

## Preparation diamonds with a guiding pin

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### Introduction

**Fixed dental prosthesis (FDP) have been used in occlusal rehabilitation for decades and their use is gradually increasing. Enormous growth in the need of prosthetic crowns and fixed partial dentures has been seen in all industrialized countries with the increasing dentate elderly populations. Knowledge of restorative options and demands towards the dental treatment which improve oral health related quality of life will increase.**

Today restorative materials need to mimic biological conditions maybe more than ever before. Ceramic materials can restore the esthetics and function provided that the restorative procedures have been done adequately. In order to restore the shape and function of deconstructed tooth sufficient amount of tooth

substance need to be removed. Modern full ceramic and structural ceramic materials require 1 to 2 mm thickness for adequate mechanical strength<sup>1</sup>. Despite the use of adhesive luting agents crown preparation should provide good retention and resistance for withstanding removing forces during chewing. Esthetic demands also require optimal amount of tooth preparation.

Various preparation techniques and instruments have been developed for variable materials. Preparation finish lines have varied from deep slices to 90 degree shoulders<sup>2</sup>. Chamfer preparation margin was introduced with the development of ceramic fused to metal technique<sup>3</sup>. Today modifications of chamfer preparations are the most popular preparation types for crowns and fixed dental prostheses utilizing CAD/

CAM techniques as they leave sufficient space for ceramic materials in esthetically demanding preparation margins<sup>4</sup>. Precise preparations with sound finish lines are mandatory for the successful CAD/CAM techniques. Optimal preparation with traditional preparation diamonds can be difficult as their use offer the possibility for insufficient preparation. Inadequate preparation may result in bulky crown shapes. On the other hand excessive preparation with traditional chamfer preparation diamonds may create thin lips on preparation margins (Fig. 1). Final preparation line becomes unclear and hampers the fit of the entire restoration.

New preparation kit for the CAD/CAM techniques have been introduced on the dental markets (DIATECH CAD/CAM kit) (Fig. 2). The kit has nine multi-



Fig. 1: Inadequate chamfer preparation may produce lips in the preparation margins.



Fig. 2: DIATECH diamonds for CAD/CAM preparations.

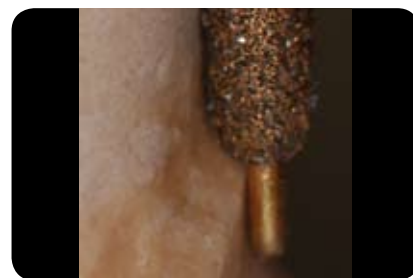


Fig. 3: Body of a preparation diamond creates optimal axial reduction and wall taper.



Fig. 4: Adequate preparation can be done also on lingual and palatal surfaces.



Fig. 5: Panoramic radiograph before the extraction of right first premolar and lateral incisor.



Fig. 6: Adjustment of the guiding pin with a sandpaper disk.

layer diamonds with varying diameter, length and surface roughness. The diamonds are produced with a smooth guiding pin which guides the diamond for optimal tooth substance removal. Well distinguished margin is easy to prepare, while the shape of the diamond creates optimal abutment wall (Fig. 3). The benefits of these types of diamonds are especially clear while preparing tooth surfaces with poor visibility (Fig. 4).

### Case presentation

Fiftyfour-year-old man was seeking a treatment for missing maxillary teeth and impaired esthetics. First molars had been removed few years earlier. Fracture on right lateral incisor led to decision to restore the missing teeth with fixed dental prostheses (FDP). First premolar was removed due to caries and bad prognosis. Left lateral incisor was congenitally missing and canine had taken its position leaving a diastema between the canine and first premolar (Fig. 5). Provisional FDP was first made immediately with the extraction of the fractured lateral incisor and first premolar. Final fixed prosthesis

was fabricated two months later. CAD/CAM zirconium dioxide substructure was chosen for the final FDP. The abutment teeth were periodontally healthy. The endodontically treated abutments were provided with glass fiber reinforced root canal posts and restored for preparation with composite core (ParaCore, Coltène/Whaledent). Tooth preparation was decided to be made with CAD/CAM multilayer diamonds in order to secure sufficient preparation for the substructure and veneering material. Preparation was started with 018 diamond with the grit size of 45µm and finished with 125µm grit size diamond. Oral surfaces were prepared with 023 diamond with grit size of 150µm. The DIATECH CAD/CAM diamonds proved to be effective and easy to use. In shallow pockets the guiding pin was occasionally too long but was easily adjusted with a sandpaper disk (Fig. 6). Final impression was made with putty wash technique using addition silicon type impression materials (AFFINIS wash and putty soft, Coltène/Whaledent, Altstätten, Schweiz).

Sufficient space for the final restora-

tions was confirmed from the working casts (Fig. 7 a, b, c) before the fabrication of the zirconium dioxide substructures. Two zirconium dioxide substructures were made (Fig. 8 a, b, c). Passive fit with good marginal adaptation was noted during the try-in visit (Fig. 9). Ceramic work was done with feldspar veneering ceramics designed for zirconium dioxide substructures (VITA VM9, VITA Zahnfabrik). Preparations with rounded multilayer diamonds allowed sufficient space for the veneering ceramic (Fig. 10 a, b) Final restorations were luted with dual curing luting composite (Fig. 11 a, b, c).

### Final remarks

CAD/CAM techniques require smooth and sufficient preparations, which are difficult to achieve with traditional preparation tools. Preparation diamonds with guiding pin offer fast and easy way to create well defined preparation margins. These types of diamonds are practical also for an experienced practitioner especially when preparing surfaces with poor visibility. Preparation diamonds with guiding pin have been proven to be excellent



Fig. 7 a: Clear preparation margin and finish line is visible on the working casts.



Fig. 7 b



Fig. 7 c



Fig. 8 a: Zirconium dioxide substructures for final FDP.



Fig. 8 b



Fig. 8 c

tools for those who have less experience with the preparations for CAD/CAM restorations- such as undergraduet students.

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Fig. 9: Try-in of zirconium dioxide substructure before veneering.



Fig. 10 a: Preparations allowed optimal space for substructure and veneering ceramics.



Fig. 10 b



Fig. 11 a: Final FDP after luting.



Fig. 11 b



Fig. 11 c

### References

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