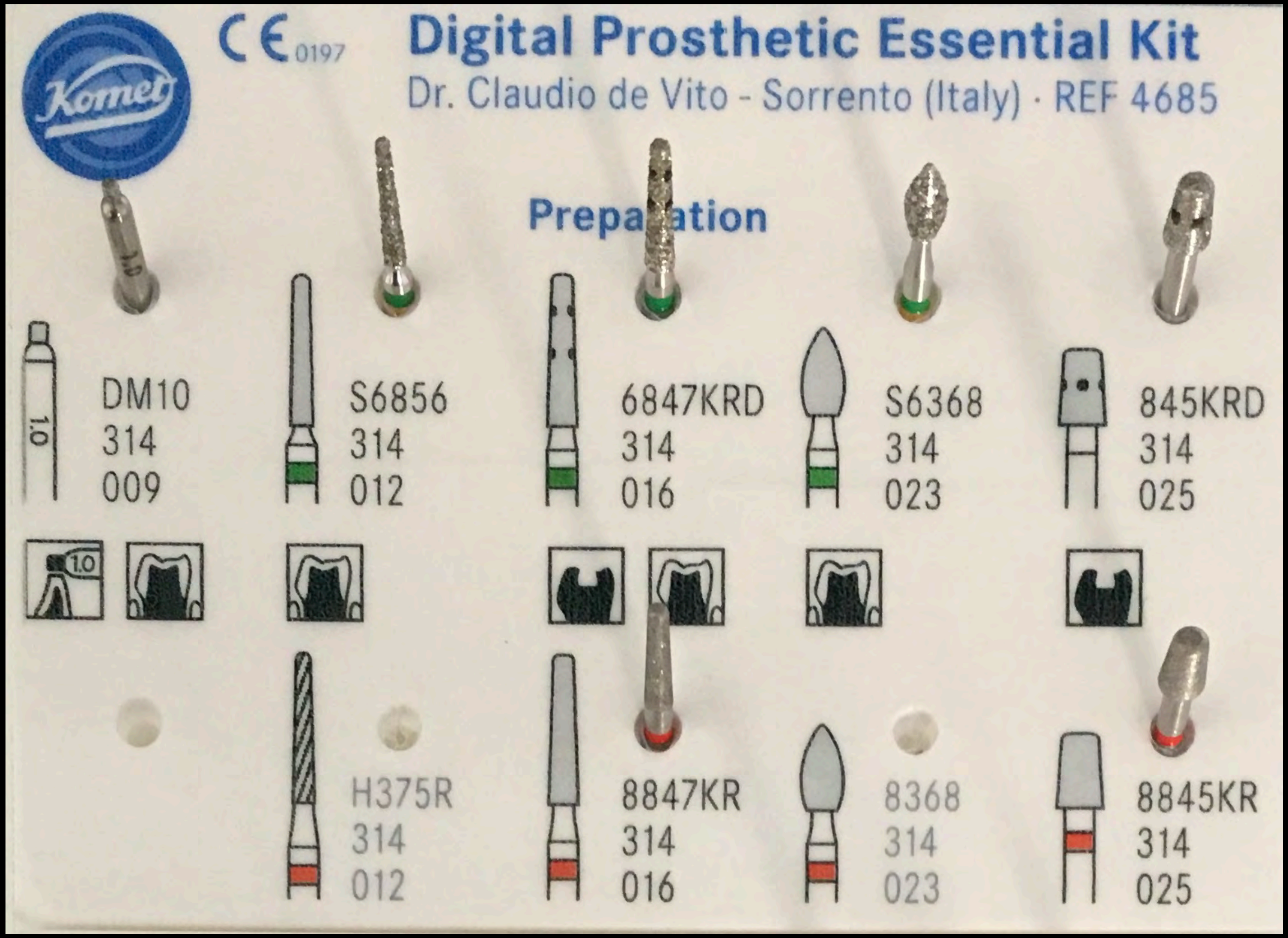
Rz è la media aritmetica dei valori assoluti dei 5 picchi più alti e delle 5 valli più profonde compresi in un intervallo.

L’analisi dei risultati mostra chiaramente che le superfici trattate secondo il protocollo del Digital Prosthetic Essential Kit sono molto più levigate delle superfici trattate con la singola fresa. Questo era facilmente intuibile ancora prima di eseguire lo studio, ma il risultato straordinario è rappresentato dal fatto di aver ottenuto, in molti casi, una superficie più levigata di quella ottenuta seguendo il protocollo fornito dall’azienda produttrice.

