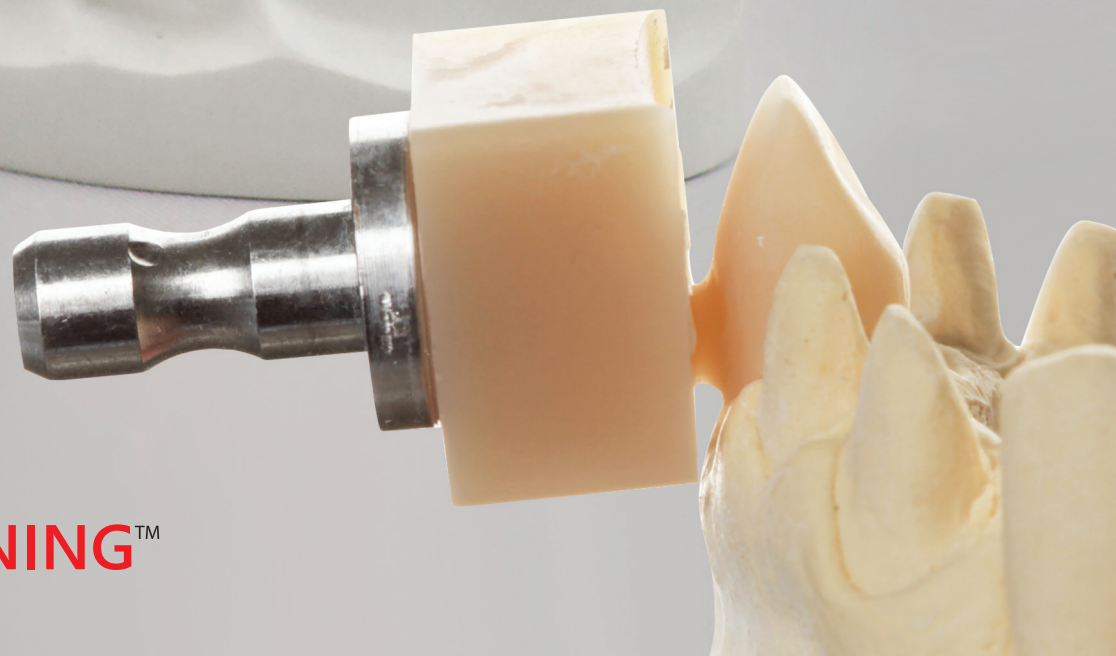


September 2021

# INCREASING POSITIVE OUTCOMES WITH MILLED RESTORATIVE TECHNIQUES



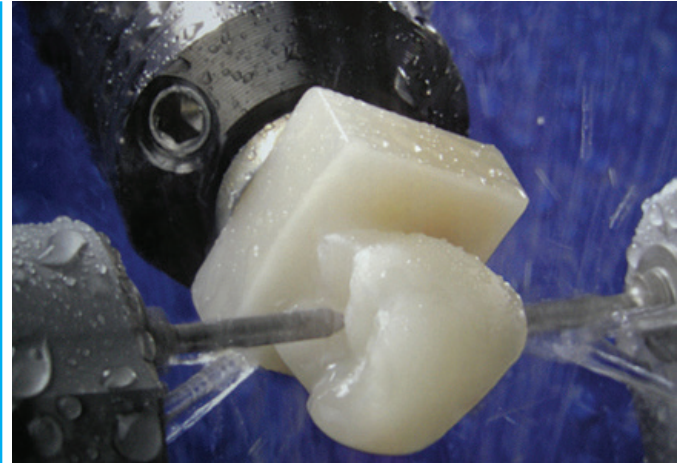
# THE “DIRECT VS. INDIRECT RESTORATION” DECISION

## Introduction

Whether you're doing your own milling with a tabletop milling machine or scanning (or even taking impressions) and sending the order off to the lab, today's milled restorations represent a new generation of restorative dentistry. The question is: When should you use them?

Most of the time it is obvious that an indirect restorative is called for. In these cases the decisions are about materials and milled versus pressed restorations.

Other times, however, the “direct vs. indirect” decision is less clear. Should you do a large direct restoration or go to an onlay procedure? After all, simply placing a composite will save the patient a great deal of money... at least in the short run.



