

## DENTAL MATERIALS

### Impression Techniques: Clinical Properties That Matter

#### INTRODUCTION

Indirect restorations require some type of impressions in order to be fabricated. Stone replicas made from the impressions have been used in dentistry for many years. These models can be read digitally from CAD/CAM technology, or the restorations can be built directly on the dies with conventional lost wax techniques or direct application processes. While some techniques are available to read preparations directly with digital readers, most dentists still use physical impression materials.

There are a number of different impression materials available, but I have found that vinyl polysiloxane (VPS) impressions work well in my hands. VPS materials offer several advantages to the clinician compared to impression materials with different chemistry (eg, polysulfide, polyether, agar, alginate, etc).

This article will introduce, describe, and demonstrate the advantages and use of a VPS impression material that I have used extensively in my own practice. First, let's review the key material properties that are considered important in capturing an optimal impression, and then we will look at a few impression technique mini-case demonstrations.

#### IMPORTANT MATERIAL CONSIDERATIONS Dimensional Stability

One of the most important properties of an impression material is dimensional stability—higher accuracy results when

the dimensional change is lowest. VPS materials, due to their chemistry, exhibit the least dimensional change compared to different types of impression materials. However, among different manufacturers, the dimensional change is variable since an optimum between organic matrix and inorganic fillers must be obtained.

#### Tear Strength and Elastic Memory

Another important property that VPS materials possess is high tear strength. This property refers to the ability of the material to withstand high tearing forces at the most susceptible areas, such as the thin interproximal areas and the depth of the gingival sulcus. Tearing in the impression causes defects, which affects the accuracy of the final replica. Additionally, some impression material remnants may remain in the sulcus and may produce inflammation reactions. Therefore, it is necessary for impression materials to have maximum tear strength at the time of the removal. Impression materials that present very good elasticity and elastic memory are much preferred. The term *elastic memory* refers to the ability of a material to retain its original shape (dimensions) when forces are applied. The clinical importance of this property is that when the impression material is removed from the dental surface, the final replica should be highly accurate, with no changes in dimension, regardless of the force



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applied. If the force applied exceeds the elastic memory, the material should instantly break, or the final impression will not be accurate. It is important to note that not all VPS products have the same ability to perform in this way.

### Hydrophilicity

While VPS materials are inherently hydrophobic (water-hating), a few manufacturers have developed novel additives that change this physical property and produce VPS products that behave like hydrophilic (water-loving) materials. This allows the material to flow easily in a wet field and around the tissues, resulting in very accurate impressions.

### Viscosity

Another important factor of the VPS materials, especially for the light-body impressions, is the consistency as it refers to the "rheology/flow property" of the impression material. With light-body impressions, the clinician tries to capture the detail of the tooth and the surrounding area. Higher consistency would result in higher accuracy impressions as the material can flow into the thin interproximal and cervicular areas more easily, producing an accurate and detailed replica.

### Hydrogen Gas Formation Versus Model Pour-Up

Early VPS materials had problems with bubbles forming on the surface of the die due to release of hydrogen gas. This problem was easily resolved by having the technician wait one hour for the gas to dissipate before pouring the models. The stability of these impression materials allows for pouring models days or weeks later, so many dentists send the impressions to a lab where they are poured up many hours (or even days) after they are set. As a result, the formation of hydrogen gas bubbles is not a major concern these days. However, some manufacturers have developed special hydrogen scavengers that prevent this bubbling effect for those impressions that may need to be poured up more quickly.

### BASIC IMPRESSION TECHNIQUES

There are many different types of impression techniques that are used in the dental profession. The technique that each dentist will use depends on one's training and past experience as well as one's impres-



Figure 1. (Case 1.) Teeth Nos. 4 to 13 were prepared for all-ceramic crowns.



Figure 2. Light Body Bonasil A+ (DMP Dental) beginning to be syringed at margins by the clinician.



Figure 3. Light-body impression material continued to be syringed around margins.

sion materials of choice. The most common techniques are as follows:

(1) Tray (putty or heavy-body) with a wash material (light-body or medium-body).

- One-step—means that the tray and wash materials are used simultaneously, where the assistant mixes and loads the tray while the dentist syringes around the prepared teeth.

- Two-step—means that the assistant mixes and loads the tray and the dentist takes the first impression. Space is created in the impression and then the wash material is syringed and the second impression is seated over the tray material.

(Note: The technique that I use most often is the one-step tray and wash. I like this technique because it saves time. In addition, this technique gives me the best overall results when detail, accuracy and cost are all considered.)

(2) Monophase material.

Generally used in the single-step technique, where the dentist uses the same material for both the tray and the wash material, replacing the 2 with one impression material.

### My VPS Materials of Choice

After using several different brands of VPS materials, I have found that DMP Dental products offer extremely accurate replicas, even when used in the most difficult cases. A wide variety of types and viscosities designed for the various impression techniques have performed excellently in any application I have tried. Two types of light-body, both exhibiting excellent tear strength and hydrophilicity, are available. CAD/CAM, clear, and alginate substitute impression materials are also among the choices, if you have the need for any of these.