Digital Prosthetic Essential Kit

Preparazione
Finitura
Lucidatura





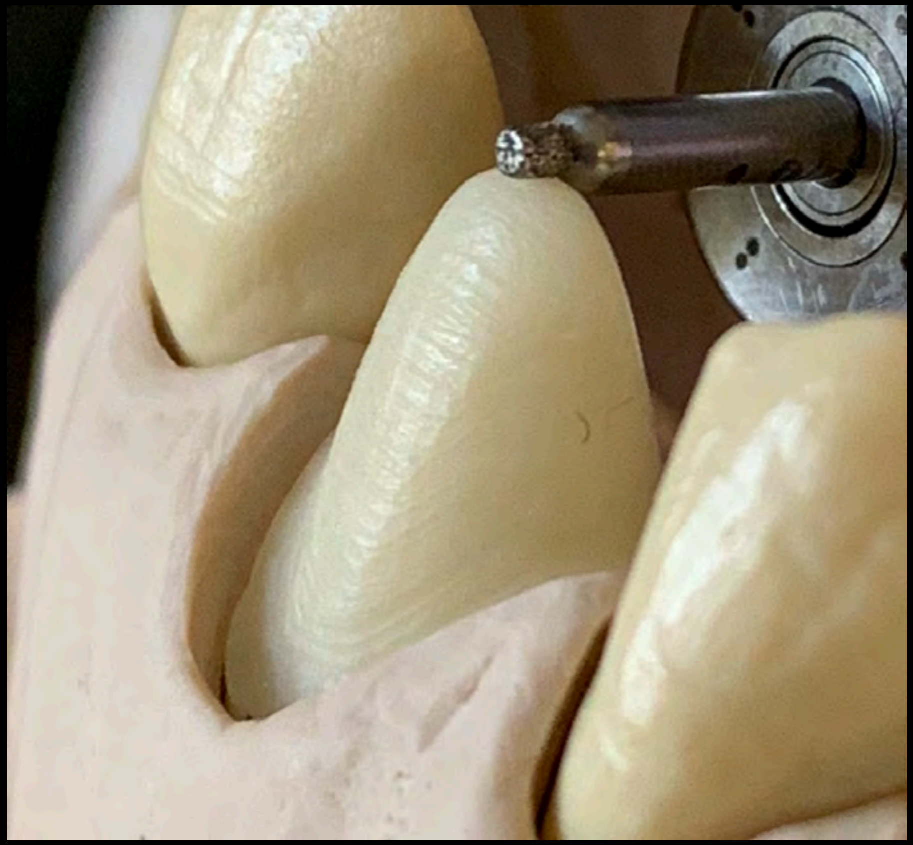
Preparation

Per restauri parziali e totali

Questa fresa è usata per marcare la profondità di preparazione in tutti gli ambiti della restaurativa e soprattutto per aiutare a dare il giusto spessore alla preparazione nella zona incisale.

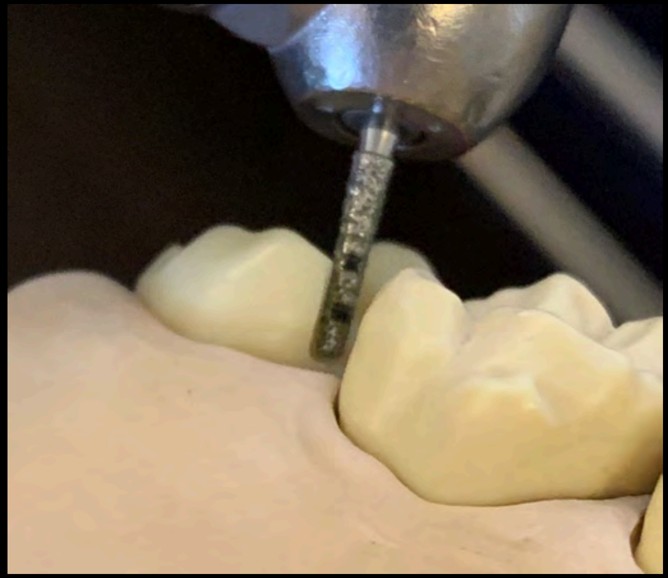
Frequentemente il diametro della testa della fresa della fresatrice che deve preparare la corona nella sua parte cava è di almeno 0,8mm; una preparazione con uno spessore incisale inferiore non può essere riprodotta dalla fresatrice che quindi produrrebbe un restauro incongruo.

