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RATINGS:

Excellent + + + + +
Very Good + + + +
Good + + +

Impression and Bite Registration Materials

Accurate impressions depend on proper technique as well as desirable material characteristics. Elastomeric impression materials (polyethers, polyvinyl siloxanes, and hybrids) are popular impression materials because of their excellent physical and mechanical properties including excellent detail reproduction, high elastic recovery, and good dimensional stability.

This issue of THE DENTAL ADVISOR reviews the clinical properties of elastomeric impression materials, compares polyethers and polyvinyl siloxanes, and answers some common questions about impression taking. In addition, bite registration techniques and materials are addressed.

Clinical Evaluations



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Impression and Bite Registration Materials

The preferred elastomeric impression materials on the market are polyvinyl siloxanes (PVS) and polyethers (PE). Polyethers are known for their hydrophilic properties and good flowability. Polyvinyl siloxanes, on the other hand, are known for their excellent elasticity, high tear strength, and stability. The decision to use one over the other varies among clinicians and is based on personal preference.

In recent years, a new class of impression materials has emerged. The polyether/polyvinyl hybrids were developed to combine the best features of both materials. GC America introduced EXA'lence, a Vinyl PolyEther Silicone (VPES) material, and more recently, Kettenbach introduced Identium, a Vinylsiloxanether (VSXE). In 2013, *Kulzer* introduced *Flexitime Fast & Scan* a fast-setting VPS impression material that can be scanned without powder or additional surface treatment.

Clinical Properties of an Impression Material

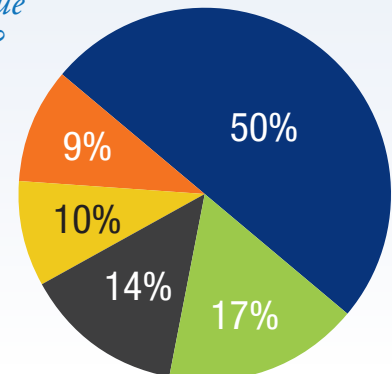
Wettability	Impression materials should be able to displace moisture and form intimate contact with the tooth and soft tissue. No bubbles or voids should be present.
Flexibility	Impressions should be easy to remove from the mouth when set.
Elastic Recovery	A set impression should return to its original dimensions upon removal from undercut areas in the mouth.
Tear Strength	Impressions must resist tearing upon removal from the mouth and when separating the model from the impression.
Detail Reproduction	Impression material must reproduce the finest details of the oral tissues and be able to transfer these details accurately to gypsum dies.

Clinical Consultant Survey:

What impression material/technique do you primarily use in your office?

Eighty-nine of our clinical consultants responded to a survey on impression materials/technique.

- Polyether
- Light Body/Heavy Body PVS
- One Step Putty/Wash PVS
- Two Step Putty/Wash PVS
- Digital Impression



Editors' Note: The survey results were not used to rate products.

Polyvinyl Siloxanes (PVS)

Addition silicones, also known as Polyvinyl Siloxanes, are the most commonly used impression material in the United States. They are available in a wide range of viscosities, colors, scents/tastes, and can be used with all impression techniques. Additional characteristics include long shelf life, adequate working times, fast set times, dimensional stability, and adequate working time. Although polyvinyl siloxanes meet many of the criteria for an ideal impression material, they are inherently hydrophobic. This can reduce accuracy in a moist or wet environment. Surfactants are added to PVS materials to make them more hydrophilic and result in better impressions.

Advantages

- + Highest accuracy and Excellent elastic recovery.
- + Excellent long-term dimensional stability.
- + No unpleasant taste or smell.
- + Good resistance to tearing.
- + Disinfectants can be used due to hydrophobicity of PVS materials.

Disadvantages

- Inherent hydrophobic nature.
- Gloves containing sulfur can inhibit setting.
- Hydrogen gas release can lead to bubbles in gypsum dies.

Polyethers

Polyethers have been in the dental market for over 40 years. While they have earned a reputation for being too rigid and bitter in taste, enhancements over time have made them more desirable. Polyethers remain popular among a large number of clinicians mainly because of their inherent hydrophilic nature. The water-loving elastomeric material provides superior wettability and adherence to preparations, resulting in good surface detail. Their use is ideal in situations where it is hard to maintain a dry environment and/or when tissue management is difficult.

Advantages

- + Excellent wettability (hydrophilic).
- + Good reproduction of surface detail.
- + Not affected by latex gloves.
- + Good short-term dimensional stability.
- + Excellent elastic recovery.
- + Good resistance to tearing.