DMP Dental's material has an additive that will reduce hydrogen bubbles to almost zero in 15 minutes. This particular impression material can be poured up to 30 days after the impression, and the physical properties allow for multiple pours. It is compatible with gypsums, electroplating, and refractory models.

In my hands, I have found that the Bonasil A+ (DMP Dental) materials perform very well and are reasonable in price. The hydrophilic Bonasil A+ light or the Bonasil A+ HTS Light Body materials do not sag or drip, flowing well under pressure and making these materials to be among the very best I have ever found for syringing around the teeth. Furthermore, due to superb tear strength, I don't have to worry about it tearing in thin sections. The Bonasil A+ Heavy Body has an excellent consistency and durometer and helps to force or drive the tray material into the sulcus area and around the teeth very easily. It also bonds securely with the Bonasil A+ Light Body material.

For bite registrations, I like Bona Bite Air, a mousse-like product (DMP Dental). Mousse-type products allow the patient to bite gently in the material without distortion, and these materials will not flow around the oral cavity when the bite is taken. This reduces the patient sensation that the material is flowing in the mouth, thereby possibly affecting the bite impression. I have also observed that the Bona Bite Air, a mousse-like bite material has excellent tear strength and hydrophilic properties, and the material sets very hard for proper trimming and the articulation of models in the laboratory.

### CLINICAL EXAMPLES

Let's look at a few abbreviated case reports that will demonstrate the clinical application of these VPS materials.



**Figure 4.** Bonasil Putty (DMP Dental) heavy body catalyst and base ready to mix.



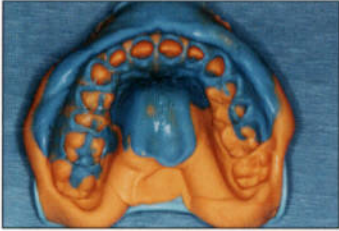
**Figure 5.** Putty was mixed by the assistant.



**Figure 6.** Putty was then placed in the impression tray.



**Figure 7.** The putty heavy body was inserted over the light-body material.



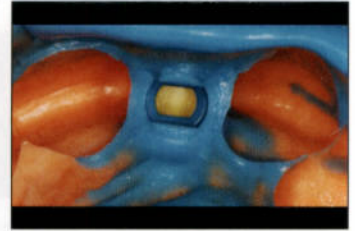
**Figure 8.** The completed final impression.



**Figure 9.** (Case 2.) Impression abutment for implant in place.



**Figure 10.** Light Body Bonasil A+ syringed around impression abutment.



**Figure 11.** Final impression for implant.



**Figure 12.** Bona Bite Air, a mousse-like product (DMP Dental) was injected over incisal edges.



**Figure 13.** Final bite registration.



**Figure 14.** (Case 3.) Completed quadrant dual-arch final impression.



**Figure 15.** Occlusal registration for posterior restorations.

### Case 1

In Figure 1, you can see that the patient's maxillary teeth (Nos. 4 to 13) were prepared for all-ceramic restorations. The margins were placed at the tissue height and no retraction cord was used. I used Bonasil A+ Light Body to syringe around all the margins (Figures 2 and 3) while my assistant mixed the putty tray material (Figures 4 and 5). In less than 60 seconds, I had completed the syringing of the light-body material, and the putty material was in the tray ready to place (Figure 6). I placed the tray (Figure 7) and used slight pressure to seat it over the light-body material. The impression was allowed to remain in place for 3 minutes and was then removed. Figure 8 shows the excellent final impression capturing every margin and all the details needed by the laboratory team to fabricate excellent restorations.

### Case 2

An impression abutment for an implant is shown in Figure 9, ready to capture. The Bonasil A+ Light Body material was injected around the impression abutment in Figure 10, and then the heavy-body tray material in a full-arch tray was placed. A close-up view of the impression for the implant is shown in Figure 11. A bite registration material (Bona Bite Air, a mousse-like product) was injected on the incisal edges of the mandibular anterior teeth (Figure 12) and the patient was instructed to close in centric occlusion for 60 seconds. The final bite registration is shown in Figure 13.

### Case 3

Finally, in Figure 14, a dual-arch quadrant impression was taken (using the same technique as seen in Case 1); light-body material was injected in the sulcus and

putty tray material in the metal quadrant tray. The untrimmed occlusal bite registration, immediately after removal from the mouth, can be seen in Figure 15. ♦

**Dr. Nash** operates a general practice focused on aesthetic and cosmetic procedures in Huntersville, NC. He is cofounder of the Nash Institute for Dental Education, which has a new facility at his office site in Huntersville. An Accredited Fellow in the American Academy of Cosmetic Dentistry and a Diplomate on the American Board of Aesthetic Dentistry, he has authored chapters in 2 textbooks on aesthetic dentistry and is a consultant for numerous dental product manufacturers. He can be reached at (704) 904-3458 or via e-mail at rossnashdds@aol.com, or visit thenashinstitute.com.

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