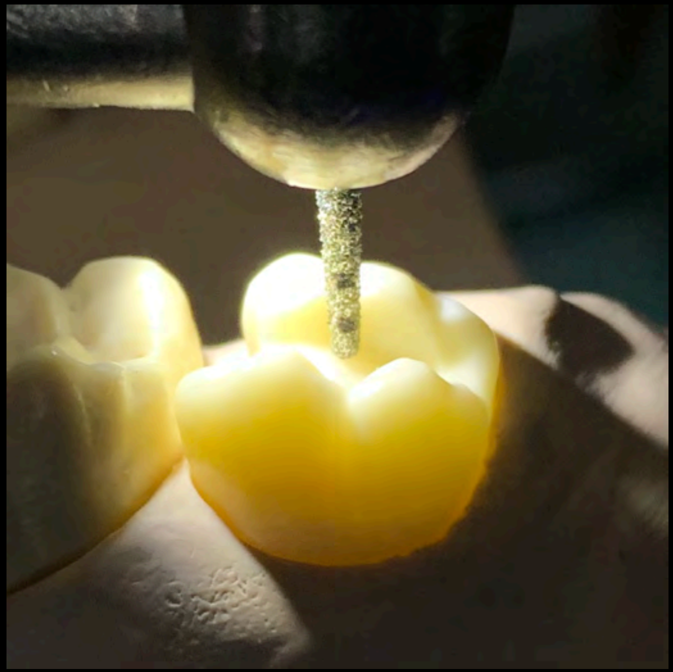
L’uso della sola parte lavorante sul margine incisale della preparazione garantisce uno spessore di 1mm.



Fresa anello verde da 012, conica a testa arrotondata, puo’ essere usata per preparazioni minime sia di corone che di faccette. Dato il suo spessore ridotto trova applicazione anche nella preparazione delle zone prossimali

Fresa anello verde, conica da 016 a testa piatta con bordi arrotondati.
Da utilizzare per la preparazione orizzontale di corone in modo da facilitare l’uso di scanner intraorali per impronta ottica.
Importanti gli indicatori di profondità a 2 e 4mm.
Questi facilitano la corretta preparazione di cavità per inlay informando il clinico dello spessore necessario da dare al restauro.