Disadvantages

- Unpleasant taste reported by some patients.
- Hard to remove from mouth due to rigidity.
- Immersion disinfection can change the dimensional stability of the impression.
- Not as stable over a long period of time.
- Low tear strength of some products.

Q: In taking impressions, I always lose a lot of impression material due to poor mixing in the first bit of extruded material - any suggestions?

A: There is an interesting small mixing syringe called Better Faster Cheaper (BFC) Syringe (Ho Dental Company). It is designed to avoid wasting material that is typically left in a standard mixing tip. It can be attached to the dual cartridges of the impression material. The catalyst and base can be extruded into the smaller syringe before mixing. These small, disposable syringes have angled intraoral tips designed to provide control and access to tight and hard-to-reach areas, to allow direct access to the entire sulcus and to minimize bubbles at the margin. The syringe can also be used to mix and dispense temporary materials.

Clinical Properties of an Impression Material

Bite registrations orient the maxillary and mandibular relationship during the mounting of models, playing an extremely important role in the success of the final restoration. Restorations made on correctly mounted models require considerably less adjustments, resulting in a shorter seating appointment.

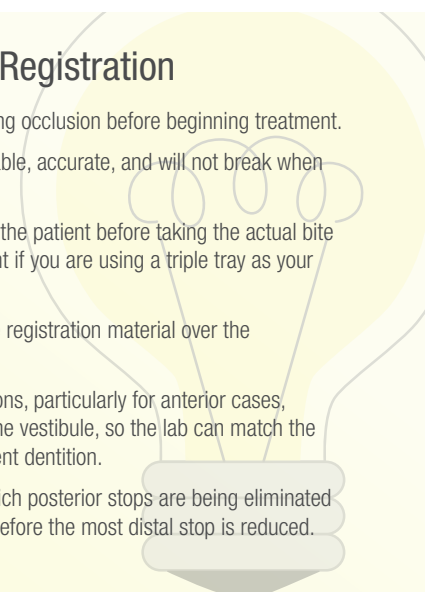
Most clinicians use polyvinyl siloxane (PVS) bite registration materials due to their ease of use, relative stiffness, accuracy, and proven stability.

Scannable Bite Registration Materials

With the ever-growing popularity of CAD/CAM systems, many manufacturers are introducing scannable bite registration materials to their line of products. These polyvinyl siloxane materials can be scanned by optical or laser systems without the use of powder during the design phases of a CAD/CAM restoration.

Clinical Tips for Bite Registration

- Examine the patients pre-existing occlusion before beginning treatment.
- Select a bite material that is stable, accurate, and will not break when trimming.
- Practice biting into centric with the patient before taking the actual bite registration (especially important if you are using a triple tray as your bite registration).
- Use a very small amount of bite registration material over the preparations only.
- When taking full-arch impressions, particularly for anterior cases, use enough material to reach the vestibule, so the lab can match the emergence profile of the adjacent dentition.
- For posterior restorations in which posterior stops are being eliminated during prepping, take the bite before the most distal stop is reduced.



Most Common Issues Faced with Impression-Taking

Problem	Possible Causes	Solutions
Voids	<ul style="list-style-type: none"> • Poor retraction • Improper syringe technique • Poor control of moisture / bleeding 	<ul style="list-style-type: none"> • Ensure sufficient retraction 360 degrees around margin • Immerse syringe in wash material to avoid trapping air
Pulls	<ul style="list-style-type: none"> • Insufficient material • Working time exceeded • Tray moved after seating 	<ul style="list-style-type: none"> • Follow manufacturers working time specifications
Tears	<ul style="list-style-type: none"> • Inadequate mix • Early removal from mouth • Poor retraction 	<ul style="list-style-type: none"> • Bleed cartridge before attaching tip • Ensure sufficient retraction 360 degrees around margin
Drags	<ul style="list-style-type: none"> • Improper seating in mouth • Seating tray in one motion 	<ul style="list-style-type: none"> • Position tray in mouth slowly, once positioned, seat tray vertically
Ledges	<ul style="list-style-type: none"> • Working time exceeded • Seating tray too quickly • Insufficient wash material 	<ul style="list-style-type: none"> • Use sufficient wash material to cover preparation
Light and Heavy body not blending together	<ul style="list-style-type: none"> • Working time exceeded • Latex contamination • Relining wash material 	<ul style="list-style-type: none"> • Do not reline impression with wash

