

DENTAL ITEMS OF SIGNIFICANCE 67

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QUESTIONS & ANSWERS

"Questions & Answers" is a feature in which we present and answer some of the questions we have recently received from the field. This month we feature questions about flowable composites, resin cements, giomers, mouth rinses, and bonding amalgam. Should you want more information about a particular topic, please contact the individual whose name follows the specific answer in which you are interested. If you have a question about a topic not discussed in this issue, feel free to call DIS at DSN 792-7676.

67-01 Going with the Flow: Does it Make Sense?

Question: Is it a good idea to use a flowable composite as a liner beneath a packable composite when I restore a posterior tooth?

Answer: It has become popular to routinely place a flowable composite (e.g., Filtek Flow, Flow-It ALC, Tetric Flow, Revolution Formula 2) on the pulpal floor and axial wall of a Class II preparation prior to restoring the tooth with a packable resin composite (e.g., Pyramid, SureFil, Solitaire 2, Prodigy Condensable).¹ In fact, some manufacturers of packable and flowable composites include recommendations in their instructions to do so. Clinicians usually place a flowable liner because it reduces the bulk of packable composite that has to be placed. This makes it easier and less time consuming to restore the tooth. Others believe it helps reduce leakage at the tooth/resin interface because the liner is flexible and absorbs some of the packable composite's shrinkage as it cures. This, at least theoretically, may result in a better bond between the resin and tooth with little or no gap being formed. There is some evidence supporting this theory.^{2,3} Finally, some users place a flowable because it contains fluoride, and they believe that the fluoride release will have an anti-cariogenic effect.

If you routinely place a flowable composite as a liner before restoring a tooth with a resin composite, be it a microhybrid or packable, you should be aware of some precautions to take. First, the flowables are essentially thinned down composite resins, which accounts for their appealing characteristic of easy placement. The thinning down process is accomplished, at least in part, by incorporating fewer filler particles into the resin. As a result, physical properties such as strength and resistance to fracture are lower. So we should be mindful of the need to place a flowable in a relatively thin layer. Also, a study published a few years ago found that a number of then currently-available flowable composites lacked a sufficient degree of radiopacity.⁴ This means that on radiograph the flowable would appear as a thin, radiolucent line extending from the margin to the axial wall. Without a well-documented record, a clinician could misinterpret this as caries, possibly secondary to microleakage. Unfortunately, cases have been reported where the otherwise acceptable resin composite restoration has been removed only to find that the radiolucent line was a non-radiopaque flowable resin.

Perhaps the best reason for using a flowable resin as a liner beneath a packable composite is to make it easier to pack the composite into the preparation. Packables are thick, and it can be difficult to place them in a preparation (especially one that is irregular with undercuts) without producing voids. By placing a flowable resin liner into areas of the preparation that are difficult to access, the potential for producing voids is reduced.

The bottom line is not that we shouldn't use flowable resins as liners, but that we need to be aware of their limitations, so that we choose the right flowable product and use it sparingly so that its lesser physical properties do not compromise the clinical success of the packable resin restoration.

(Col Charlton)

References:

1. Fortin D, Vargas M. The spectrum of composites: new materials and techniques. J Am Dent Assoc 2000;131:26S-30S.
 2. Payne JH IV. The marginal seal of Class II restorations: flowable composite resin compared to injectable glass ionomer. J Clin Pediatr Dent 1999;23:123-130.
 3. Ferdianakis K. Microleakage reduction from newer esthetic restorative materials in permanent molars. J Clin Pediatr Dent 1998;22:221-229.
 4. Murchison DF, Charlton DG, Moore WS. Comparative radiopacity of flowable resin composites. Quintessence Int 1999;30:179-184.
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67-02 A Luting We Will Go

Question: I was reading a question and answer that was in an old issue of your newsletter and saw that you listed some of the new resin cements DIS had evaluated. Could you do the same thing again for the ones you've evaluated since that earlier issue?

Answer: I'd be happy to. The previous entry you're referring to is located at *DIS* 59-08, which was published in January, 2000. Since that time, DIS has evaluated three more products. More will surely appear in the future as manufacturers take advantage of the tremendous interest patients have shown in esthetic dentistry. Finding a resin cement with which you will be satisfied depends, to a great degree, on your specific needs and on what you consider to be important features. For example, if you use a resin cement to lute the occasional all-ceramic restoration, but mostly use it for resin-bonded bridges (i.e., Maryland bridges) and other all-metal restorations, you probably would be satisfied with a small number of shades but would want the kit to include a good metal primer. On the other hand, if you are primarily cementing porcelain veneers and rarely use the cement for all-metal restorations, you would want a wide range of shades, corresponding try-in pastes, a porcelain etchant, and a good silane solution. Because contents vary so much from product to product, DIS occasionally likes to present short synopses of its most recently evaluated products so that you can easily compare their features. The three resin cements evaluated since *DIS* 59 are Illusion, Nexus 2, and M-Bond. Pertinent information for each is given in the following table.

Product	Illusion	Nexus 2	M-Bond
Company	Bisco, Inc. (800) 247-3368 www.bisco.com	SDS/Kerr (800) 537-7123 www.kerrdental.com	Tokuyama/J. Morita (888) 566-7482 www.jmoritausa.com
Gov t Price	\$263.50	\$135.14	\$144.00
Retail Price	\$310.00	\$174.00	\$240.00
Curing Method	dual cured	dual cured	self cured
Packaging Form	two pastes	two pastes	powder and liquid
Number of Shades	Theoretically unlimited with use of Color Modifier; 3 supplied shades are Clear, Milky, and Opaque	4 in kit (Clear, White, White Opaque, Yellow); a 5 th (Brown) is available separately	2 (Clear, Ivory)

Number of Viscosities	One shade that can be altered with Viscosity Modifier	Two (high and low)	One
Radiopaque?	Yes	Yes	No
Fluoride-Containing?	No	Yes	No
Number of Try-in Pastes	3	4	None
Bonding Agent in Kit	One-Step	OptiBond Solo Plus	Two-bottle Primer
Silane Provided?	Yes	Yes	No
Metal Primer(s) Included?	No	No	No
Film Thickness: Company Claim DIS Test Results	20 microns 36 microns	18 microns 32 microns	None provided 71
Comments	Also comes with porcelain etchant; composite primer, and VLA blackout paste to neutralize dark underlying dentin	Packaged in compact tackle box	Good working and setting time; generally handles well but kit is incomplete; not radiopaque
DIS Rating	Recommended	Recommended	Marginal
Location of Review	<i>DIS 64-11</i>	<i>DIS 63-10</i>	<i>DIS 67-??</i>

For additional information about these cements, please refer to their product reviews published by DIS or contact the products manufacturer.

