

CEREC®

Preparation Guidelines



The key to any great restoration fabricated by the CEREC technique is a great tooth preparation. The requirements for ceramics tend to be a little different than that of traditional featheredge and bevel techniques used for gold or other materials.

Detailed below are basic preparation guidelines including the recommended instruments that will help you achieve the desired results.

Meisinger

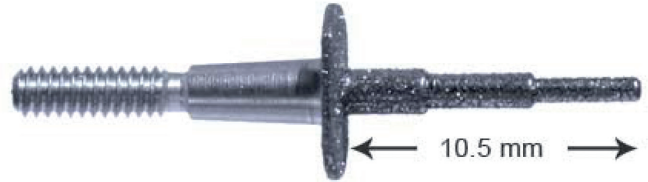
CEREC 3D Preparation Guidelines

Before knowing exactly what the preparation guidelines are for CEREC, we must first understand how the milling instruments work and what we can do with them.

Let us start with the orientation of the milling instruments. The Step Bur 10 is positioned on the left side of the milling unit and is responsible for milling the intaglio (fitting surface) of the restoration. For this reason the Step Bur 10 has the greatest bearing on our preparation guidelines. The Cylinder Pointed bur, positioned on the right side of the milling unit, mills only the occlusal surface and therefore has little impact on these preparation guidelines.

Let's now look at the dimensions of the available milling instruments. The Step bur 10 has an effective milling length of 10.5 mm.

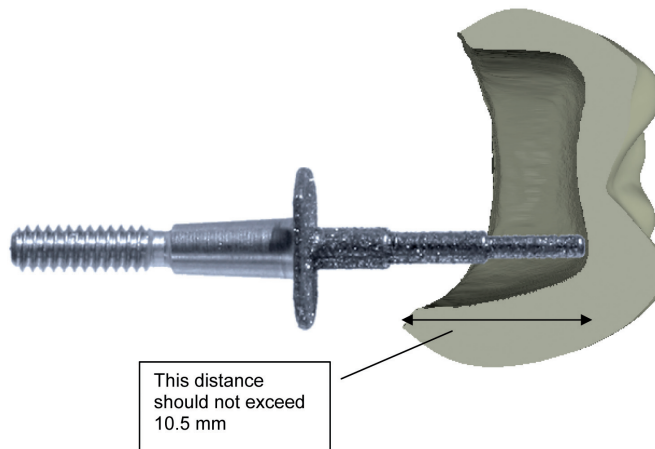
Step bur 10
Mills the fitting surface of the restoration



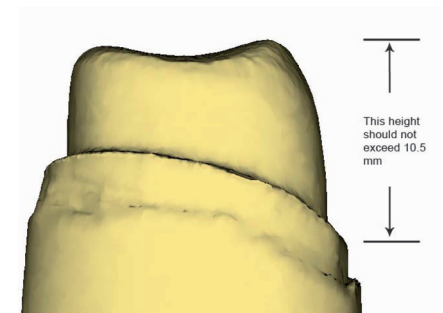
Cylinder Pointed bur
Mills the occlusal surfaces only



As you can see below, our first preparation requirement is: the lowest point of the preparation should not be greater than 10.5 mm from the highest point.



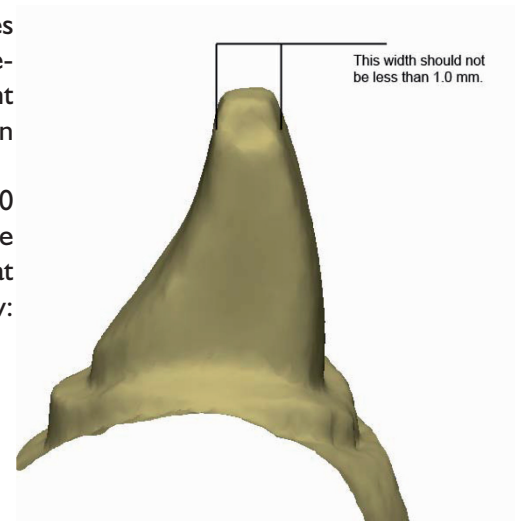
Here's another way of looking at the same case:



So much for the length, what about the diameter of the burs?

