



## Professional Resources

Home

Teeth For A Lifetime

Balancing

Articles

Seminars

Brush & Floss Dental Center

Contact Us

## Innovative Crown & Bridge Technique -- The H&H Impression Technique

By Dr. Jeffrey C. Hoos, DMD, FAGD

### Abstract

A dual-arch impression technique is reported that enables the dentist to make accurate final impressions of subgingival margins without use of retraction cord, gingival excision, or application of hemostatic agents. The technique relies on specific physical properties of the chosen materials, sequential use of high- and low-viscosity impression materials, and the application of hydraulic force using a standardized method of material application. The procedure is described as the Hydraulic and Hydrophobic Impression Technique (H&H Technique).

### Clinical Challenges

The ultimate goal in producing final impressions for crown and bridge restorations is to make accurate impressions that can capture subgingival margins. Conventional one-step impression techniques referred to in this report assume the sequential use of a low- or medium-viscosity impression material and a high viscosity material. In conventional practice, the low-viscosity material is first extruded into the sulcus surrounding the prepared teeth. The impression tray is then filled with a high-viscosity material and placed over the prepared teeth and dental arch.

Four clinical challenges frequently hinder the replication of subgingival margins when using the described conventional impression technique. To understand these challenges, it is essential to have a working knowledge of key physical properties of the impression materials selected for use. These physical properties include viscosity, durometer hardness, and resistance to fluid absorption.

The first challenge in capturing final impressions of subgingival margins is the use of retraction cord to displace gingival tissue. Low- or medium-viscosity materials typically have a durometer hardness (40 to 50) that is insufficient to displace soft tissue, blood, or saliva. Therefore, it is necessary to mechanically retract the gingiva in order to allow impression materials to passively enter the sulcus and produce an accurate impression of the finish line. The insertion and use of gingival retraction cord is time consuming and uncomfortable for the patient. In certain quadrants, access to the working area is difficult and may require multiple injections of anesthesia, adding to the patient's discomfort and chairtime. In anterior areas where aesthetics are critical, use of retraction cord may damage the interproximal gingiva or the col area, and subsequently result in an unaesthetic appearance.

A second challenge with the described conventional impression technique is the necessity to maintain a dry field. The chairside dental team must work together quickly to assure a dry sulcus upon delivery of the low-viscosity material. Assuming the gingiva has been properly retracted, the presence of blood or saliva will still act to deflect the low-viscosity material and result in an inaccurate replication of the subgingival margin. Although the majority of vinyl polysiloxane impression materials resist water absorption, the durometer hardness of low-viscosity materials is insufficient to displace blood or saliva.

Following the preparation of subgingival margins, hemorrhaging occurs in the majority of clinical cases. This presents the third clinical challenge of the conventional impression technique. Although hemorrhaging can be controlled with hemostatic agents, it often produces rapid clotting in several areas. If all blood clots are not removed prior to final impressions, the low viscosity, low durometer impression material can be deflected, resulting in an inaccurate replication of the subgingival margins.

© 1999 - 2005  
Dental  
Explorations LLC



There are several implicit difficulties with use of hemostatic agents prior to impression taking. Following application of the hemostatic agent, the tooth and sulcus must be rinsed. This causes hemorrhaging to resume, requiring reapplication of the hemostatic agent. The procedure must be repeated until hemorrhaging is controlled. This decreases patient comfort and increases chairtime. Another difficulty can arise with use of hemostatic agents that contain sulfur, which is known to interfere with the setting times of vinyl polysiloxane impression materials. In addition, hemostatic agents that contain epinephrine can be a medical concern for patients with cardiovascular conditions.

A fourth clinical challenge with the use of the described conventional impression technique is the potential for damage to the periodontium if electrosurgery is used to remove tissue to create a sulcus. Although electrosurgery can be used to sculpt the gingival tissue and create a free channel for the flow of impression material, it may result in gingival recession, or have an irreversible effect on the health of the periodontium. Electrosurgery can also cause hemorrhaging, in which case retraction cord or hemostatic agents may be necessary anyway.