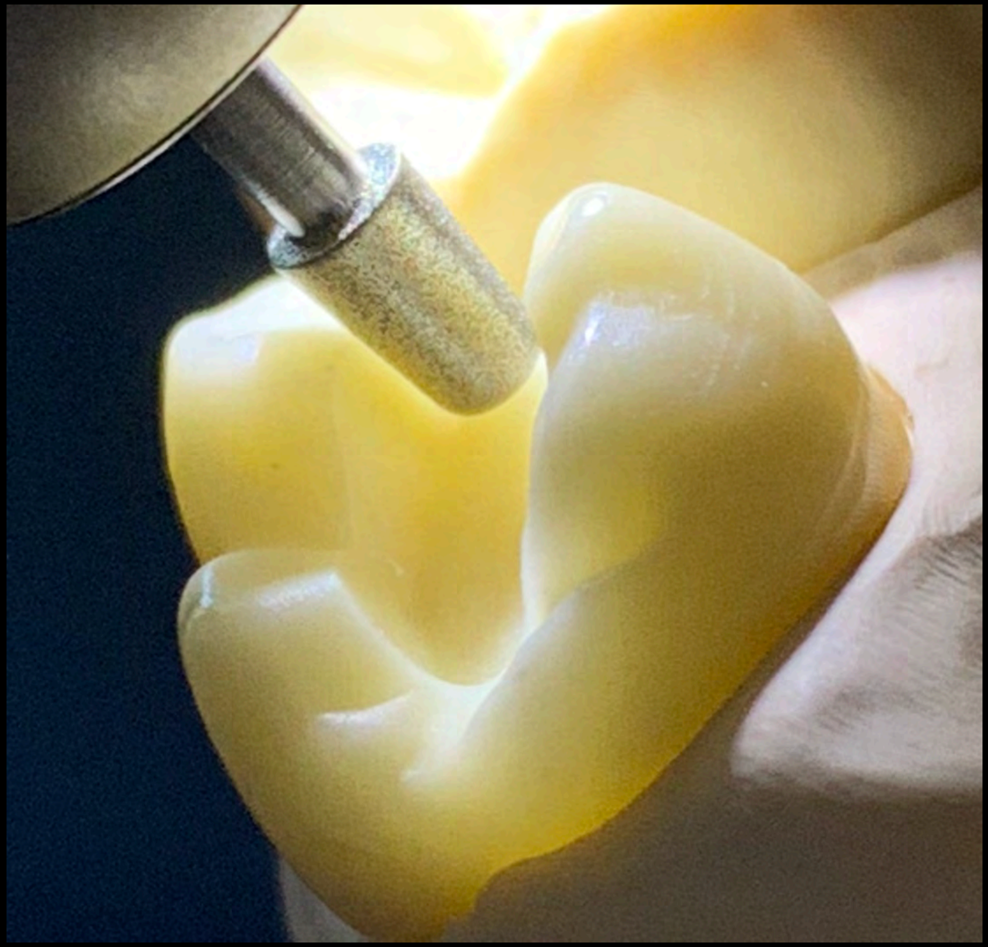


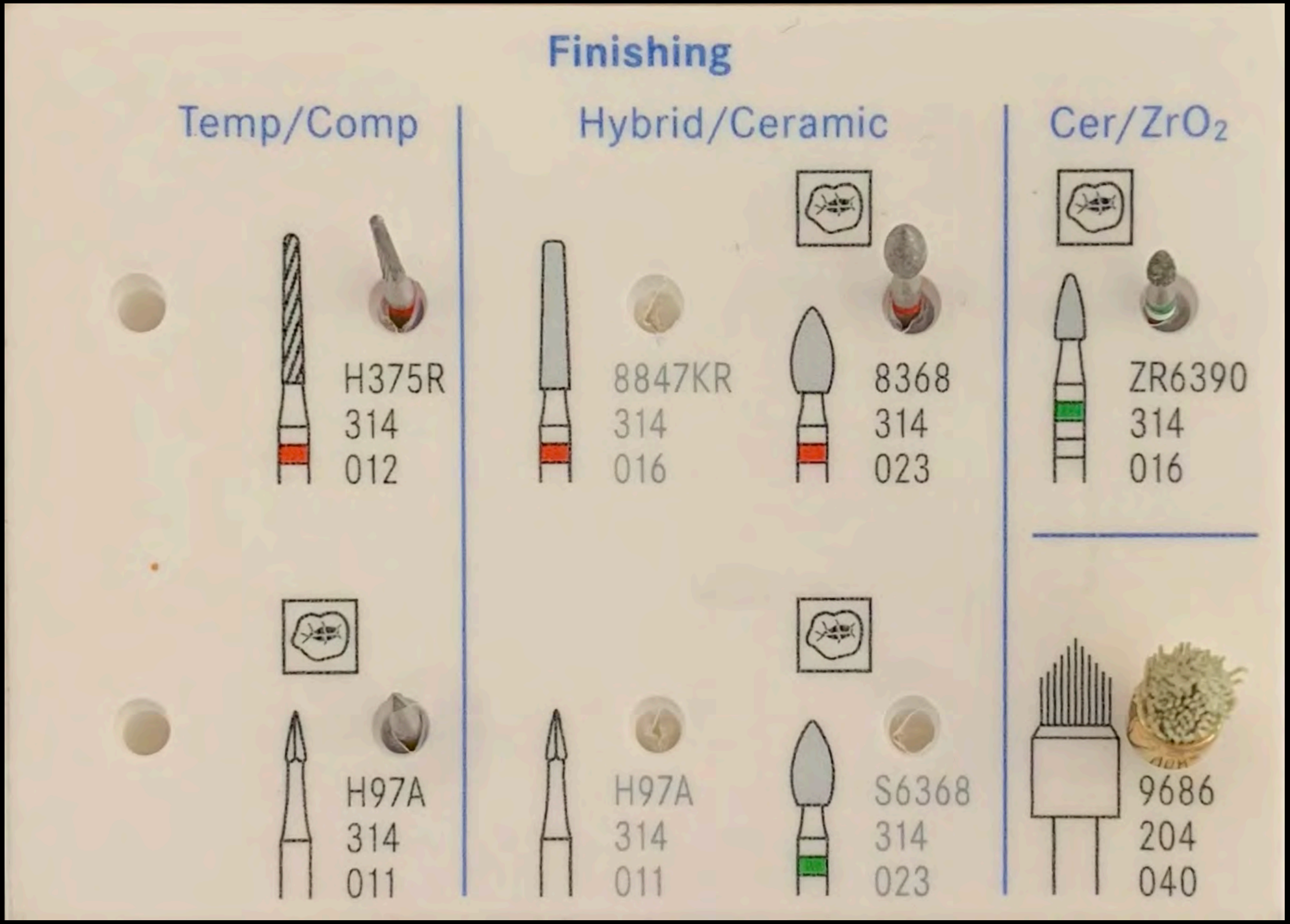


Palla da rugby anello verde per riduzione occlusale e linguale. Ha una particolarità: è appuntita. Questa caratteristica viene sfruttata per migliorare l'anatomia occlusale di restauri eseguiti con materiali ceramici molto resistenti. Infatti trova spazio anche nella sezione "finitura"

Tronco-conica, bordi arrotondati, con contrassegno di profondità a 2mm.
Fresa per intarsi da 025.
Comodissima in quanto conferisce alla preparazione della cavità i requisiti minimi di profondità e di spessore laterale affinché il restauro sia eseguito in sicurezza.

Tronco-conica, testa piatta, bordi arrotondati. Fresa per rifinire le cavità per inlay realizzate con la 845KRD.

