



# A Great First Impression

The right methodology  
leads to predictable clinical  
success, time after time

**Dr. Chad C. Duplantis** received his DDS degree from The University of Texas Health Science Center at San Antonio Dental School, then continued his postdoctoral training at Baylor College of Dentistry and earned a certificate in advanced education in general dentistry.



Duplantis has been in private practice since 2000 in the north Fort Worth, Texas, area with an emphasis on restorative and aesthetic dentistry. He is a member of Catapult Education's speakers bureau and has also been a member of several aesthetic and restorative continuums, most recently the Spear Education Study Club. He is a fellow in the Academy of General Dentistry and a clinical consultant for Glidewell Laboratories. Duplantis lives with his wife and his children in Keller, Texas, where he enjoys cycling, shooting sporting clays, fishing, traveling and being outdoors.

Indirect restorative dentistry presents clinicians with many options in regard to technique, materials and acquisition of a final impression. As dentistry has evolved, digital technology has proven to be a worthy competitor to analog methods; however, the need for traditional impression materials will exist for the foreseeable future.

Regardless of the method of acquisition, the principles of impressing remain the same. Adherence to these principles, an understanding of the materials and technology and a sound preparation design will help dentists achieve clinical success of the final restoration. This article addresses various aspects that provide predictable results regardless of mode of acquisition.

### Preparation design

After the appropriate diagnosis and treatment planning for an indirect restoration, it's imperative that all restorations start with an appropriately planned preparation design. Ultimately, several factors—caries, previous restorations, etc.—will dictate the final design but it is still important to try to adhere to some fundamental criteria. In a desired design for a full-coverage restoration, an appropriate preparation with attention to marginal detail is crucial for restorative success.

Characteristics of an appropriate preparation design include:

- Ideal taper (5–6 degrees).
- Axial wall height (3–4 mm).
- Appropriate use of retentive features (e.g., boxes and grooves) when needed.
- Avoidance of undercuts.
- Smooth, finished with a finer diamond.
- Established path of insertion.

In addition to these characteristics, it is imperative to follow the preparation guidelines for the proposed material of the restoration—especially reduction. Attention to these parameters will increase success in the impression, cementation and overall longevity of the restoration (Fig. 1).

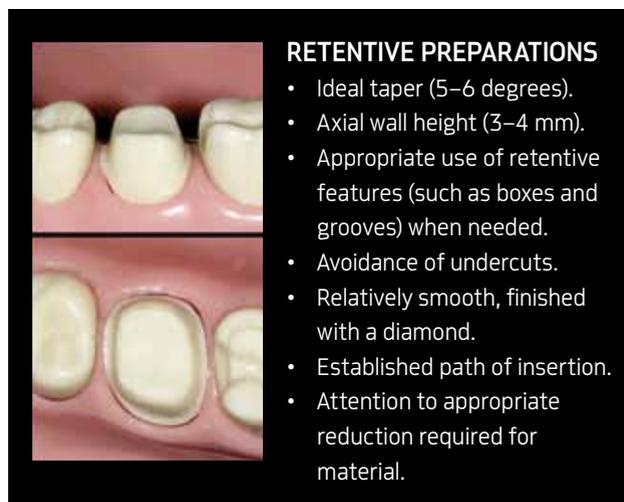


Fig. 1: "Ideal" characteristics of a retentive preparation.

## Analog impression materials and technique

Analog impression materials have evolved over the past several decades to include some impressive materials. As a profession, we have seen some great successes with reversible hydrocolloid, polyether and polyvinylsiloxane (PVS) impression materials. Although all will work, some of the newer PVS materials have favorable characteristics that will provide a nice result.

It's important to understand the various viscosities of impression materials. Elastomeric impression materials are available in multiple viscosities: low (syringe or wash material), medium or monophasic, high (tray or heavy body) and very high (putty). The viscosity is determined by the filler content in the impression material. As filler content increases, so does viscosity, which lowers the shearing forces.<sup>1</sup>

Other characteristics that play a role in the accuracy of an impression material are the hydrophilicity of the dental impression material (related to the contact angle) and the elastic recovery (which is directly related to the dimensional stability). Any material with a low contact angle will capture better detail. Although the material can still be affected by blood and saliva, artificial surfactants have been incorporated into the material to offset the potential distortion.<sup>2-4</sup>

It's also important to understand the products' working and set time. These will vary among brands and even within brands. Most brands will have a "quicker"

set version for the viscosities, in which the lower viscosity will flow better and is used to capture the detail of preparations while the higher viscosity is used to fill the tray and capture the surrounding structures.