(Col Charlton)

67-03 Giomer = Glass Ionomer + Composite

Question: What is a giomer? Is it like a glass ionomer, and what is it used for?

Answer: Giomers are a relatively new type of restorative material. The name giomer is a hybrid of the words glass ionomer and composite, which pretty well describes what a giomer is claimed to be. Although glass-ionomer restorative materials such as Ketac-Fil (3M ESPE) and Fuji Type II (GC America) have some very important properties, such as fluoride release, fluoride rechargeability, and chemical bonding to tooth structure, they also have well-known shortcomings. Their esthetics, for example, are less than ideal and make them a poor second choice to resin composites for restoring esthetically-demanding areas. Also, they are sensitive to moisture contamination and desiccation, which can present the clinician with challenges during their placement. In the 1990s manufacturers improved these shortcomings by adding resins to glass ionomers to produce resin-modified glass ionomers. These products (e.g., Fuji II

LC, GC America; Vitremer, 3M ESPE; Photac-Fil Quick, 3M ESPE) have much better esthetics and handling characteristics than glass ionomers. Importantly, they also retain many of the glass ionomer's beneficial properties, such as long-term fluoride release and the ability to be recharged with topically-applied fluoride. They tend, however, to discolor over time. In another attempt to better the glass ionomer restorative materials, compomers were also developed. They were touted as being similar to glass ionomers but having much better esthetics and being easier to place and polish. Unfortunately, some of the manufacturer's claims were not confirmed by published research. Although they handled better than GICs, they released much less fluoride and could not be recharged.

In the continuing quest for improved glass ionomer-like restoratives, manufacturers have developed and introduced a new class of materials called giomers. As noted earlier, the term implies they are combinations of glass ionomers and composites. Their manufacturers claim they have properties of both glass ionomers (fluoride release, fluoride recharge) and resin composites (excellent esthetics, easy polishability, biocompatibility). Giomers are distinguished by the fact that, while they are resin-based, they contain pre-reacted glass-ionomer (PRG) particles. The particles are made of fluorosilicate glass that has been reacted with polyacrylic acid prior to being incorporated into the resin. The pre-reaction can involve only the surface of the glass particles (called surface pre-reacted glass ionomer or S-PRG) or almost the entire particle (termed fully pre-reacted glass ionomer or F-PRG). Giomers are similar to compomers and resin composites in being light activated and requiring the use of a bonding agent to adhere to tooth structure. Only one giomer is commercially available at the time of this writing, Shofu's Beautiful, which uses the S-PRG technology. According to Shofu, Beautiful is indicated for restoring Class I through V lesions as well as for treating cervical erosion lesions and root caries. It is available in 13 shades and is supplied in syringes.

Little published research is available on the properties or performance of giomers. One recently published study compared the fluoride release of a glass ionomer, a resin-modified glass ionomer, a giomer, and a compomer. It found that while the giomer released fluoride, it did not have an initial burst type of release like glass ionomers, and its long-term (i.e., 28-day) release was lower than that of the other materials.¹ Another study found that a giomer, after polishing with Sof-Lex disks, had a smoother surface than a glass ionomer, and one that was comparable to that of a compomer and a resin composite.² A three-year clinical study comparing the performance of a giomer with that of a microfill resin composite in Class V erosion/abrasion/abfraction lesions has also been done. After measuring eight performance characteristics, no significant differences between the two materials were found.³

Almost assuredly, many other giomer products will become available in the future. DIS will continue to assess the results of the published literature and perform evaluations of these products as they become available.

(Col Charlton)

Reference

1. Yap AUJ, Tham SY, Zhu LY, Lee HK. Short-term fluoride release from various aesthetic restorative materials. *Oper Dent* 2002;27:259-265.
2. Yap AUJ, Mok BYY. Surface finish of a new hybrid aesthetic restorative material. *Oper Dent* 2002;27:161-166.
3. Matis BA, Cochran MA, Carlson TJ, Eckert GJ, Kulapongs KJ. Giomer composite and microfilled composite in clinical double blind study [Abstract]. *J Dent Res* 2002;81:A-80.

67-04 Rinse and Spit your Problems Away

Question: Is a pre-procedural mouth rinse recommended to reduce contamination from aerosols and spatter?

Answer: Pre-procedural mouth rinsing is the use of an antimicrobial mouth rinse by the patient before a dental procedure. Its objective is to reduce the number of oral microorganisms that may be released as an aerosol or spatter from a patient's mouth during dental care that subsequently contaminate equipment, operatory surfaces, and dental healthcare personnel.

A visible spray is created during the use of rotary dental and surgical instruments (e.g., handpieces, ultrasonic scalers) and air-water syringes. This spray contains, primarily, a large-particle spatter of water, saliva, blood, microorganisms, and other debris. Spatter travels only a short distance and settles out quickly, landing either on the floor, nearby equipment and operatory surfaces, the dental healthcare personnel providing care, or the patient. The spray may also contain some aerosol. Aerosols take considerable energy to generate, consist of particles less than 10 microns in diameter, and are not typically visible to the naked eye. Aerosols can remain airborne for extended periods of time and may be inhaled; they should not be confused with the large-particle spatter that makes up the bulk of the spray from handpieces and ultrasonic scalers. Appropriate use of dental dams, high-velocity air evacuation, and proper patient positioning should minimize the formation of droplets, spatter, and aerosols during patient treatment.