## Hydraulic Force and Durometer Hardness

A Hydraulic and Hydrophobic (H&H) impression technique is presented that allows the dentist to proceed from tooth preparation involving subgingival margins directly to final impression without use of retraction cord and without the requirement of homeostasis or a dry field. This technique relies on use of an impression material with a high durometer, which is used with a specific impression-taking method that generates hydraulic pressure to propel a low durometer material into the sulcus, thereby capturing the details of the subgingival margin. Throughout the description of this technique, the physical properties of selected materials will be referenced with respect to their impact on the accuracy of the final impression.

## Materials and Clinical Preparation

The vinyl polysiloxane materials selected for the H&H impression technique necessitate specific physical properties. Since the technique involves two steps, the materials are referred to as first-step and second-step materials. The first-step material must have a high durometer hardness (no less than 85); exhibit a whipped consistency with a high viscosity; and maintain placement without running or slumping after the material is extruded and before it is set (Table I).

<b>Material</b>	<b>Manufacturer</b>	<b>Shore A Durometer</b>
2 Minute Blue Velvet	J. Morita USA	75
90 Second Blue Velvet	J. Morita USA	85
30 Second Blue Velvet	J. Morita USA	85
Blu-Mousse	Parkell	85
Blu-Mousse Super Fast	Parkell	85
Tri-Bite Bite Registration	Direct Dental Service	85
VPS Bite Registration Fast Set	Exacta Dental	85

As a result of its high durometer, the first step material will exhibit a plaster-like rigidity after it is set. This characteristic is critical to the success of the technique, as it does not permit rebound of the material after setting. The rigidity of the high durometer material creates the hydraulic force needed to move the lower durometer material into the sulcus and displace the gingival tissue. The second-step material must have a durometer hardness of 40-50; exhibit a low viscosity; yet maintain placement without running or slumping after the material is extruded and before it is set (Table II).

<b>TABLE II</b> Examples Of Vinyl Polysiloxane Impression Materials Exhibiting Low Shore A Durometer Hardness		
<b>Material</b>	<b>Manufacturer</b>	<b>Shore A Durometer</b>
2 Minute Blue Velvet	J. Morita USA	40
90 Second Blue Velvet	J. Morita USA	40
30 Second Blue Velvet	J. Morita USA	40
Tri-Bite Fast Set Light Body	Direct Dental Service	N/A

The high- and low-durometer materials must both exhibit: a.) hydrophobic properties, that is, resist fluid absorption; and b.) thixotropic behavior, or flow under applied pressure and not slump when placed in the impression tray. These materials will not absorb blood and saliva, because they are dimensionally stable and highly accurate. As with all impression procedures, the working and setting times are determined by the clinician's preference.

The technique described exemplifies impression-taking for a full crown. Prior to preparing the tooth, a dual-arch tray is selected for the patient with appropriate try-in to be certain that the tray does not impinge on any anatomical structures and exhibits a passive fit. The dentist should have the patient open and close several times with the empty tray in place until the patient feels comfortable with this practice. It is essential that the patient occlude completely down into Maximum Intercuspation (MI) without interference from the impression tray (**Figure 1**).



**Figure 1**  
Try-in of empty, dual-arch tray with patient occluded in Maximum Intercuspation (MI).

Following this try-in procedure, the dentist may proceed with preparing the tooth and subgingival margins.

## **The H&H Technique**

Following tooth preparation, the dentist extrudes the high durometer material onto both sides of the dual arch tray while the clinical assistant uses the air-water syringe and suction to rinse and dry the prepared tooth and control saliva. The dentist coaches the patient to completely bite down as the material-filled tray is inserted into the patient's mouth. This directs the patient into MI (**Figure 2**).



**Figure 2**  
Both sides of the dual-arch tray have been filled high-durometer impression material and inserted in the mouth. Patient is occluded in MI.

Due to the high viscosity of the first-step, high-durometer material, an impression of the prepared teeth, adjacent teeth, and opposing teeth is produced without exceptional detail.

Once the high-durometer material is set, the dentist stabilizes the impression and tray by applying gentle pressure directed at the opposing arch and asks the patient to open (**Figure 3**).



**Figure 3**

The high durometer material is set. The patient opens while the impression is held against the opposing arch to make ready for the low durometer material.