These newer PVS materials have provided clinically acceptable impressions. V-Posil VPS impression material (Voco), for example, offers many of the characteristics that clinicians should look for in the VPS category. It's available in a range of viscosities—light, heavy and mono—and flows very well among them. It has a unique time-optimized working and set time. Although it is labeled "fast," the working time of two minutes is ample for single or multiple units. The set time is only two minutes as well. These characteristics make this material attractive to the dentist for efficiency and the patient for comfort.

For a great analog impression, a suggested technique is to use a light-body material and place the tip into the sulcus, extruding gently in a circumferential manner to capture the margins. Do not remove the tip until you have covered the entire margin. Then, use a light stream of air to continue to introduce the material into the sulcus. You may then cover the entire prep(s) with light-body and use air to thin the material once more.

While the clinician is introducing the light-body material to the preparation, the assistant should be filling the tray with medium- or heavy-body impression material. The tray is then gently seated. The final

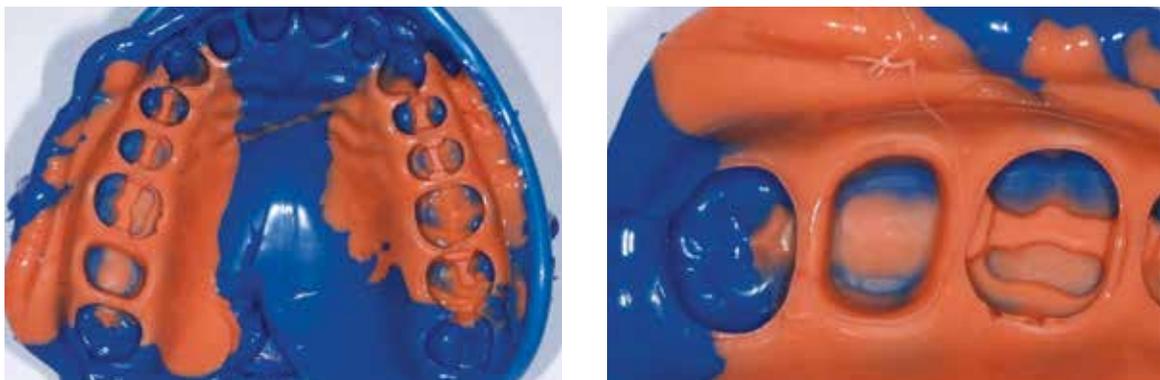
impression should capture marginal detail with no bubbles or voids on the margin or crucial areas of the preparation (Fig. 2). All of this is done in a timely manner and with respect to the working and set times of the impression material.

## Digital impressions and techniques

Digital impressions have become a common alternative over the past several years for restorative dentistry. In a 2021 survey, 43% of respondents reported using digital impression systems—up from 37% in 2020 and 36% in 2019. Among DSO respondents, 57% report using intraoral scanners.<sup>5</sup> This represents a huge market shift over the past several years. With increased users, we must understand how these systems work and become comfortable using them.

Intraoral scanners offer several advantages, including comfort for patients, time efficiency and simplified procedures for dentists, reduction in the need for stone models and better communication among the dentist, patient and laboratory.<sup>6</sup>

These scanners are incredibly accurate, which makes them a suitable alternative for traditional impressions for multiple prosthetic restorations. Inlays, onlays, crowns, fixed partial dentures and single to multiple units are all great capabilities of the current scanners on the market. (There is somewhat of a debate on the capabilities in terms of longer span and full-arch restorations and appliances.<sup>6,7</sup>)



**Fig. 2:** A clinically acceptable impression taken with V-Posil VPS Heavy Fast (blue) and V-Posil Light Fast (orange) impression materials, with all crucial areas and margins captured. Small bubbles are noticed at the gingival margin of Tooth #3 but not on the preparation margin.