To date, no scientific evidence supports the claim that pre-procedural mouth rinsing actually prevents disease transmission in the dental operatory, but studies have shown that a pre-procedural rinse with a product containing an antimicrobial agent (e.g., chlorhexidine gluconate, essential oils, povidone iodine) can reduce the level of oral microorganisms generated when performing routine dental procedures with rotary instruments. Pre-procedural mouth rinses may be most beneficial before a prophylaxis using a prophylaxis cup or ultrasonic scaler since rubber dams cannot be used to minimize aerosol and spatter generation, and unless the provider has an assistant, high-volume evacuation is not commonly used.

Question: Is a pre-procedural mouth rinse recommended to reduce dental procedure-induced bacteremias?

Answer: Pre-procedural mouth rinsing is the use of an antimicrobial mouth rinse by the patient before a dental procedure. Its objective is to reduce the number of oral microorganisms that may be released from a patient's mouth during dental care in the form of aerosols or spatter that subsequently contaminate equipment, operatory surfaces, and dental healthcare personnel. Also, rinsing may decrease the number of microorganisms introduced into the patient's bloodstream during invasive dental procedures.

The science is unclear concerning the incidence and nature of bacteremias from oral invasive procedures, the relationship of these bacteremias to disease, and the preventive benefit of antimicrobial rinses. Limited studies have not shown a significant benefit of mouth rinsing to reduce the numbers of oral microorganisms in dental-induced bacteremias. Current American Heart Association recommendations (as of 1997) for preventing bacterial endocarditis during dental procedures, do provide some limited support for the use of pre-procedural mouth rinsing with an antimicrobial rinse as an adjunct for those patients at risk for bacterial endocarditis. Further study is needed to determine the effectiveness of pre-procedural mouth rinsing in reducing the numbers of microorganisms in dental procedure-induced bacteremias, and the relationship of these bacteremias to disease.

Adapted from: www.cdc.gov/OralHealth/infection_control/faq/pre_procedural_mouthingrinse.htm.
(Lt Col Harte)

Selected references and additional resources:

1. Brown AR, Papasian CJ, Shultz P, Theisen FC, Shultz RE. Bacteremia and intraoral suture removal: can an antimicrobial rinse help? J Am Dent Assoc 1998;129:1455-1461.

2. CDC. Recommended infection-control practices for dentistry, 1993. *MMWR* 1993;41(RR-8):1- 12.
3. Cochran MA, Miller CH, Sheldrake MA. The efficacy of the rubber dam as a barrier to the spread of microorganisms during dental treatment. *J Am Dent Assoc* 1989;119:141- 144.
4. Dajani AS, Bisno AL, Chung KJ, Durack DT, Freed M, Gerber MA, Karchmer AW et al. Prevention of bacterial endocarditis: recommendations by the American Heart Association. *JAMA* 1990;264:2919- 2922.
5. Dajani AS, Taubert KA, Wilson W, Bolger AF, Bayer A, Ferrieri P et al. Prevention of bacterial endocarditis: recommendations by the American Heart Association. *JAMA* 1997; 277:1794-1801.
6. Fine DS, Mendieta C, Barnett ML et al. Efficacy of preprocedural rinsing with an antiseptic in reducing viable bacteria in dental aerosols. *J Periodontol* 1992;63:821- 824.
7. Fine DS, Yip J, Furgang D, Barnett ML, Olshan AM, Vincent J. Reducing bacteria in dental aerosols: pre-procedural use of an antiseptic mouth rinse. *J Am Dent Assoc* 1993;124:56- 58.
8. Fine DH, Furgang D, Korik I, Olshan A, Barnett ML, Vincent JW. Reduction of viable bacteria in dental aerosols by preprocedural rinsing with an antiseptic mouthrinse. *Am J Dent* 1993;6:219- 221.
9. Klyn SL, Cummings DE, Richardson BW, Davis RD. Reduction of bacteria-containing spray produced during ultrasonic scaling. *Gen Dent* 2001;49:648- 652.
10. Litsky BY, Mascis JD, Litsky W. Use of an antimicrobial mouthwash to minimize the bacterial aerosol contamination generated by the high-speed drill. *Oral Surg Oral Med Oral Pathol* 1970;29:25- 30.
11. Lockhart PB. An analysis of bacteremias during dental extractions. A double-blind, placebo-controlled study of chlorhexidine. *Arch Intern Med* 1996;156:513- 520.
12. Logothetis DD, Martinez-Welles JM. Reducing bacterial aerosol contamination with a chlorhexidine gluconate pre-rinse. *J Am Dent Assoc* 1995;126:1634- 1639.
13. Miller CH and Palenik DJ. Aseptic Techniques. In Miller CH, Palenik DJ, eds. *Infection Control and Management of Hazardous Materials for the Dental Team*, 2nd Ed. St. Louis: Mosby, 1998:207.
14. Mohammed CI, Monserrate V. Preoperative oral rinsing as a means of reducing air contamination during use of air turbine handpieces. *Oral Surg* 1970;29:291- 294.
15. Muir KF, Ross PW, MacPhee IT, Holbrook WP, Kowolik MJ. Reduction of microbial contamination from ultrasonic scalers. *Br Dent J* 1978;145:76 - 78.
16. Pallasch TJ, Slots J. Antibiotic prophylaxis and the medically compromised patient. *Periodontol* 2000 1996;10:107- 138.
17. Wylter D, Miller RL, Micik RE. Efficacy of self-administered preoperative oral hygiene procedures in reducing the concentration of bacteria in aerosols generated during dental procedures. *J Dent Res* 1971;50:509.