When using the H&H technique, the impression and tray are not removed from the mouth until the final low durometer material is applied and set. With the patient's mouth open and the impression and tray secured on the opposing arch, the clinical assistant rinses and dries the prepared tooth as well as the impression of the prepared tooth. The dentist extrudes a small amount of the low-durometer material into the coronal half of the impression of the prepared tooth (**Figure 4**) while the clinical assistant turns attention to rinsing and drying the prepared tooth.



**Figure 4**

A small amount of the low-durometer material is extruded into one-half of the corona portion of the prepared tooth. The low durometer material is not placed on the prepared tooth directly, nor is it placed anywhere else on the impression.

The dentist encourages the patient to completely bite down into the material to reach MI (**Figure 5**).

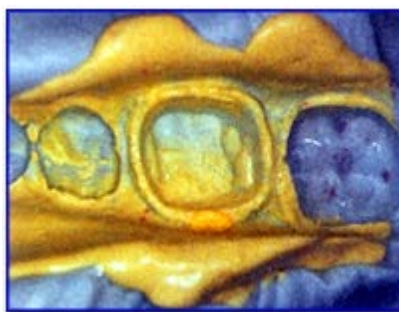


**Figure 5**  
Final step of the H&H technique. The patient is held in MI.

It is important to note that only a thin film of the low-durometer material should be applied in the coronal half of the impression of the prepared tooth.

The principle objective of the low-durometer material is to flow into the sulcus and engulf the subgingival margin to yield an accurate impression. When the low-durometer material has completely set, the dentist stabilizes the impression and tray against the arch that contains the prepared tooth and instructs the patient to open while still maintaining pressure against the arch that contains the prepared tooth. The impression and tray are gently rocked and removed from the mouth.

An accurate impression is obtained with clear delineation of the subgingival margins (**Figure 6**).



**Figure 6**  
Close view of the vinyl polysiloxane impression. Note the definition and fine detail of the subgingival margins of the tooth preparation.

Best results are obtained when the high durometer material shows through the low durometer material on the occlusal aspect of the impressed area of the prepared tooth. This indicates the patient gained complete closure into MI and the impression was completely seated.

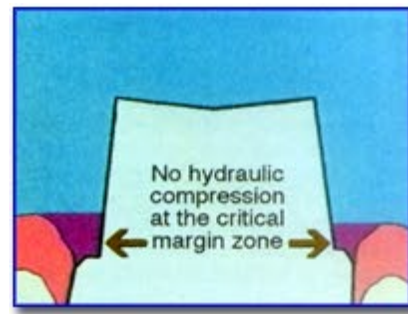
## **H&H Hydraulic and Hydrophobic Properties Work Together**

The physical properties of the high- and low-durometer materials used in the H&H Technique are the key to understanding the logic behind this method. The high durometer of the first-step material permits the material to set to a rigid, plaster-like state. It is this rigidity that allows no rebound of the first-step material and creates a hydraulic force that promotes the surge of low-viscosity material into the sulcus and subgingival margins during the second step of the procedure. The hydraulic force of the rigid, high-durometer material displaces the soft gingival tissue to allow the flow of the hydrophobic low-viscosity impression material in the second step of the H&H Technique (**Figure 7a-e**). Due to this hydraulic and hydrophobic action of the materials, the gingival retraction cord is not required.

**Figure 7. A - E Graphics demonstrating the dynamics of hydraulic and hydrophobic properties working together in the H&H Technique.**