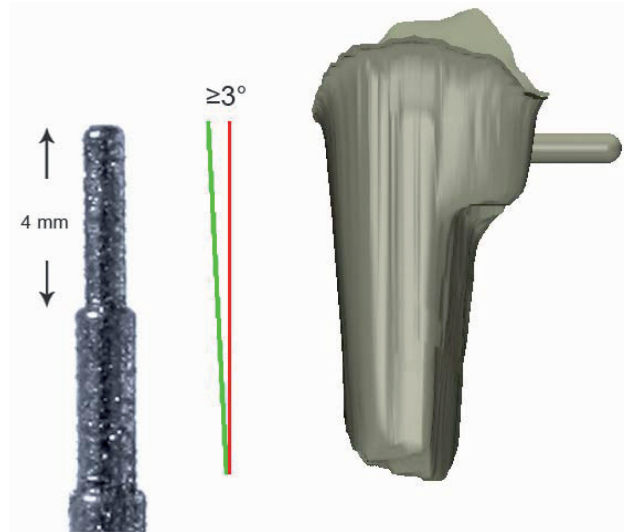
With molar preparations the diameter of the bur does not have too great an effect. As we approach the anterior, however, the diameter becomes more important due to the fact anterior teeth are generally smaller than the posteriors, especially in the mandible.

Preparation of anterior teeth must account for the 1.0 mm tip of the Step Bur 10 carving the inside of the crown. For example, the width of the preparation at the occlusal should not be less than 1.0 mm. See below:



Tall vertical walls

Unusually tall vertical walls (greater than 4 mm in length) need caution due to the configuration of the Step Bur which is used to mill the intaglio of all restorations. The Step Bur is able to mill a 0° surface which is less than 4 mm in length. Surfaces greater than 4 mm in length should have a 3° taper or greater. This is due to the “steps” of the bur. See below:

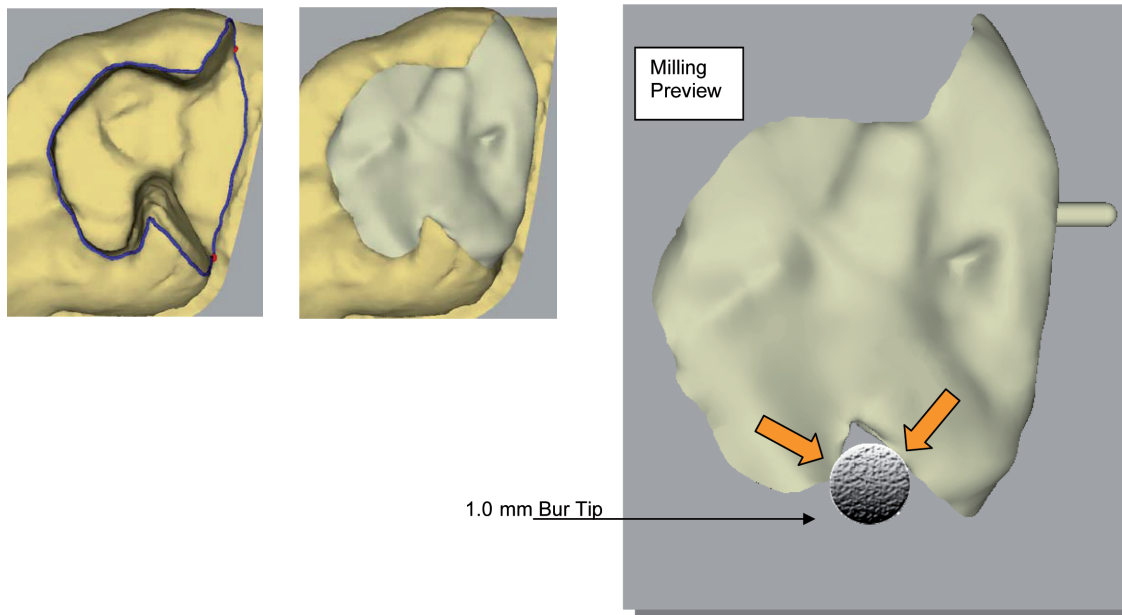


Nearly all restorations can be milled with only the top 4 mm of the Step Bur. For surfaces greater in length (e.g. endo restorations) please be sure the preparation has at least 3° of taper.

If 3° of taper cannot be achieved be sure to mill in the “Step Bur” mode (this mode can be selected in the Milling Preview stage).

Tight Corners

Another area of concern with regard to the milling instruments is corners and extensions. Keeping in mind the diameter of the two instruments (Cylinder Pointed Bur: 1.6 mm and Step Bur 10: 1.0 mm) we can recognize areas where the instruments are unable to adequately remove material. For example:



Obviously the Step Bur 10 would have great difficulty milling such a corner. The arrows indicate the areas of immediate binding. The software will also attempt to incorporate the tapered bur in such cases, but it is often not an ideal result, leaving behind excess material which the operator must manually adjust.

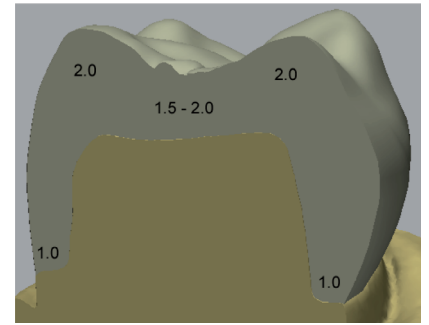
Recommendation:

Ensure corners of the cavosurface margin have greater than 1.0 mm diameter.