## Large Direct Resin Restorations Can Be Problematic

It is an unfortunate reality that the outcomes for large composite restorations are not as ideal as we would like them to be. Common problems, all of which can result in recurrent decay, include:

- **Microleakage** – If your techniques are not perfect, you're likely to get the wider marginal gaps associated with microleakage.
- **Shrinkage and Polymerization Shrinkage Stress** – Composite materials can shrink anywhere from one to six percent, thereby creating a large marginal gap.
- **Incomplete Curing** – This can be caused by holding the light in the wrong position, exceeding allowable curing depths and/or not testing the output of the curing light.

UNIVERSAL RESIN CEMENT WITH QUICK & EASY CLEAN-UP

LEARN MORE

for all Your Cementation Needs

REALITY Four Star Award

### Bifix® QM

Universal, dual-cure, bonded-in resin cement

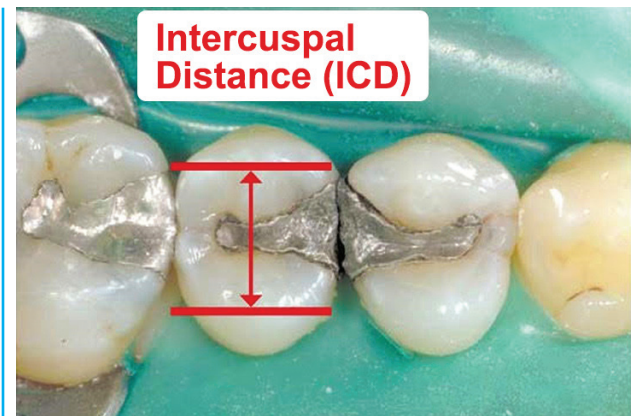
- Easy gel phase clean-up
- Truly universal for all cementation indications and all substrates
- Low film thickness saves occlusal adjustment time
- Low water uptake avoids shade shifting and bond failures
- Fast and flexible technique with dual-cure universal adhesive Futurabond U
- High radiopacity for easy x-ray identification



## Base Your Decision on the Cavity's Measurements

Luckily, you do not need to base your decision on whether to place a direct or indirect restoration on guesswork. Instead, all you need to do is take two measurements and do some simple math:

- 1 Measure the width of the preparation that needs to be made.
- 2 Measure the width of the buccolingual cusp (illustrated by the vertical arrow in the image).
- 3 Divide the preparation width by the buccolingual cusp width.



If the answer is greater than 0.33—i.e., if the preparation width is greater than one-third of the buccolingual cusp width—then you should use an indirect restoration that covers at least the functional cusp of the tooth.

Why are these measurements so important? Because studies have shown that when you exceed that one-third ratio, it will only take half the amount of force to fracture the tooth.



If the preparation width is greater than one-third of the buccolingual cusp width, use an indirect restoration.





# WHICH ESTHETIC MILLED MATERIAL IS BEST FOR INDIRECT RESTORATIONS?

There are Four Basic Categories of Esthetic Materials to Choose From

- 1 Glass-Based Ceramics** – This category includes milled lithium disilicate, feldspathic porcelain and leucite-reinforced ceramic. These are extremely esthetic materials that can be a good choice for veneers and anterior crowns. However, they can be very prone to fracture when the margins get thin. From the time perspective, most of these materials require secondary heating and must go back into the oven for glazing after they have been milled.
- 2 Composite Resins** – Because these often have lower luster as well as problems with bonding and strength, composite resins are best used for temporary restorations.
- 3 Zirconia** – These are very strong materials that can be a good choice for posterior restorations—provided you have a 4-millimeter axial wall all the way around the tooth, to ensure you can cohesively cement the restoration. Depending on the specific zirconia used, esthetics can be a concern. Plus, they are time-consuming to polish and need to be put into a sintering oven.
- 4 Ceramic-Resin Hybrids** – There are many variants within this category, so the properties vary. Some are ceramics with resin fillers while others are resin-based materials with ceramic fillers. Within this category, VOCO's Grandio blocs are an excellent choice for most applications.

Esthetic materials for milled indirect restorations include:

1. Glass-Based Ceramics
2. Composite Resins
3. Zirconia
4. Ceramic-Resin Hybrids

## VOCO's Grandio Blocs are a Superior Ceramic-Resin Hybrid

Grandio blocs have a resin base with a nano-ceramic filler. What sets this ceramic-resin hybrid apart is that it contains 86% filler. As a very densely-filled nano-particle ceramic, Grandio blocs give you the best of both worlds: the polishability and bondability of a ceramic, with the flexibility, forgivability and strength of a resin.