67-05 What's the Best Product?

Question: The doctors at our clinic want to switch from the composite we have been stocking to a new one. What's the best one to buy?

Answer: DIS commonly receives this type of question and, of course, it isn't restricted to composites. Sometimes, people want to know what the best amalgam is, or resin cement, or bonding agent. Although it sounds like a simple question, it really isn't. Let's see why, by looking at the question you asked: what's the best composite to buy? We should probably start by putting the word "best" in quotation marks. It is often very challenging to what the "best" product is for you or your clinic, and the reasons are many. First, it can be difficult to differentiate between different brands by testing them. Let's take amalgam as an example. The vast majority, if not all, amalgam brands on the market today are high-copper alloys, and they exhibit physical properties that easily exceed the minimum values required by pertinent dental standards. They also all generally perform acceptably in the mouth. The same situation is seen with the majority of resin composites on the market. Their formulations do not differ dramatically from each other, and so they generally perform acceptably in the mouth. So that's one problem we encounter when trying to identify the best product. The other problem is that the kind of product evaluations you see in *Dental*

Items of Significance as well as in other product evaluation newsletters, are usually based on physical property testing (how the product performs in the laboratory) and limited clinical-user testing. Although these types of testing yield useful information and can help weed out clearly inferior products, the true measure of a dental material's performance is how it does over a number of years in the mouth. This is the true test of a product because it is being tested in the environment where it is used. Intraorally, it is subjected to constant moisture, intermittent drying, occlusal forces from all directions and of different degrees, bacterial attack, and a host of other factors that can potentially affect its ability to perform well. Unfortunately, long-term clinical trials, such as those carried out over a three- to five-year period, are very rarely available to the potential buyer because most companies do not conduct them prior to marketing. The reason they don't is that trials like these take too long and are often prohibitively expensive.

So what is a person supposed to base his/her decision on? I'd suggest three considerations. First, potential buyers should review product literature and available published studies to ensure that the product does, at least, meet (and hopefully exceed) minimum standards required of it by such organizations as the American National Standards Institute (ANSI), International Organization for Standardization (ISO), and American Dental Association (ADA). Second, you should determine what type of clinical cases you intend to treat and what clinical uses you have for the product. For example, if you are in a military practice where your patients are of a narrow age range and you anticipate doing very little cosmetic work (e.g., diastema closures, direct veneers), you would probably want a resin composite with fewer shades and a less complicated shade guide such as Prodigy (SDS/Kerr), Palfique Estelite (Tokuyama/J. Morita), or Ælite LS (Bisco). If your needs are the opposite (many shades, detailed shade guide), you may want to select Esthet-X (Dentsply/Caulk), Point 4 (SDS/Kerr), or the Venus Master's Kit (Heraeus Kulzer). Finally, you should consider the price. Potential buyers should be aware that prices for different brands of a particular dental material can vary significantly. This is one factor that DIS takes into account when evaluating new products.

So, as you can see, finding the "best" product can be difficult and should be done with care. Always remember, it is can frustrating being the first practitioner in your area to buy and use a new material. It's wise to let others do the testing for you. You can then benefit from their experiences and possible future product modifications. DIS is always available, however, to make the selection process easier. Please call us for information when you are considering a new product purchase.

(Col Charlton)

67-06 To Bond or not to Bond?

Question: I have been told to bond all of my amalgam restorations at my base. Should I be placing a resin adhesive so routinely?

Answer: Many laboratory and several clinical studies over the last decade have evaluated the potential advantages and disadvantages of bonding amalgam to tooth structure.

Multiple laboratory studies have found definite advantages for bonded amalgam restorations including increased retention,¹ fracture resistance,^{2,3} and marginal seal.⁴ Staninec found that the use of adhesives provided greater retention than grooves or dovetails.¹ Oliveira and others found improved fracture resistance in large MOD preparations when bonding amalgam compared to the use of Copalite alone.² A study by Burgess and others found no difference in the strength of complex amalgam restorations using four TMS pins or bonding, but the combination of the two significantly increased the forces necessary for fracture.³ Studies have also shown increased retention of amalgam when bonding with resins containing filler particles.⁵ The more viscous bonding agent may improve penetration into the amalgam during condensation.⁶ Also, research has shown a reinforcement of remaining tooth structure with bonded amalgam restorations.⁷ However, the ability to maintain this reinforcement over time remains equivocal with some studies showing no increase in fracture resistance after aging and thermocycling.^{8,9} The use of an adhesive agent under amalgam has been shown in laboratory studies to decrease

microleakage.⁴ Again, the long-term significance of this decrease is unknown.

Most of the clinical studies have found no decrease in post-operative sensitivity^{10,11} and no difference in the performance of bonded amalgam restorations compared with traditional mechanically-retained restorations.^{6,12} Contrary to popular belief, the preponderance of clinical investigations has demonstrated no difference in sensitivity reported by patients receiving amalgam restorations with or without resin adhesives.^{10,11} Summitt and others published a clinical study comparing the performance of bonded versus pin-retained complex amalgam restorations and found no difference after five years between the two techniques. They concluded that bonding with a filled bonding resin (Amalgabond Plus, Parkell Inc., Farmingdale, NY) was a satisfactory method of retaining large amalgam restorations replacing entire cusps.⁶ So, should you place an adhesive agent under all of your amalgam restorations? Given the added cost, time and technique sensitivity of using adhesive liners, there appears to be no clinically-demonstrated benefit in bonding conventional preparations which contain customary retentive features.¹³ However, given the advantages of increased retention, strength and marginal seal found in laboratory studies, the bonding of amalgam may be justified adjunctively with traditional mechanical retention in large restorations replacing a cusp, when tooth structure may need some reinforcement, and for crown foundations.¹³

(Col Vandewalle)