Polyvinyl Siloxane Materials

Product	Company	Viscosities	Fast Set Available	Clinical Rating
Flexitime	Kulzer	H, P, Mono, L, M, R	Yes	97%
Flexitime Xtreme 2	Kulzer	H, R	Yes	95%
Flexitime Fast & Scan	Kulzer	L, M, H, P, Mono	Yes	86%

Bite Registration Materials

Product	Company	Fast Set Available	Scannable	Clinical Rating
Flexitime Bite	Kulzer	Yes	Yes	92%



TDA Recommends:

PVS Impressions:

- **Flexitime (Kulzer)**

Bite Registration Materials:

- **Flexitime Bite (Kulzer)**



Dynamix speed



Description

Dynamix speed is an automatic impression mixing unit with three speed options. It is designed to facilitate the mixing and extrusion of polyether, VPS and alginate substitute impression materials with a mixture ratio of 5:1 in bulk cartridges. *Dynamix speed* is an improvement of the original *Dynamix* machine with three different delivery speeds - two for loading trays and one for loading syringes. The high-speed option delivers material twice as fast as the original machine. Cartridges are marked with a symbol designating the proper speed setting, based on viscosity of the material. The *Dynamix speed* unit comes with a two-year warranty, with the option to extend the warranty for an additional two years. *Dynamix speed* was evaluated by 12 consultants in 56 uses. This impression mixer received a 96% clinical rating.



Consultants' Comments

"Loading an impression tray is usually hard on my hand from squeezing the handle of an automix gun. This mixing system is literally as easy as the push of a button."

"Cartridges are easy to change."

"Short mixing tips minimize waste."

"Fast mixing and excellent results."

"I would like to have a foot pedal so I have both hands free."

Suggested Retail Cost \$2,517⁰⁰

Products that will fit into the Dynamix speed machine:

Take1 (Kerr), *Affinis (Coltene)*, *Aquasil Ultra (Dentsply Caulk)*, *Algin-X Ultra (Dentsply Caulk)*, *Impregum Penta (3M ESPE)*, *Position Penta (3M ESPE)*, *Imprint 3 Penta (3M ESPE)* and *Honigum MixStar (DMG America)*. For evaluation purposes, the company provided *Flexitime Fast&Scan Dynamix Trial Kits*.

Equipment Features

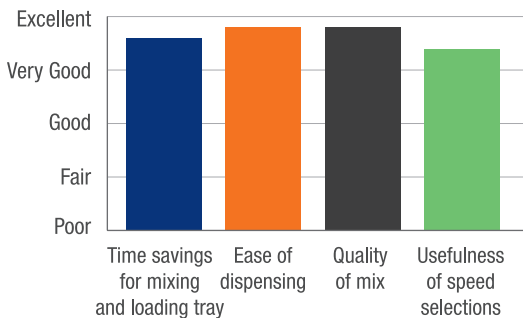
Dynamix speed is an excellent unit for mixing and dispensing impression material. The fast speed makes it stand out among mixers, loading trays in a short amount of time. Compared to hand mixing

(putty) or extrusion from an automix cartridge that can cause hand fatigue, dental assistants noted that using *Dynamix speed* was effortless. The unit works with all brands of dynamic mixing impression materials (see box). The machine has a compact size and neat appearance, and the functions are clearly marked. A fill level indicator allows visual estimation of amount of material remaining in the cartridge.

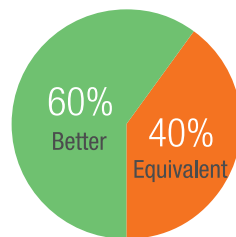
Clinical Tips

- Only *Dynamix* cartridges labeled with a "star" symbol can be delivered at the high-speed option. ■

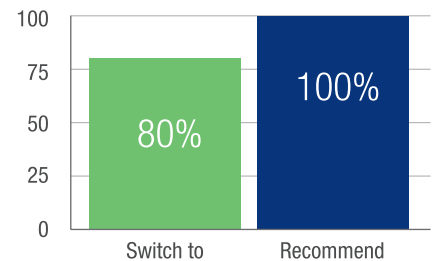
Key Features



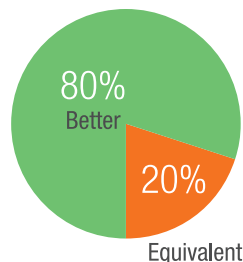
Compared to other impression mixing units



Percentage of consultants who would:



Compared to hand mixing and hand dispensing



Flexitime

Description

Flexitime is a hydrophilic, addition silicone impression material, which is available in the following viscosities: *Light Flow* – extra-light body, *Correct Flow* – light body, *Medium Flow* – regular body, *Monophase*, *Heavy Tray* – heavy body, and *Easy Putty*. Most viscosities are available in 50 ml cartridges, and the putty is supplied in 600 ml tubs. *Heavy Tray* and *Monophase* are also available for use with the *Flexitime Dynamix* automatic mixing delivery system. The trial kits contain sufficient material along with mixing tips and tray adhesive. **Flexitime** has a unique formula that allows a range of working times from 30 seconds to 2:30. The set is accelerated by mouth temperature and the set time is 2:30 after insertion. Eight consultants evaluated **Flexitime** in 115 clinical cases. This product received a 97% clinical rating.