### Grandio blocs / Grandio disc

Nano-ceramic Hybrid CAD/CAM Blocks and Discs

- 86% filled for enhanced strength and excellent wear resistance
- Tooth-like elasticity and thermal expansion allows for thinner crown margins
- Natural esthetics with enhanced color stability and polish retention
- No firing required for true one appointment dentistry
- Easy intraoral polishability, characterization and repair

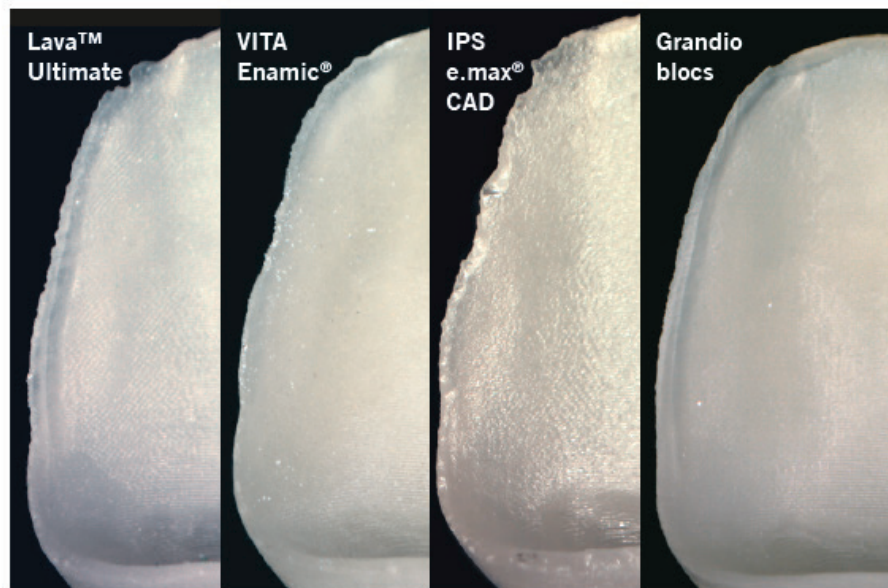


Grandio blocs provide:

- Very natural esthetics with beautiful polishability and strong color stability
- Best-in-class compressive and biaxial flexural strength
- Excellent wear resistance
- Greater bonding
- Tooth-like elasticity
- Thermal expansion coefficient similar to natural teeth
- Smoother edges right out of the milling machine



#### Edges after grinding



Source: Internal pictures, veneer 0.6mm  
VOCO is not the holder of the mentioned trademarks.

Plus, because they do not have to be fired after they are milled, Grandio blocs enable you to offer fast, efficient one-appointment dentistry.

# PREPARATION & ADHESION FOR MILLED GRANDIO BLOCS

## Be Aware of Width Requirements for Different Situations

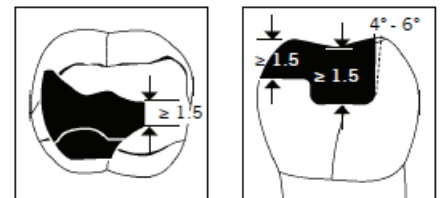
Grandio blocs can be used for inlays, onlays, crowns and veneers, as well as over implants. Of course, given the previous discussion about when to do an indirect versus a direct restoration, inlays will not generally be recommended altogether. Once the isthmus is more than one-third of the total buccolingual width you'll want to cover the cusp to protect the tooth from fracture.

When working with Grandio blocs you generally must have 1.5 millimeters of width for the material to come out of the milling machine ideally and then have ideal strength. However, for an adhesively-bonded restoration like a veneer you can sometimes get the margins all the way down to 0.4 or 0.5 millimeter in a thin margin. For a cohesively-placed restoration like a crown, you should avoid getting the margins less than 0.8 millimeters, or less than 1.5 millimeters anywhere that will be under occlusal load, such as on an incisal edge.

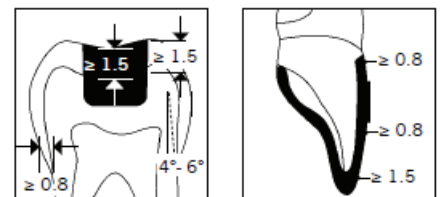
### 1) Inlay



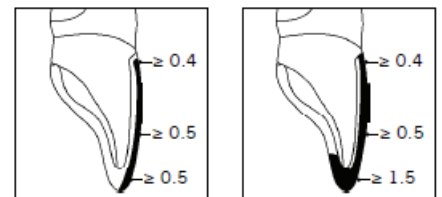
### 2) Onlay



### 3) Crown



### 4) Veneer



When planning your restoration you must pay close attention to width.