Reference

1. Staninec M. Retention of amalgam restorations: undercuts versus bonding. *Quintessence Int* 1989;20:347-351.
2. Oliveira JP, Cochran MA, Moore BK. Influence of bonded amalgam restorations on the fracture strength of teeth. *Oper Dent* 1996;21:110-115.
3. Burgess JO, Alvarez A, Summitt JB. Fracture resistance of complex amalgam restorations. *Oper Dent* 1997;22:128-132.
4. Meiers JC, Turner EW. Microleakage of dentin/amalgam alloy bonding agents: results after 1 year. *Oper Dent* 1998;23:30-35.
5. Diefenderfer KE, Reinhardt JW. Shear bond strengths of 10 adhesive resin/amalgam combinations. *Oper Dent* 1997;22:50-56.
6. Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. The performance of bonded vs. pin-retained complex amalgam restorations: a five-year clinical evaluation. *J Amer Dent Assoc* 2001;132:923-931.
7. el-Badrawy WA. Cuspal deflection of maxillary premolars restored with bonded amalgam. *Oper Dent* 1999;24:337-343.
8. Santos AC, Meiers JC. Fracture resistance of premolars with MOD amalgam restorations lined with Amalgabond. *Oper Dent* 1994;19:2-6.
9. Bonilla E, White SN. Fatigue of resin-bonded amalgam restorations. *Oper Dent* 1996;21:122-126.
10. Mahler DB, Engle JH, Simms LE, Terkla LG. One-year clinical evaluation of bonded amalgam restorations. *J Amer Dent Assoc* 1996;127:345-349.
11. Smales RJ, Wetherell JD. Review of bonded amalgam restorations and assessment in general practice over 5 years. *Oper Dent* 2000;25:374-381.
12. Browning WD, Johnson WW, Gregory PN. Clinical performance of bonded amalgam restorations at 42 months. *J Amer Dent Assoc* 2000;131:607-611.
13. Setcos JC, Staninec M, Wilson NHF. Bonding of amalgam restorations: existing knowledge and future prospects. *Oper Dent* 2000;25:121-129.

WHAT'S NEW?

"WHAT'S NEW?" features recently-marketed dental equipment and materials. New and innovative products are marketed each month and DIS is unable to evaluate all of them. This section of the newsletter brings these products to your attention. Because DIS has not had the opportunity to evaluate these products, we cannot confirm manufacturers' claims about them. If you would like additional information about the products or are interested in evaluating them, please contact DIS.

Quickcheck is an indicating spray made by the Vacalon Company. Its highly visible colors (red, white, or green) are said to allow the technician and dentist to accurately pinpoint unwanted contacts and high spots on all types of metal, porcelain, and acrylic dental prostheses. The manufacturer claims it can be sprayed on wet or dry surfaces with an applicator tip in a measured and accurate manner. Once dispensed, the powder is said to dry instantly to allow for fast checking of the prosthesis. The powder can be removed with a brush and water or a laboratory steam cleaner. Quickcheck is supplied in a 75-gram (225-mL) aerosol can at a cost of \$16.45 (retail) and \$12.50 (government) per can. Quickcheck contains no CFCs. For ordering information, contact the Vacalon Company at (800) 729-8192 or (614) 577-1945. (MSgt Osborn)

VersaTemp is a self-cured Bis-GMA based resin for fabricating provisional restorations. It is packaged in automix form and is available in six shades keyed to the Vita shade guide (A0-Bleach, A1, A2, A3.5, B1, C2). Its manufacturer, Sultan Chemists, claims that it has a working time of 1½ minutes with a setting time of 4 minutes. Each 25-mL cartridge of material is supplied with 10 small mixing tips, which Sultan claims minimizes waste. The company also claims that the cartridges are clog-proof. VersaTemp provisionals can be made using a direct or indirect technique. Any voids or porosity can reportedly be repaired with a new mix of VersaTemp. A VersaTemp Temporary Crown and Bridge Resin Introductory Kit (item number 72010) contains four 25-mL cartridges of material (1 each of shades A1, A2, A3.5, B1), an automix dispenser, and 40 mixing tips. The product is available for \$200.00 (retail) and \$120.00 (government) from Sultan Chemists at (800) 637-8582, (201) 871-1232, (201) 871-0321 FAX, or www.sultanchemists.com. (Col Charlton)

SensiTemp Resin is a noneugenol-containing cement for short- and long-term cementation. Its manufacturer, Sultan Chemists, recommends it for short-term and long-term cementation of provisional restorations, and for permanent cementation of implant-retained crowns. The company claims that SensiTemp Resin has a two-stage setting reaction that makes it easy to handle. Ninety seconds after mixing, it reportedly enters a rubbery stage when excess cement can be removed. Within 4 to 5 minutes, the cement achieves its final rigidity. The cement does not contain eugenol, which can interfere with the polymerization of resin-based materials, but it does contain potassium nitrate which Sultan claim s minimizes post-operative sensitivity. SensiTemp is available in two packaging forms. It can be purchased preloaded in a 4-mL hand-held automix syringe that mixes the cement s two pastes using a mixing tip. It is also available in a 25-mL cartridge for use in an automix gun dispenser. Pricing for the two packaging versions is given below.

Packaging	Contents	Retail Price	Government Price
SensiTemp Hand-Held Syringe Kit (item number 70010)	4-mL automix syringe, 20 mixing tips	\$35.00	\$21.00
SensiTemp Introductory Kit (item number 70015)	25-mL automix cartridge, 1 automix dispenser, 30 mixing tips	\$185.00	\$111.00

For more information, contact Sultan Chemists at (800) 637-8582, (201) 871-1232, (201) 871-0321 FAX, or www.sultanchemists.com.