A common misperception of intraoral scanners is that they will alleviate some of the problems associated with traditional analog impressioning methods. The technique plays an important role, but adherence to a few principles will be critical to achieve a satisfactory impression regardless of the method. In other words, both methods allow the practitioner to achieve a highly successful impression.

## The principles

Before taking a final impression for indirect restorative cases, each situation must be analyzed and treated as unique. I've already discussed appropriate preparation design, but it's important to evaluate tooth condition after preparation but before impressions. Some factors that may inhibit a successful impression are excessive tissue, blood and saliva.

To take a great final impression, a few principles must be adhered to, and remain constant regardless of technique, for predictable success. Once again, these principles remain constant regardless of technique:

- Visualization.
- Retraction.
- Moisture control.

## Visualization

To take an impression, the entire preparation must be visible and free of contamination. This includes the occlusal surface, margins and axial walls. The preparation should be free of undercuts and rough edges, as previously outlined for ideal preparations. A great way to visualize this is to use an occlusal mirror or hover over the prep with the wand of an intraoral scanner before impressioning. The entire prep must be visible, or it will not be captured, regardless of method of impressioning

## Retraction

After preparation, tissue can collapse or cover the margin, decreasing visibility and hindering the ability to fully capture the margin. The necessity for retraction persists even with the most ideal of preparations.

In practice, we have several items at our disposal that can assist with retraction. In some instances, multiple items may be needed to accomplish appropriate retraction. Below is a list of several items commonly used to retract the tissue:

- Retraction cord, mostly Sizes 1 and 2 (multiple manufacturers).

- A diode laser (BlueWave, Clinicians Choice; AMD Picasso, AMD Lasers).
- Retraction paste (Voco Retraction Paste, Voco; 3M Retraction Paste, 3M Oral Care; Expasyl, Acteon; Traxodent, Premier Dental).
- Compression Cap (Roeko Comprecap, Coltene)

A commonly used approach in my clinical practice is a combination of a No. 1 retraction cord and retraction paste. If the preparation is more subgingival, the use of a diode laser may be indicated to "trough" the tissue around the margin of the preparation.

Voco's retraction paste is unique in this category because it has a two-phase consistency for a simpler application: The paste first flows easily under lower pressure, then increases its viscosity over time to remain stable and hold the sulcus.

The material is contained in a compule with an elongated and flexible tip (Fig. 3), which affords the capability of direct, controlled introduction into the sulcus. The material controls sulcular bleeding, displaces any remaining sulcular moisture, and leads to a widened sulcus for visualization and accurate impressioning. After



Fig. 3: Voco retraction paste compule packaging and illustration of introduction of the material into the sulcus.



**Fig. 4, upper left:** Sulcular bleeding present at Tooth #3 after preparation. **Lower left:** Applying Voco Retraction Paste and Roeko Comprecap to compress gingival tissue. **Upper right:** Retraction paste after removal of Comprecap. **Lower right:** After two minutes, retraction paste is removed, margins are visible and bleeding has ceased.



**Fig. 5:** Final digital impression of #3 with all visible margins. Tooth #4 is an implant scan body.

application, the material is rinsed off with ease after one or two minutes. Its active ingredient is aluminum chloride, which unlike ferrous sulfite astringent materials leaves no precipitate that can interfere with bonding or cause discoloration over time.

### Moisture control

Once we have achieved visualization and retraction, moisture must be controlled. It is essential to consider the crevicular fluids and excessive moisture on the tooth. Whether the material is clear (saliva, water, etc.) or colored (blood and other materials used during the procedure), the presence of excessive fluid will adversely affect the quality of the restoration. This holds true for both digital and analog techniques. Gentle air pressure will not only help maintain a dry field but also assist in the introduction of higher-viscosity impression material into the

sulcus in an analog technique. For digital impressions, air is necessary, but cotton rolls and Dri-Angles can help isolate the area and control moisture in the surrounding tissues.