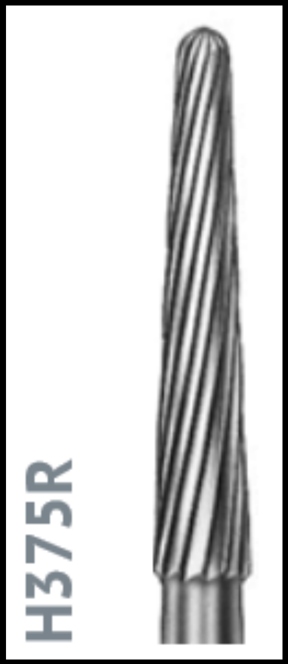


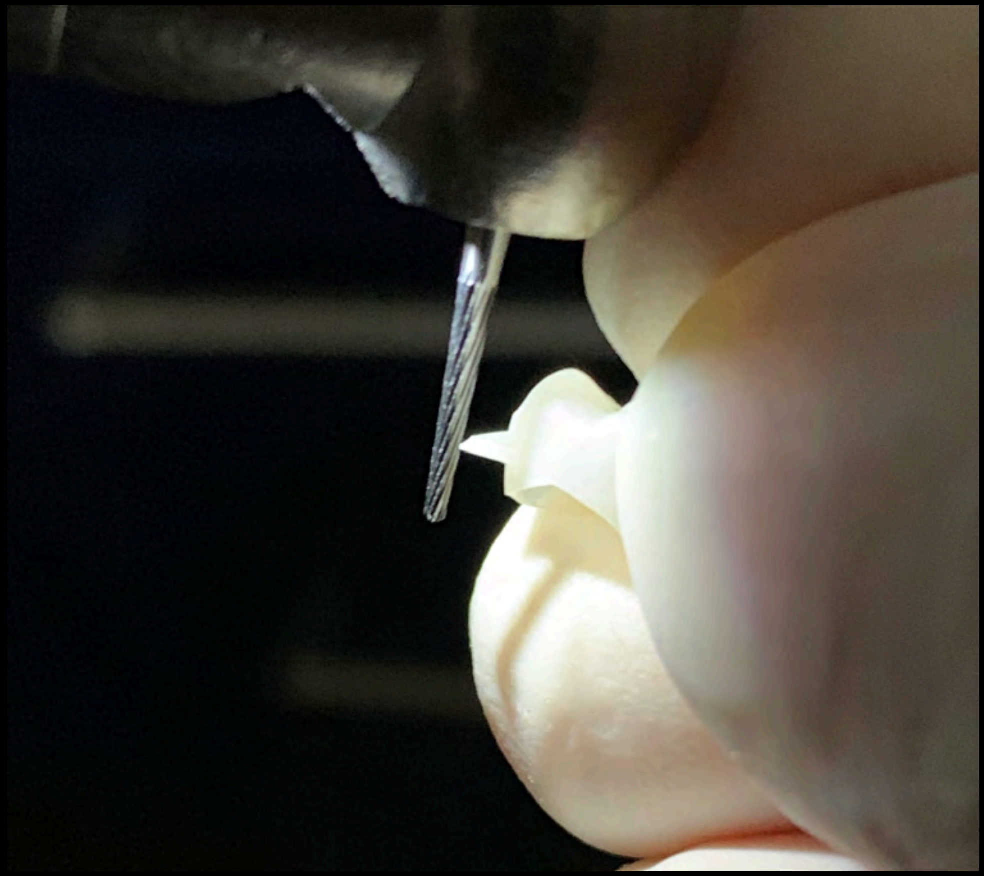


Finishing

Pre e post cementazione

Fresa anello rosso in carburo di tungsteno da 012, conica a testa arrotondata per rifinire i monconi dopo la S6856.
È una dodici lame e per questo trova posto anche nella sezione “finitura” : si adopera delicatamente su materiali a matrice resinosa come PMMA e compositi.
Non “impasta”.