(Col Charlton)

Ultradent Products recently introduced a new curing light, the **Ultra-Lume LED 2**. The light features two, second-generation light-emitting diodes (LEDs) and a unique large oval (10 x 13 mm) curing footprint which may save time by illuminating the entire occlusal or facial surface. The low-profile design is claimed to provide access anywhere in the mouth. The curing light produces high-intensity light in the visible spectrum ranging from 410 to 490 nanometers (nm). The peak (453 nm) and base wavelengths are shorter than those of all other LEDs (463 nm). Shifting the spectral output to the left, the company claims, not only activates more of the camphoroquinone range, but also engages a substantial amount of other proprietary photo-initiator ranges as well. The corded handpiece is lightweight and stores in a handpiece holder or on a wall mount. The power pack is adaptable from 100 to 240 volts. The Ultra-Lume LED 2 can be purchased for \$1299.00 (retail) and \$1100.00 (government) from Ultradent at (800) 552-5512, (800) 842-9024 FAX, or www.ultradent.com.

(Col Vandewalle)

Linkmax Paste Pak, an adhesive cement from GC America, has just been released to the market. The dual-curing resin cement is dispensed in two pastes from dual tube cartridges that are inserted into a metal, hand-operated device. Designed for use with all types of porcelain, composite, and noble-metal and base-metal restorations, Linkmax purportedly offers ample working time, easy clean up, and low film thickness. It uses a self-etching primer to bond to tooth structure and separately-available primers to bond to prostheses, core build-ups and posts made out of different materials. The company claims the fluoride-releasing resin cement provides high compressive, adhesive, and shear bond strengths. The cement is available in two shades (A3 and Clear). Linkmax Paste Pak Starter Package may be purchased from GC America for \$249.00 (retail) and \$149.40 (government) at (800) 323-3386, (708) 597-6222 FAX, or www.gcamerica.com.

(Col Vandewalle)

3M ESPE has developed a new self-adhesive universal resin cement, **RelyX Unicem**. The cement was formulated to be self-adherent, eliminating the need for a separate priming, etching or bonding step and purportedly reduces the potential for patient sensitivity. The dual-curing cement is dispensed from convenient uni-dose capsules. Excess cement is said to be easily removed from the margins. Combining the advantages of both conventional luting cements and resin cements, the company reports excellent adhesion, high physical strengths, low linear expansion, and superior marginal integrity. The cement, available in five shades, is designed for all types of porcelain, composite, metal, and porcelain-fused-to-metal restorations. An introductory kit of RelyX Unicem Cement is available for \$225.00 (retail) and \$189.00 (government) from 3M ESPE at (800) 237-1650, (612) 733-8524, (800) 888-3132 FAX, or www.3MESPE.com.

(Col Vandewalle)

The **Hawe X-Ray Film Holder System** is a new Extension Cone Paralleling (XCP) device from KerrHawe. It is claimed to help eliminate radiographic retakes by precisely and consistently placing the film in the appropriate radiographic plane. Six configurations are available for bitewing, endodontic, anterior and posterior periapical radiographic use. The lightweight plastic device is made of two-piece construction and is autoclavable up to 284 C (140 C). The endodontic, anterior and posterior film holder rotates 360 degrees for use in all quadrants and is color-coded for easy identification. Alignment is accomplished via the Centring alignment ring or the Index alignment-positioning device affixed to the alignment indicator rod. The Endo Bite block is designed to allow the patient to bite down on the block without removal of the endodontic files. Another feature of the device is the disposable cardboard Centring Aid disk that attaches to the Centring alignment ring and purportedly allows for easy cone positioning regardless of cone design. For additional information and government pricing, contact Pinnacle Products at (800) 878-3902, (714) 516-7400, (952) 469-5482 FAX, or www.hawe.ch.

(TSgt Sutter)

Filtek Supreme is a new resin composite by 3M ESPE with unique nanofiller technology. Formulated with nanomer (1/1000 of a micron) and nanocluster filler particles, the composite is purported to combine the strength of a hybrid and the polish of a microfil. It is available in 30 different shades in 4 opacities - dentin, body, enamel and translucent, and said to be suitable for anterior and posterior restorations, core build-ups, splinting, and indirect restorations, including inlays, onlays and veneers. A shade selection wheel is provided for more complex restorations and serves as a guide for placing anywhere from one to four layers of composite. An introductory kit of Filtek Supreme Universal Restorative is available for \$291.65 (retail) and \$183.80 (government) from 3M ESPE at (800) 237-1650, (612) 733-8524, (800) 888-3132 FAX, or www.3MESPE.com.

(Col Vandewalle)

Esthet-X Flow is a new flowable microhybrid resin composite by Dentsply/Caulk which the company claims has unique pseudoplastic handling that allows easier control during placement. The product reacts to the movements of your instrumentation by stacking in a Class V preparation or by flowing freely in a Class II preparation. The company claims that Esthet-X Flow has strength and wear resistance equal to that of a hybrid, high radiopacity for easier diagnosis, low polymerization shrinkage for improved marginal integrity, and fluoride release. The new flowable resin composite comes in seven Vita shades and is marketed for use in Class V, Class III, Class II lining, and small Class I restorations. An introductory kit of Esthet-X Flow is available for \$117.00 (retail) and \$70.35 (government) from Dentsply/Caulk at (800) 532-2855, (717) 845-7511, (800) 788-4110 FAX, or www.dentsply.com.

(Col Vandewalle)

Starvest is a microfine, high-heat, crown and bridge investment manufactured by the Emdin International Corporation. The manufacturer claims Starvest can be used to cast all types of alloys and pressable ceramics using a ring or ringless technique. Starvest is mixed under vacuum at 200-450 rpm for 60-90 seconds, and then held under vacuum for an additional 30 seconds before pouring into the casting ring. It is reported that burnout can be accomplished as a fast-fire one-hour method, or a traditional slow multi-stage burnout. See the table below for pricing information. Emdin International Corporation can be contacted at (626) 813-3740, (626) 445-5233 FAX, or www.emdin.com.

