

## INTRODUCTION

- Effective restorative treatments can come only as a result of precise tooth preparation.
- Such precision can be impeded by visual shortfalls, manual imprecision, and the limitations inherent in working within a constricted oral space.
- Major contributors to imprecision in preparing the axial walls can result from inadequate tooth reduction, over-reduction, excess tapering, or under-reduction.

## BACKGROUND

Precise tooth preparation is necessary to ensure the success of dental restorations and preserve the integrity of the underlying abutment tooth structure. Digital dental technology evolution has opened the door to virtual 3-D diagnostic pre-treatment analysis and enabled minimally invasive treatment planning, digital design, and final restoration fabrication. Digitally-guided tooth preparation is a cutting-edge approach that allows controlled and minimally invasive tooth reduction through 3D-printed guide based on a virtual diagnostic wax-up. Several techniques that employ the digitally-guided preparation concept are abundantly illustrated in recent literature..

## METHODS & MATERIAL

### The Kwon & Lee guide

The Kwon & Lee guide based on 3D virtual diagnostics indicates the location and amount of tooth substance to be removed. Allows for controlled occlusal reduction by removing only the tooth structure that is extending beyond the guide thickness  
*Lee et al. J Prosthet Dent 2020*

### 3-D Printed Digital Preparation Device

This methodology method allows for controlled preparation through using calibrated vent holes to measure preparation reduction depth.  
*Taha et al. J Prosthet Dent 2020*

### Stereolithographic Method

A stereolithographic tooth reduction template guides the digital restorative planning process and provides more precise control of the reduction depth of the labial and incisal preparation and simplifies the operation.  
*Gao et al. J Esthet Resto Dent 2020*

### First Fit system

The veneer guided prep system permits minimally invasive, veneer preparation using special handpiece and easy-to-use 3D printed guides have a channel directing the operator through the preparation. Enables veneer application at the second appointment, thus alleviating a need for provisional restoration  
*Silva et al. J Esthet Resto Dent 2020*



Image courtesy of First Fit system

## DISCUSSION

- Magne and Belser offered two general preparation techniques in fixed dental prosthesis: a non-guided preparation that would employ existing tooth structure and a second preparation technique based on the future restoration final volume. The latter technique adheres to the bioeconomic principle (maximum conservation of healthy natural tooth structure) and supports residual tooth structure reinforcement. Leveraging this guided technique has spawned the development of new tooth preparation methods that employ silicone matrices that calibrate tooth preparation based on the final diagnostic waxing volume. Although these methods have been advantageous, they are limited to 2D view and are technique sensitive.
- Cho et al have reported that a surgical template could enable clinicians to control labial depth reduction with a template that could measure a minimal 0.1 mm reduction.
  - Compared to the conventional methods of tooth preparation, digitally guided techniques allows for accurate abutment preparation, increased efficiency, preservation of tooth structure and decreased in treatment duration.
  - Further studies will be required to more accurately evaluate the efficacy of different techniques and overcome limitations such as increased cost for special equipment or limitations to extend the preparation to include all teeth aspects.

## CONCLUSION

Although digitally-guided preparation is yet in its infancy, it is a promising concept and methodology. Growing interest in digital dentistry innovation is paving the way to providing exponentially more effective and precise tooth preparation, eliminating hand orientation errors, and yielding notable reduction in tooth structure.

## REFERENCES & PRESENTATION