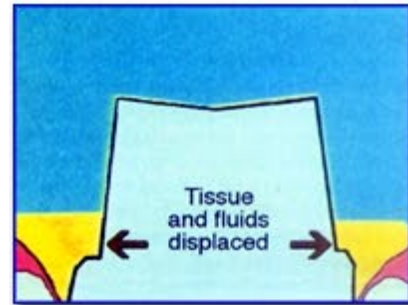
**Figure 7a**



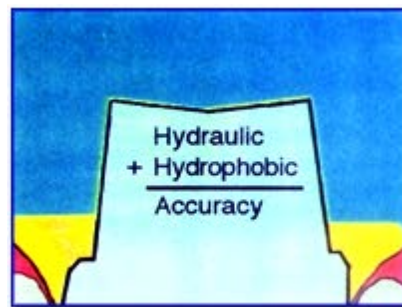
**Figure 7b**



**Figure 7c**



**Figure 7d**



**Figure 7e**

## Contraindications

There are four instances in which use of the H&H Impression Technique would be contraindicated. For clinical cases involving mobile teeth, use of a material with a high durometer would cause excessive stress on the teeth during withdrawal of the impression due to the rigid set of the material. Secondly, patients exhibiting maxillary or mandibular tori or anatomical undercuts would present a challenge when disengaging the final impression from the arch. A third clinical situation that would contraindicate use of the H&H Technique is that of severely malposed or inclined teeth, in which case the patient may have difficulty with complete occlusion into the material during the second step of the technique. Finally, any extreme spatial discrepancy between the maxillary and mandibular arch could present a problem selecting a dual arch tray to accommodate the physical abnormality.

## Discussion

The H&H Technique produces an accurate impression without the placement of retraction cord, hemostatic agents or use of electrosurgery.

These are all integral steps used in conventional impression techniques to gain access to subgingival margins. The H&H Technique relies on hydraulic force to propel the low durometer material into the sulcus. This is made possible by the interaction of the high and low durometer materials combined with the sequential technique of impressing the materials into the prepared site.

In conventional two-step impression techniques, the first impression is taken, set, and removed from the mouth. The impression and tray are then returned to the mouth for the second step of the procedure. If

the first step impression is not positioned correctly, the second step impression may be inaccurate. Using the H&H Technique, the first step impression is not removed from the mouth until the final impression is complete. This makes it easier for the patient to relocate MI during the second step of the H&H Technique since the tray is never removed from the mouth.

There are a variety of high durometer materials that can effectively be used with the H&H Technique. A partial list is presented, although this does not represent all available materials. **(Table I)**

<b>TABLE I</b> Examples Of Vinyl Polysiloxane Impression Materials Exhibiting High Shore A Durometer Hardness		
<b>Material</b>	<b>Manufacturer</b>	<b>Shore A Durometer</b>
2 Minute Blue Velvet	J. Morita USA	75
90 Second Blue Velvet	J. Morita USA	85
30 Second Blue Velvet	J. Morita USA	85
Blu-Mousse	Parkell	85
Blu-Mousse Super Fast	Parkell	85
Tri-Bite Bite Registration	Direct Dental Service	85
VPS Bite Registration Fast Set	Exacta Dental	85

For most clinical situations a working time of 90 seconds is comfortable. However, if multiple crown and bridge units are prepared, a two-minute working time may be desirable.

Examples of low durometer impression materials are presented. This partial list does not represent all available materials. **(Table II)**

<b>TABLE II</b> Examples Of Vinyl Polysiloxane Impression Materials Exhibiting Low Shore A Durometer Hardness		
<b>Material</b>	<b>Manufacturer</b>	<b>Shore A Durometer</b>
2 Minute Blue Velvet	J. Morita USA	40
90 Second Blue Velvet	J. Morita USA	40
30 Second Blue Velvet	J. Morita USA	40
Tri-Bite Fast Set Light Body	Direct Dental Service	N/A

Due to the small amount of low durometer material used in the H & H Technique, a working time of 90 or 30 seconds will afford ample time for delivery of material.

## **Self-Test**

1. What are the three key physical properties of impression materials that are most influential in the clinical performance of the material?
  - a. resistance to fluid absorption, tasteless, odorless
  - b. viscosity, durometer hardness, resistance to fluid absorption
  - c. durometer hardness, working time, and setting time
  - d. none of the above
2. Which of the following present clinical challenges that hinder accurate impressions of subgingival margins when using conventional impression taking techniques?
  - a. maintaining a dry field
  - b. retraction cord placement and associated difficulties
  - c. electrosurgery complications
  - d. gingival hemorrhaging after subgingival margin preparation