Quantity & Package Size	Item #	Gov Cost	Retail Cost
144 pkgs x 60gm + liquid	71260	\$136.00	\$170.00
100 pkgs x 90gm + liquid	71290	\$136.00	\$170.00
72 pkgs x 160gm + liquid	71360	\$147.92	\$184.90
12 pkgs x 1kg + liquid	71901	\$136.00	\$170.00

(MSgt Osborn)

Infection Control and Occupational Safety and Health Web Site--Updates

The Centers for Disease Control and Prevention's (CDC) Division of Oral Health has updated their Web site (www.cdc.gov/OralHealth) and now includes an expanded dental infection control section with frequently asked questions and fact sheets. Other relevant information on adult and children's oral health and water fluoridation can also be found at the site.

The National Institute for Occupational Safety and Health (NIOSH) recently added a Web page on Bloodborne Infectious Diseases (www.cdc.gov/niosh/topics/bbp/). Excellent information is also provided on safer medical devices, as well as links to other CDC Web sites.

The Occupational Safety and Health Organization (OSHA) recently added a section to their Web site (www.osha.gov/SLTC/dentistry/index.html) on safety and health topics relevant to dentistry.

The Organization for Safety and Asepsis Procedures (OSAP) has updated their frequently asked question site, which can be found at www.osap.org.

(Lt Col Harte)

Micrylium recently announced an improved version of their dental unit waterline cleaner Bio 2000, which DIS evaluated (see *DIS* 61-36). The product has a new name, **Lines**, and the manufacturer claims it can be used as a once-a-week disinfectant to achieve the American Dental Association (ADA) goal for microbiological quality of dental treatment water (i.e., less than 200 colony-forming units per milliliter of dental effluent water). The new version is glycerin-free in order to address concerns some clinicians had regarding possible adverse effects on bonding. Lines is available 10 bottles per case for \$88.95 (retail) and \$62.27 (government). For purchasing information, contact Micrylium Laboratories at (800) 489-8868, (416) 667-7040, (416) 667-0071 FAX, or www.micrylium.com.

(Lt Col Harte)

The Kerr Corporation and Dental Recycling North America, Inc. (DRNA) have announced a new recycling service for all Kerr scrap amalgam, used Kerr capsules, and Pinnacle Dispos-a-Traps[®]. DRNA's amalgam recycling service includes secure amalgam waste containers, transportation of all waste, recycling of waste by US Environmental Protection Agency standards, and certification of the entire process. The retail cost of this service is approximately \$99, but Kerr will send a 50-capsule, double-pill (600-mg) box of either Tytin, Tytin FC, or Contour amalgam (retail value \$78) to all participants upon sending materials to DRNA for processing. The 50-capsule amalgam offer from Kerr has a limit of four uses per year. Further information can be obtained at (800) 360-1001, (212) 956-5188, (212) 247-4420 FAX, or RecycleKerrCapsules@DRNA.com.

(Lt Col Roberts)

Kerr Dental has just introduced a new light-emitting diode (LED) curing light, the **L.E. Demetron 1**. The light features an ergonomic, lightweight, cordless design that reportedly provides constant output for 45 minutes before needing to be recharged. The handpiece presents a digital display of 10-, 20- or 40-second cure times. A spare battery and separate charger are supplied to extend working time. The charger has a built-in battery gauge to monitor charge levels and a radiometer to measure irradiance. The L.E. Demetron 1 is available from SDS/Kerr for \$1200.00 (retail) and \$750.00 (government). For further information, contact SDS/Kerr at (800) 537-7123, (714) 516-7400, (714) 516-7633 FAX, or www.KerrDental.com.

(Col Vandewalle)

Micrylium-Healthnet recently introduced **BioPAK**, a re-usable woven polypropylene sterilization pouch for moist heat sterilization methods when temperatures are below 137 C (237 F). The manufacturer claims

the pouch can be sterilized up to 30 times and is approved for 90 days of storage if not opened. After inserting the instrument(s), a dead soft stainless steel insert at the mouth of the pouch is folded over twice to close the bag. Tabs are then bent over in a manner similar to that of a coffee bag. At the time of each use, a special pen (provided with the product) is used to fill in a dot on the pouch. This marking serves as a process indicator and changes color when a certain temperature is reached during the sterilization cycle. The bag is disposed of when all dots have been used. BioPAK is available in seven sizes and is Food and Drug Administration (FDA) approved. For purchasing information, contact Micrylium Laboratories by calling (800) 489-8868, (416) 667-7040, (416) 667-0071 FAX, or www.micrylium.com.

Size (inches)	# of pouches (total # of uses)	Retail price	Government Price
2½ x 10	40 (1200)	\$48.00	\$33.60
3½ x 6	40 (1200)	\$54.00	\$37.80
3½ x 9	40 (1200)	\$55.00	\$38.50
5¼ x 10	40 (1200)	\$73.00	\$51.10
7½ x 12	40 (1200)	\$125.00	\$87.50
11 x 16	4 (120)	\$32.37	\$22.66
12½ x 18	4 (120)	\$37.50	\$26.25

(Lt Col Harte)

Ivoclar Vivadent recently introduced a new glass fiber-reinforced composite post, the **FRC Postec**, an esthetic alternative to the traditional metal post. The post incorporates glass fibers embedded in an organic matrix which purportedly transmit light into the depths of the root canal, allowing cementation with self- and dual-cure cements. Also, the interconnected fibers reportedly provide elastic properties similar to those of dentin to minimize the risk of fracture to the remaining root structure. The manufacturer claims that the post provides radiopacity that makes it visible on radiographs and a tapered design that saves tooth structure by reducing the amount of tooth that needs to be removed. Marketed for use with all-ceramic restorations or any esthetic application, FRC Postec is offered in two sizes to restore anterior and posterior teeth and is available in an introductory package for \$167.00 (retail) and \$100.20 (government). For further information, call (800) 533-6825, (716) 691-0010, (716) 691-2285, or www.ivoclarvivadent.us.com.