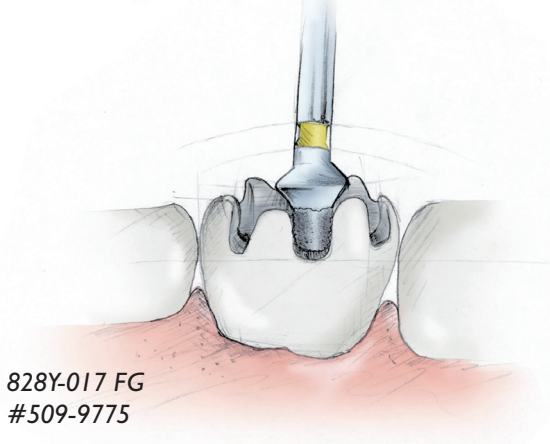
Occlusal Reduction

The first step to a successful preparation for CEREC is proper occlusal reduction. As shown below, these are the minimum requirements recommended by the various block manufacturers.

The following are the recommended minimum thicknesses: minimum axial wall thickness = 1.0 mm; minimum thickness under a cusp = 1.5 mm (anterior), 2.0 mm (posterior); minimum thickness under a fissure = 1.5-2.0 mm.



One way to ensure that you have a fast, precise, 2 mm reduction is with the Occlusal Reduction Diamond by Meisinger USA. This will maintain an even 2 mm reduction across the entire occlusal surface and still maintain the natural anatomy of the tooth.

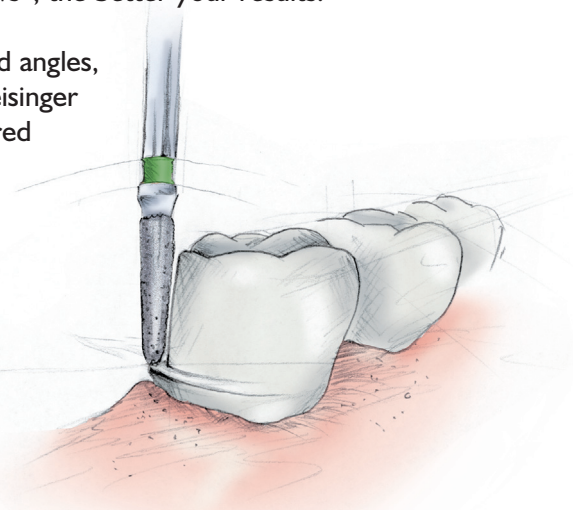


2565 Occlusal Reduction Kit
www.occlusalrouter.com

Full Crown and Inlay/Onlay Preparations

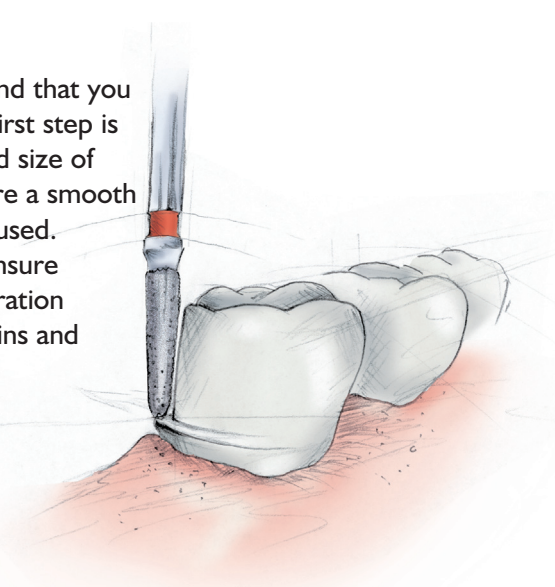
Recommended for full coverage, posterior restorations are a 1.0 mm shoulder reduction at the gingival margin with 1.5 mm reduction on the axial wall. A taper between 6° and 8° is optimum for internal adaptation and margin fit. The final step to ensuring success is to create rounded internal line angles. The more the restoration “flows”, the better your results.

To achieve the prescribed dimensions with rounded angles, the diamond to use is the 847RG-018-FG from Meisinger USA. It has softened edges to help create the desired rounded line angles.