Suggested Retail Cost

Heavy Tray - Trial kit with Medium and Light flow	\$167 ⁰⁰
Easy Putty - Trial kit with Medium and Light flow	\$324 ⁰⁰

Flexitime is also available in *Dynamix Cartridges*.

Product Features

The multiple viscosities and the ease of delivery of **Flexitime** were rated as excellent. The material injects easily and has good flow. None of the cartridges exhibited any clogging in the tips. Dental assistants found the putty to be one of the easiest to mix. Upon seating the tray, the putty is soft enough to adapt to the teeth without distortion, resulting in excellent fit of restorations. The flexibility in the working time is an advantage for multiple-unit impressions, while for single-unit impressions, the working time is reduced, because the material sets



Consultants' Comments

"I love the putty – it has a good texture and is not sticky."

"Great to have some control of the working time."

"Very little force is required to dispense material from the gun."

"The product label covers the entire cartridge, masking the amount of material remaining."

"The tray adhesive is too runny."

"It has a chameleon effect."

rapidly at mouth temperature. *Correct Flow* light body blends well with the heavy body and putty with sufficient color difference for easy reading of the margins. Eighty-eight percent of consultants would both purchase and recommend the **Flexitime** system. ■

2012 CLINICAL PROBLEM
SOLVER
 DENTALADVISOR.COM

Flexitime

Dentists and their staff face daily challenges with materials and equipment when treating patients. Most teams have identified "go to" products that are helpful. These products can solve a clinical problem and save time, headaches, and costs. This product has been recommended by the editorial team of THE DENTAL ADVISOR. It has been identified as an excellent choice for solving a particular clinical challenge.



CLINICAL PROBLEM: When I have large restorative cases I often need to make multiple pours of an impression to get several study models. Finding a material that holds up well without tears or distortion is the challenge on these cases.

SOLUTION: **Flexitime** is a great choice of material for multiple pours of study models. It has great detail so it can be used for a working model as well. I find the combination of the heavy body and light body materials is ideal for quadrant trays on single unit cases as well. I also like to use the heavy body as a pre-op bite registration material for multiple unit cases, or in situations where I'll be prepping a second molar. Sequential relines using light body in the pre-op bite registration are easy, predictable, and accurate. Finally, I will also use the *Monophase* material for a bite registration when I'm creating an appliance for my TMJ patients, when I need a material that will easily let the patient be guided into the desired bite position.

Clinician: Dr. Jim Olsen

Flexitime Xtreme 2

Description

Flexitime Xtreme 2 is an addition silicone impression material that is available in wash (green) and tray (purple) viscosities. It differs from the original *Flexitime* by having a faster setting time and a wild berry scent. It is also highly hydrophilic. The material contains a unique formula, ATS (Advanced ThermaSense), which is sensitive to mouth temperature to allow a flexible working time of 30-90 seconds. The intraoral setting time is 90 seconds. The Starter Kit contains four, 50-ml cartridges of the tray material; two, 50-ml cartridges of light body; and mixing and intraoral tips. Twenty-four consultants evaluated **Flexitime Xtreme 2** in more than 212 clinical applications. This product received a 95% clinical rating.

Suggested Retail Cost \$180²³/Trial Kit

Product Features

Flexitime Xtreme 2 received very good ratings for every characteristic evaluated including viscosities of the wash and tray materials, tear resistance and lack of voids. The flexible working time provides enough time to take an impression of one or two preparations, while the fast intraoral set increases patient comfort. The set impressions exhibit excellent margin detail, which is easily visualized with the color contrast of the wash and tray materials. Patients responded favorably to the wild berry scent, and no reports of poorly fitting restorations were generated during the clinical evaluation. The majority of consultants rated **Flexitime Xtreme 2** equivalent to or better than their current impression material, while 82% would recommend it. ■

Flexitime Fast & Scan

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Description

Flexitime Fast & Scan is a line of fast-setting VPS impression materials that can be scanned without powder or additional surface treatment. It is indicated for all standard impression techniques. **Flexitime Fast & Scan** working time is up to 1 ½ minutes and final setting time is 2 minutes. The **Flexitime Fast & Scan** line includes: *Flexitime Easy Putty* (available in 300 ml jars), *Dynamix Putty* and *Dynamix Heavy* tray materials (available in 380ml) 5:1 cartridges for dynamic mixing machines) and *Flexitime Medium Flow* and *Light Flow* wash materials (available in 50 mL, 1:1 automix cartridges with 12 mixing tips). **Flexitime Fast & Scan** was evaluated by 28 consultants in 313 uses. This scannable impression material received an 86% clinical rating.