- e. all of the above
3. Low or medium durometer impression materials typically exhibit a Shore A Durometer Hardness of?
    - a. 10-20
    - b. 60-70
    - c. 40-50
    - d. less than 80
  4. High durometer impression materials typically exhibit a Shore A Durometer Hardness of?
    - a. greater than 85
    - b. 60-70
    - c. 85-95
    - d. 75-85
  5. When using the H&H Impression Technique, which of the following physical properties of the impression material is most critical in eliminating the need for the gingival retraction cord?
    - a. Dimensional stability
    - b. Durometer Hardness
    - c. Working time
    - d. Viscosity
  6. During impression tray try-in for the H&H Technique, the patient is instructed to open and close several times with the empty impression tray in place. The purpose of this is to?
    - a. direct the patient into maximum intercuspation
    - b. allow the patient to feel comfortable with the procedure
    - c. confirm that the patient can occlude without impinging on the tray
    - d. all of the above
  7. When using the H&H Technique the high- and low-durometer impression materials must both exhibit?
    - a. hydrophobic properties
    - b. thixotropic properties
    - c. hydrophilic properties
    - d. a and b
    - e. b and c
  8. The thixotropic property of impression materials is described as the ability of the material to?
    - a. stay where it is put without slumping
    - b. flow under applied pressure
    - c. a
    - d. a and b
  9. Hemostatic agents that contain sulfur are contraindicated when using vinyl polysiloxane impression materials since they interfere with the impression material's?
    - a. durometer hardness
    - b. shelf life
    - c. water sorption
    - d. setting time
  10. When considering use of a hemostatic agent for patients who have a history of cardiovascular problems, it is prudent to avoid using hemostatic agents that contain?
    - a. sulfur
    - b. epinephrine
    - c. a and b
    - d. none of the above

11. The letters in the H&H Impression Technique stand for 1.) Hardness 2.) Hydraulic, 3.) Hydrophilic, 4.) Hydrophobic?
  - a. 2 and 1
  - b. 3 and 4
  - c. 2 and 4
  - d. 1 and 3
  
12. The hydraulic forces generated during the H&H Impression Technique are necessary to?
  - a. place the occluding teeth in maximum intercuspation
  - b. propel the low durometer material subgingivally
  - c. maintain patient comfort
  - d. all of the above
  
13. It is necessary to know the durometer hardness of the vinyl polysiloxane material used for the H&H Technique to determine if the material?
  - a. qualifies for use as a first or second step material
  - b. repels fluids
  - c. is tasteless or odorless
  - d. none of the above
  
14. When using the H&H Impression Technique, the impression is not removed from the mouth until?
  - a. the low durometer material is applied and set
  - b. the high durometer material is applied and set
  - c. all of the above
  - d. none of the above
  
15. A dual arch tray is used in the H&H Technique to capture an impression of the?
  - a. prepared teeth, adjacent teeth and opposing arch
  - b. prepared teeth and opposing arch
  - c. prepared teeth and adjacent teeth
  - d. maxillary and mandibular arch
  
16. The hydraulic effect generated in the H&H Technique is created by the?
  - a. force of the patient occluding into the impression material
  - b. rigid, plaster-like set of the first step material
  - c. a and b
  
17. The rigid plaster-like set of the first step material used in the H&H Technique is able to sustain the hydraulic force of occlusion without
  - a. resistance
  - b. fluid absorption
  - c. slumping
  - d. rebound
  
18. In which instances would use of the H&H Technique be contraindicated?
  - a. teeth exhibiting mobility
  - b. presence of mandibular or maxillary tori
  - c. severely malpositioned teeth
  - d. all of the above
  
19. When using the H&H Impression Technique, the hydraulics of the method and the hydrophobic qualities of the materials eliminate the need for?
  - a. hemostatic agents
  - b. retraction cord
  - c. electrosurgery