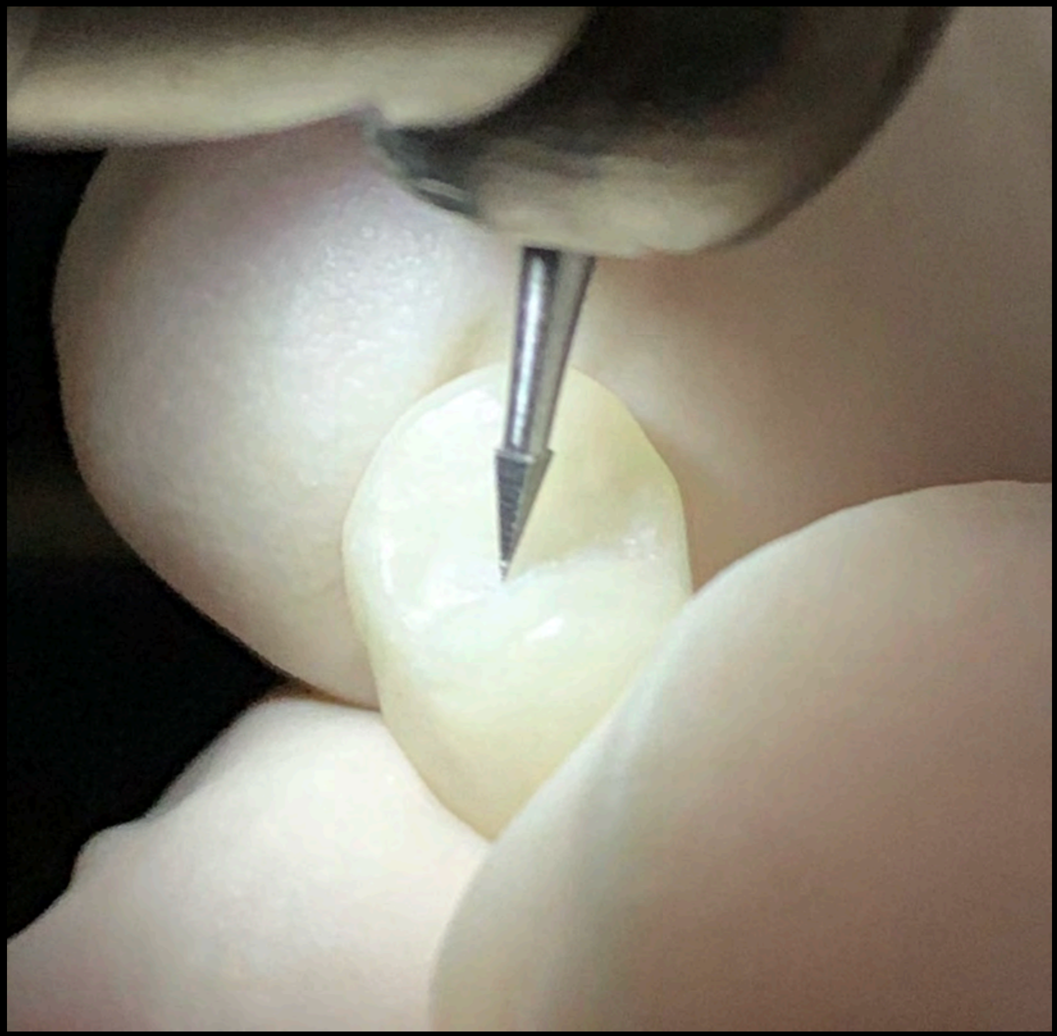




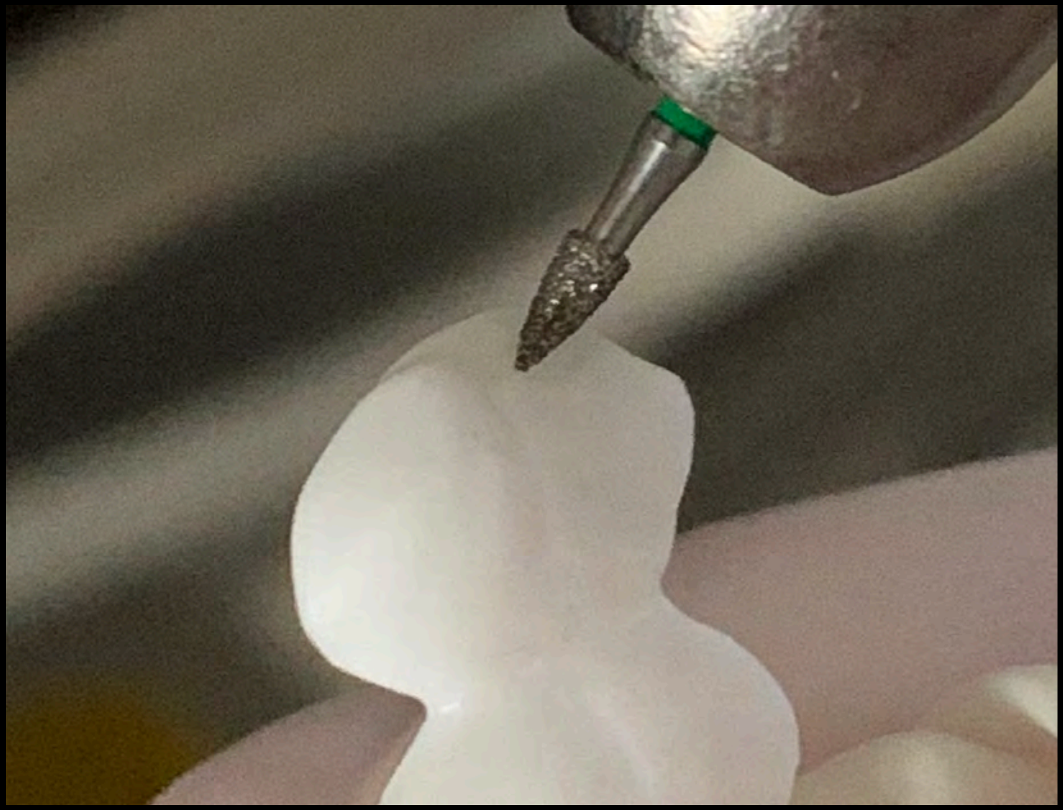
Fresa anello rosso da 016, conica, testa piatta con bordi arrotondati. Per la rifinitura dei monconi e delle cavità prossimali preparate con la 6847KRD. Può essere usata anche per la finitura di restauri utilizzati in ceramica ibrida ed in ceramica.