Several other hemostatic agents can help control bleeding before impressions are taken. In my practice we use:

- Aluminum chloride- and ferric sulfate-based hemostatic agents.
- A diode laser.
- Retraction pastes.

These products all have their place in the operatory in situations that require moisture control.

### Case 1: Retraction paste, Comprecap

In this case, Tooth #3 was prepared for a full-coverage zirconia restoration.

After preparation, some sulcular bleeding was noted. The margin was in close

proximity to the gingival margin, and the patient was in good periodontal health. It was decided to treat this case without packing a cord, using only retraction paste. Voco retraction paste was placed into the sulcus circumferentially, a medium-sized Comprecap was introduced and the patient was instructed to place pressure on the Comprecap by biting. After two minutes, the Comprecap was removed and the paste rinsed off. In Fig. 4, the paste has been displaced; this is not a characteristic of the paste but due to the placement of the Comprecap. The entire margin was visible and sulcular bleeding ceased, which led to a successful final impression (Fig. 5).

### Case 2: Single soaked cord, retraction paste

In this case, there was a supracrestal palatal fracture and the tooth had been recently



**Fig. 6. Left, top to bottom:** Sulcular bleeding present after preparing Tooth #4; bleeding still present after placing a #1 cord; after placing Voco Retraction Paste. **Right:** After retraction paste has been rinsed off, the tooth is ready for impression.



**Fig. 7:** The final digital impression for #4.

treated endodontically. The palatal margin was approximately 0.75 mm subgingival.

After preparation, sulcular bleeding was evident. A #1 cord soaked in Tissue Goo (Clinician's Choice) was placed into the sulcus and did not completely control the bleeding. Voco retraction paste was introduced into the sulcus above the cord and sat for two minutes. After rinsing the paste, sulcular bleeding had ceased and we were ready for the final impression (Figs. 6 and 7).

In both cases, one will note that Voco retraction paste was a common theme for both retraction and moisture control. The capabilities of this paste are unique and great success has been achieved with this as both the primary agent and as an additional agent. Retraction pastes are a great addition to any clinical armamentarium and should greatly improve the dental team's retraction and moisture control abilities.

## Conclusion

Indirect restorative impressioning can be accomplished by many viable methods and a satisfactory result can be achieved. Additionally, an analog or digital technique can be adopted and used with great success for indirect dentistry. Every tooth is different, every mouth is different and each clinical situation is different. Close examination of each clinical situation is imperative for success. There is no "one size fits all" for impressioning techniques. We have a vast array of materials available for use, each with different indications. Attention to the principles and an understanding of techniques can help any clinical practice take great impressions every time. ■

### References

1. Burgess J. "Impression Material Basics." *Inside Dentistry*, Oct 2005. 1(1).

2. Basapogu S, Pilla A and Pathipaka S. "Dimensional Accuracy of Hydrophilic and Hydrophobic VPS Impression Materials Using Different Impression Techniques—An In Vitro Study." *J Clin Diagn Res*. 2016;10(2): ZC56–ZC59.
3. Donovan, TE et. al. 13—Dental Biomaterials, Editor(s) Ritter AV, Boushell LW, Walter R. "Sturdevant's Art and Science of Operative Dentistry," Elsevier, 2019, Pages 453–510.
4. Punj A, Bompalaki D and Garaicoa J. "Dental Impression Materials and Techniques. *Dental Clinics of North America*." (2017) 61. 779–796.
5. Mazda J. "Trends in Dentistry 2021, Making Sense of Unusual Times." *Inside Dentistry*, Dec 2021 17 (12), Pages 12–16.
6. Mangano F, Gandolfi A, Luongo G and Logozzo S. "Intraoral Scanners in Dentistry: A Review of the Current Literature." *BMC Oral Health* (2017). 17(1), 149.
7. Ciccù M, Fiorillo L, D'Amico C, Gambino D, Amantia EM, Laino L, Crimi S, Campagna P, Bianchi A, Herford AS and Cervino G. (2020). "3D Digital Impression Systems Compared with Traditional Techniques in Dentistry: A Recent Data Systematic Review." *Materials* (Basel, Switzerland), 13(8), 1982