Suggested Retail Cost

Flexitime Fast & Scan Medium/Light Flow (2x50ml)	\$58 ⁰⁰
Flexitime Fast & Scan Heavy Tray (2x50ml)	\$58 ⁰⁰
Flexitime Fast & Scan Dynamix Heavy Tray/Putty (2x380ml)	\$445 ⁰⁰
Flexitime Fast & Scan Easy Putty (Single x 600mL)	\$168 ⁰⁰

Product Features

Flexitime Fast & Scan provides very good detail for crown and bridge impressions. The pastel colors are harder to read than deeper colors, but they enhanced imaging with some impression scanners. Some dental offices scan impressions for CAD/CAM restoration fabrication, and many dental laboratories also scan impressions for digital design of restorations. Dentists and laboratory technicians were able to scan **Flexitime Fast & Scan** without the use of powder. The putty is soft and easy to mix by hand to a homogeneous color. Its heavy consistency pushes the light-body material into the sulcus. The fast setting time is ideal for cases involving one to three units. Twenty-one percent of consultants rated **Flexitime Fast & Scan** better than other impression materials they were

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Consultants' Comments

- "Good detail reproduction."
- "The material sets fast and the margins are easy to read."
- "Less waste because of the smaller mixing tips."
- "The light viscosity stacks well."
- "It is difficult to see how much material is remaining in the cartridge."
- "It has a chameleon effect."



Consultants' Comments

- "Putty lends rigidity to a dual-arch tray."
- "Great detail quality."
- "No need to powder impression for scanning."
- "Texture is chalky rather than glossy."
- "Light colors are hard to read; I would prefer the material with a higher color contrast."
- "I would prefer a heavy tray material in an automix cartridge rather than a hand-mixed putty."

Lab Consultant Comment

- "Impression scanned easily and accurately."

using and 32% rated it to be equivalent. Thirty-six percent would switch to **Flexitime Fast & Scan** and 61% would recommend it to a colleague.

Clinical Tips

- After loading the putty into the tray, place an indentation in the approximate area of the preparation to avoid displacing all of wash material.
- Place light/medium-body material on teeth adjacent to the preparation. This will aid in capturing the cervical anatomy of these areas where the putty alone would not adapt beyond the height of contour.
- Use ½ scoop of **Easy Putty** for a quadrant impression. ■

Flexitime Bite

Description

Flexitime Bite® is an addition silicone (PVS) bite registration material. **Flexitime Bite** may be used for conventional bite registration or in conjunction with CAD/CAM systems.

Flexitime Bite can be scanned using an optical scanner intraorally or in the lab without the addition of a reflective powder. **Flexitime**

Bite is a lavender color and sets hard in 30 to 90 seconds. Each box contains two, 50-ml cartridges, 12 mixing tips and manufacturer's instructions. **Flexitime Bite** was evaluated by 19 consultants in 311 uses. It received a 92% rating.



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Suggested Retail Cost \$50.00

Product Features

Consultants observed that **Flexitime Bite** was easy to use by applying it directly from the automix cartridge onto the occlusal surfaces of the teeth. Intraoral setting time is longer than the manufacturer's claim of 30 seconds. Consultants reported that the material scans well without the need for powder. The set material is easy to trim with a sharp instrument such as a scalpel. The material is hard but not brittle and does not chip or crumble during trimming. Forty-seven percent of consultants reported that **Flexitime Bite** was better than other bite registration materials and 42% reported it was equivalent. Sixty-eight percent would switch to **Flexitime Bite** and 84% would recommend it.

Consultants' Comments

- "Easy to dispense."
- "It is rigid and easy to trim – doesn't break."
- "Great scanning detail – no need for powder."
- "I would like a faster setting time."
- "Sticks to the teeth and tissue."
- "It has a chameleon effect."

Clinical Tips

- Initially dispensed material is runny. Bleed cartridge before first use per instructions.
- Dry teeth before placing the material. ■



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