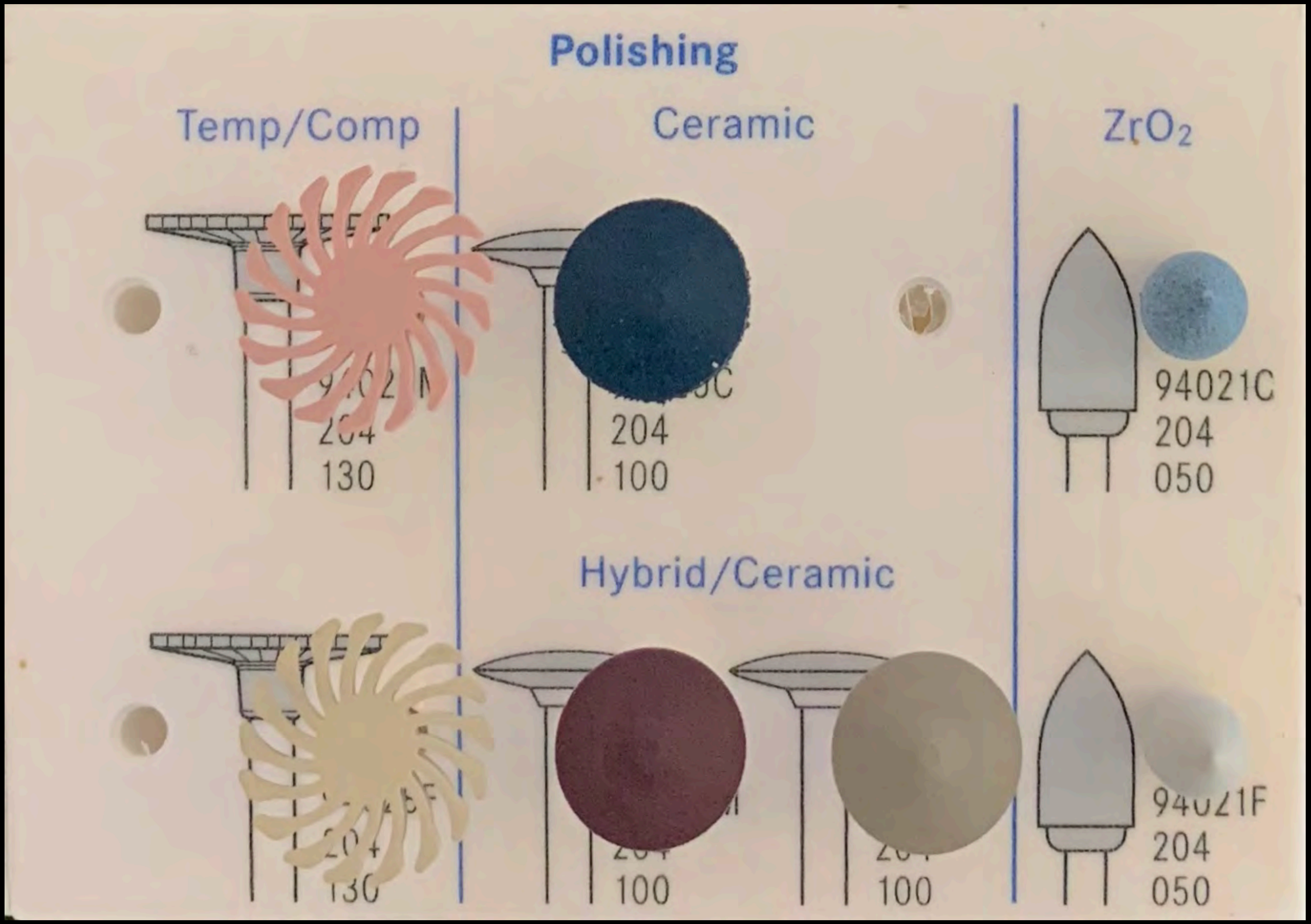
Fresa anello rosso, palla da rugby. Ovviamente analoga alla S6368. Si può usare per la modellazione e finitura della superficie occlusale di restauri realizzati in ceramica e ceramica ibrida.

Fresa a 4 lame in carburo di tungsteno. Molto tagliente. Perfetta per solchi e fossette di restauri a matrice resinosa.



Diamantata per ceramica e ossido di zirconio. Per ritocchi occlusali.





Polishing

Lucidatura di vari materiali

Gommini a spirale per raggiungere tutte le superfici. Due passaggi per ottenere il risultato migliore: prima il rosa poi il giallo. Vanno usati su superfici umide. Per PMMA, temporanei e compositi.

Gommini diamantati per ceramica. Da usare in sequenza: blu, rosa, grigio. Per la lucidatura della ceramica ibrida si consigliano solo gli ultimi due.

Gommini per ceramica dura ad alte prestazioni, ossido di zirconio. Da usare in sequenza: prima il blu poi il grigio.

Spazzolino a punta a fibre speciali con particelle integrate di carburo di silicio.
Per la lucidatura senza paste di materiali ceramici e compositi. La forma consente di essere efficace su tutte le zone.

Grazie a tutti