- d. a and b
  - e. all of the above
20. When using the H&H Technique, it is necessary to use a hydrophobic impression material to?
- a. allow fluids to be absorbed
  - b. allow the impression to float in disinfectant solutions
  - c. resist absorption of fluids in the prepared field
  - d. avoid the use of retraction cord
21. A dual arch impression tray insures an accurate reproduction of the patient's bite because?
- a. both the maxillary and mandibular arches are reproduced
  - b. the patient's maximum intercuspation can be checked on the opposing side of the restoration
  - c. the patient can feel when their teeth come together
  - d. use of a dual arch tray does not interfere with the patient's occlusion
22. The key procedural difference between conventional impression techniques and the H&H Technique is?
- a. the impression tray is a dual arch tray
  - b. the impression tray is stabilized on the arch opposing the prepared tooth while the second step material is placed in the impression of the prepared tooth
  - c. vinyl polysiloxane impression materials are used for the first and second step materials
  - d. the impression tray is stabilized on the arch opposing the prepared tooth while the second step material is placed around the prepared tooth
23. When using the H&H Technique the first step impression is not removed from the mouth until the second or final impression is complete. This makes it easier for the patient to?
- a. relocate maximum intercuspation during the second, or final impression
  - b. displace the lower durometer impression material during the second or final impression
  - c. create a stronger occlusal force
  - d. none of the above
24. Vinyl polysiloxane materials are the impression material of choice for the H&H Technique because they are?
- a. tasteless
  - b. exhibit good dimensional stability
  - c. odorless
  - d. all of the above
25. Which of the following could present a problem when selecting a dual arch impression tray for the H&H Impression Technique, and may contraindicate use of the H&H Technique?
- a. edentulous areas on the opposing arch
  - b. the presence of maxillary or mandibular tori
  - c. spatial discrepancy between the maxillary and mandibular arch
  - d. none of the above
26. The hydraulic force created during the H&H Technique, along with the hydrophobic properties of the materials?
- a. propels the low durometer material into the sulcus
  - b. pushes fluids out of the subgingival margin area
  - c. does not allow absorption of fluids
  - d. all of the above
27. For the majority of clinical situations, the most commonly used working time for the high durometer material used in the H&H Technique is?
- a. 90 seconds
  - b. 30 seconds

- c. 2 minutes
  - d. 4 minutes
28. Due to the small amount of low durometer material used in the final impression step of the H&H technique, the most commonly used working time for the low durometer material is?
- a. 90 seconds
  - b. 30 seconds
  - c. 2 minutes
  - d. a and b
29. The H&H Technique increases patient comfort with impression taking by?
- a. eliminating the need for retraction cord
  - b. reducing the number of times the impression tray is placed in the mouth
  - c. saving time
  - d. all of the above
30. Best results are achieved with the H&H Technique when the final impression is evaluated and shows the high durometer material showing through the low durometer material on the coronal portion of the prepared tooth. This is evidence that?
- a. small amount of low durometer material was dispensed in the coronal half of the impression of the prepared tooth
  - b. the clinician ran out of low durometer impression material during the procedure
  - c. the patient gained maximum intercuspation and the impression was completely seated.
  - d. a and c

**Innovative Crown & Bridge Technique -- The H&H Impression Technique** is available as a continuing education course from

The Academy Of Dental Therapeutics And Stomatology  
P . O. Box 241337  
Mayfield Heights, Ohio 44124  
(888) 463-3323

## Dr. Jeffrey Hoos

**Dr. Hoos** has been in private practice for 20 years, with an emphasis on implant, cosmetic, and restorative dentistry. He received his DMD in 1978 from Tufts University in Boston, Massachusetts and is a Fellow in the Academy of General Dentistry and the Academy of Implantology. Questions or comments can be directed to Dr. Hoos at (203) 378-9500, fax (203) 397-3632, or e-mail at [jchdmd@bettersmile.com](mailto:jchdmd@bettersmile.com).



## Perfectim® 30-Second Blue Velvet®

VPS impression material that produces a rigid, plaster-like set to yield a quick and precise bite template for bite registration or first-step impressions. Can be used for a three-function tray technique, for a pick up transfer copings and castings, bite recordings, edentulous impressions, and for a putty substitute in the putty wash technique and implant impressions. Thixotropic consistency eliminates material from running or dripping to prevent patient gagging. 30-second work time / 60-second set time.

## **Perfectim® 30-Second Flexi-Velvet®**

Captures the soft-tissue detail needed in second-step impressions without distortion. Quick, 30-second work time / 60-second set time ensures maximum patient comfort.

[More information on Perfectim™](#) and the [New Impression Taking Techniques Video](#) available from [J. Morita USA, Inc.](#)

[This article is available in PDF Format](#)



[Return to Main Page](#)

---

## **Dental Explorations L.L.C.**

**THE INFORMATION SOURCE FOR ALL DENTAL PROFESSIONALS**



**Betsy Smirnoff Hoos, Director**

**8 Hollow Oak Road  
Woodbridge, CT 06525**

**Phone: (203) 389-6263  
Fax: (203) 397-3632**

[deinfo@dentalexplorations.com](mailto:deinfo@dentalexplorations.com)



Designed and hosted by

**SK** web construction