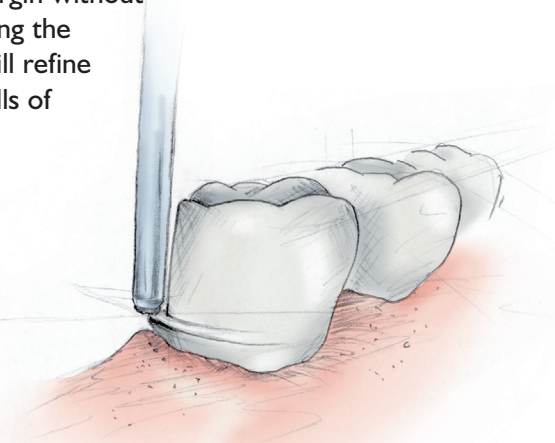


This diamond will provide the proper axial wall and gingival margin reduction as well as the correct taper to ensure a successful CEREC preparation. The key to properly using this diamond, as in all preparation for CEREC, is to follow the long axis of the tooth. Deviation from this can cause ditching at the margin and non-uniformity in your walls and prepared box, which can ultimately lead to a failed restoration. Additionally, taking the picture at a draw different from the rest of the teeth can lead to poor designs and/or increased work editing the design.

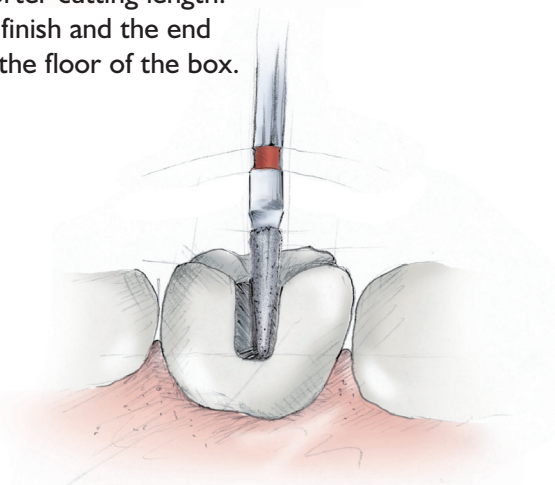
After your initial reduction, we highly recommend that you go back and “fine tune” your preparation. The first step is to use a fine diamond that is the exact shape and size of your reduction diamond. Take the time to ensure a smooth flowing prep. In this case, the 847RF-018-FG is used. This is a red-striped, fine diamond, which will ensure a smooth axial wall while maintaining our preparation goals: tapered walls, flared boxes, smooth margins and rounded shoulders.



Next, we may need to smooth the shoulder margin without affecting the adjacent tooth. This is achieved using the 839R-012-FG end-cutting only diamond. This will refine the floor of the margin without affecting the walls of your preparation.



Similarly, Inlay and Onlay preparations will use the same shape, although the 846R-016-FG is used due to its shorter cutting length. A fine diamond (846RF-016-FG) can be used to finish and the end cutting only diamond (839R-012-FG) will refine the floor of the box.



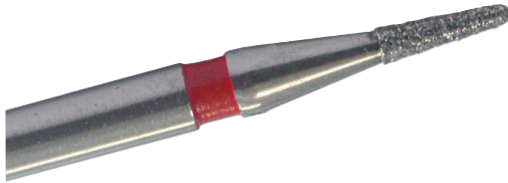
Replacing Old Restorations

Most old amalgams and other restorations have undercuts to provide the mechanical retention. It's not necessary to remove the undercut and sacrifice tooth structure in the axial walls (above the pulpal floor) to do a restoration with CEREC. We want straight, clean axial walls with rounded internal line angles. This can be accomplished with the 808L-018-FG diamond. This is a long, subtly tapered inverted cone with round edges. The medium grit will clean up the old silver amalgam stain and provide a clean, straight wall.

REMEMBER, the proximal boxes do need to have an ideal taper of 6-8 degrees. Although the CEREC camera blocks out undercuts beautifully above the pulpal floor, it will cause an open margin in the proximal box with an undercut.

Breaking Contact / Exit Angles

Another area of critical importance is breaking contact on the neighboring teeth. The key here is to keep your exit angles straight at 90°. Without accurate exit angles, it is difficult to record the margins accurately, the restoration can bind or not seat completely during try-in, and the resulting thin ceramic margins become prone to fracture. The 855LF-009-FG is the perfect shape to achieve the desired result. The tapered sides come to a rounded, blunt point, which helps to smooth the preparation while achieving the proper exit angles.



On all preparations, our primary goals are as follows:

- Smooth straight tapered walls – ensures good internal adaptation with the least amount of binding
- Sharp, well defined margins – aids in margin detection and fit
- Rounded internal line angles – ensures passive seating and prevents fracture from internal stresses
- Exit angles and margins approaching 90° – ensures bulk of ceramic and enamel at margins for strength
- Adequate tooth reduction – ensures strength of ceramic material. Inadequate reduction is the number one cause of bulk fractures

Veneers

The minimum facial reduction for a CEREC veneer is 5 mm. Therefore, depth cuts should be produced with a facial depth-cutting bur such as the 834-021. This will allow for even reduction of the facial surface. This can then be reduced with a chamfer diamond, such as the 852G-016 to allow for the proper margin.