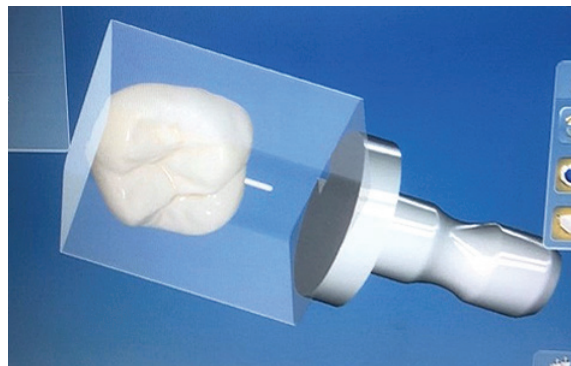
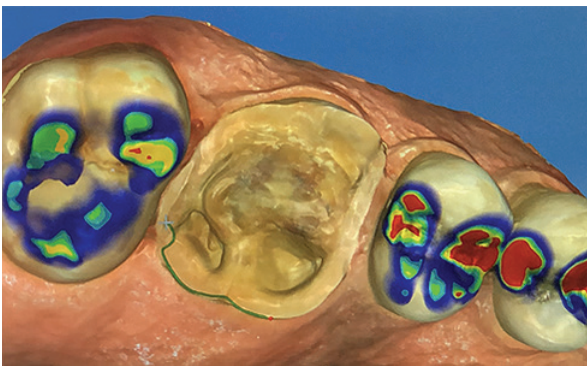


## Steps to Follow to Perform the Restoration

- 1 Prep the tooth.** If you're doing an adhesive onlay procedure you want to see about a millimeter of an enamel ring. Because we know that the long-term reliability of an etched enamel bond is very good, you should not just rely on dentinal bonds.

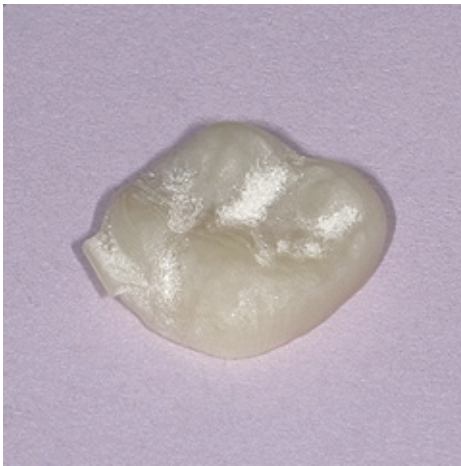


- 2 Scan, design and mill.** Use an intraoral scanner to capture a 3D image, then use this image to design the restoration. Create the milling files and then either mill the restoration in-house or send the files to the lab.

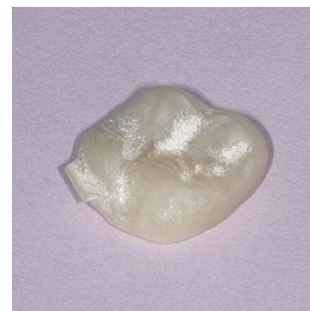


## Steps to Follow to Perform the Restoration

- 3 Try-in and then polish the restoration.** Remove the screw from the restoration and then steam it so it can be tried in the mouth. Check the occlusion and fit in the mouth and then gently polish it up.



- 4 Air abrade both the tooth and the inside of the restoration.** Your goal is to create the largest surface area for the best adhesion.





## Steps to Follow to Perform the Restoration

- 5 Put a silane ceramic primer inside the restoration.** While there are various brands of silane primer available, using VOCO's ceramic bond with Grandio blocs lets you stay within VOCO's system for the adhesive protocol.



- 6 Isolate, etch and put an adhesive on the tooth.** After you rinse away your etching material, place VOCO's Futurabond all over the preparation. This is a self-etching primer and adhesive all in one. Air thin and light-cure the material.



## Steps to Follow to Perform the Restoration

- 7** Place a dual-cure resin cement on the restoration. VOCO's Bifix QM is recommended for use with Grandio blocs.



- 8** Place and polish the restoration. That's it. You're done!





## Fastest Growing Dental Podcast Show



# Dental Talk™



### Hosted by Dr. Phil Klein

Listen on [Vivalearning.com](https://www.vivalearning.com), Spotify, Apple Podcasts, Google Podcasts, iHeart Radio and other major platforms.  
Keyword search: **dentaltalk**



**Related Webinar**  
Increasing Positive  
Outcomes with Milled  
Restorative Techniques