(Col Vandewalle)

PDQ is a new single-step composite polishing system from Axis Dental. After finishing and contouring a resin composite restoration, the diamond-impregnated polishers are used with minimal water and light pressure at a speed between 5,000 and 7,000 RPMs. The stainless-steel shank reportedly provides optimal seating with no risk of breakage in slow-speed handpieces. Available in right-angle latch in cup, point and disc shapes, the flexible polishers purportedly produce a high shine very quickly. The introductory set containing 10 discs, 5 points and 5 cups is available from Axis Dental for \$74.95 (retail) and \$45.00 (government). For further information, call (888)-654-2947, (972) 536-6000, (972) 257-3647 FAX, or www.axisdental.com.

(Col Vandewalle)

Twister pro, by Renfert, is a new programmable, hands-free, vacuum mixer. The manufacturer claims Twister pro can mix materials such as plasters, investments, and silicons to a homogenous and bubble-free mass. Twister pro is equipped with five program keys, each of which can be assigned a unique designation. All parameters in the five programs can also be programmed to suit the user's needs. Mixing time is adjustable from 0 to 5 minutes. Revolutions per minute (RPM) can also be set from 150 to 600 RPM. Pre-vacuum and post-vacuum can be applied for up to 60 seconds. The direction of rotation of the mixer can be changed numerous times during mixing. Twister pro is reportedly powered by a high-

torque motor with an electronic speed control that monitors the force required to maintain the preprogrammed mixing speed. It also has a dual inlet filter that is said to prevent dust and other materials from entering the vacuum pump. The manufacturer claims the vacuum pump is high-performance and performs at a rate of 15 liters per minute. The Twister pro standard unit comes complete with a 500mL mixing bowl and is intended to be wall mounted, but an optional stand is available for bench-top use. The Twister pro is available in 230v or 120v versions. It is distributed through Lincoln Dental Supply at a retail cost of \$1496.00 and government cost of \$1379.00. For more information call (800) 289-6678, (856) 663-3280, (856) 488-6346 FAX, or www.lincolndental.com.

(MSgt Osborn)

Eclipse is a new prosthetic resin system manufactured by Dentsply International. Eclipse is reported to be flask-free, monomer-free, and takes you from the baseplate procedures to the completed prosthesis. The Eclipse system is comprised of three resins: a baseplate material, a setup resin, and a contour resin. The system is said to use a processed baseplate that will also be part of the completed prosthesis. This concept is said to allow the dentist to evaluate the fit of the finished prosthesis at the occlusal registration and the try-in appointments. Teeth are held in place for the try-in with the setup resin. Contour resin is then applied with an electric spatula to form the contours of the denture base. After the try-in appointment, changes or corrections can reportedly be made to the setup by warming the still uncured resin. Final polymerization of the prosthesis is accomplished in the Eclipse processing unit. The manufacturer claims the Eclipse system is faster than conventional compression molded processing, incorporates less chance of processing errors, and meets or exceeds ISO standards for color stability, tooth retention, sorption, solubility, and flexural properties. The system includes a processing unit, conditioning oven, electric spatula and tips, melting pot, hot air gun, and an assortment of auxiliary materials, burs and brushes. Also included is Eclipse baseplate, setup, and contour resins (boxes of 12) which are available in original, light pink, light reddish pink, and dark pink shades. The cost of the Eclipse starter kit is \$15,750.00 (retail), and \$11,055.00 (government). For more information, contact Dentsply at (800) 877-0020, (717) 845-7511, (717) 849-4762 FAX, or www.dentsply.com.

(MSgt Osborn)

UniFil Bond is a new light-cured resin adhesive system from GC America. The two-step, self-etching bonding system reportedly is less sensitive to variations in dentin wetness compared to traditional total-etch systems and may result in less post-operative sensitivity, fewer voids, and minimal leakage. The bonding system purportedly uses both chemical and micro-mechanical adhesion and can sufficiently etch all types of enamel. UniFil Bond Kit comes complete with 6-mL bottles of primer and adhesive, dispensing dish, microtips and handle, and can be purchased from GC America for \$119.00 (retail) and \$71.40 (government) at (800) 323-3386, (708) 597-0900, (708) 597-6222 FAX, or www.gcamerica.com.

(Col Vandewalle)

FROM THE LITERATURE

Periodically, articles appear in the literature that present clinically useful information or evaluate the performance of a material or piece of equipment. Because DIS believes that this type of research is of value to clinicians, we present a brief description of these articles to make you aware of them. The complete citation is provided so you can obtain the article if you are interested in reading it in its entirety.

STUCK ON CARIES: DO ADHESIVES WORK?

Bonding of self-etch and total-etch adhesives to carious dentin. Yoshiyama M, Tay FR, Doi J, Nishitani Y, Yamada T, Itou K, Carvalho RM, Nakajima M, Pashley DH. J Dent Res 2002;81:556-560.

In addition to retaining sound, healthy dentin, the goal of conservative dentistry is to remove the highly-infected, denatured dentin (infected dentin) while preserving intact, bacteria-free, remineralizable dentin (affected dentin). Unfortunately very little research has been done to determine the ability of today's adhesives to bond to infected and affected dentin. This study used microtensile bond strength testing and ultrastructural examination by transmission electron microscopy to evaluate the ability of a total-etch adhesive and a self-etch adhesive to bond to these types of dentin. The authors used sixteen extracted human molars with carious dentin for the study. After selective grinding and examination to identify infected versus affected carious areas, they used a total-etch product (Single Bond, 3M ESPE) or an experimental self-etch product (ABF System, Kuraray) to bond to each type of carious dentin and to sound, noncarious dentin. Microtensile bond strength testing revealed that the mean bond strengths of the adhesives to infected dentin was significantly lower than to affected dentin. The bond strength to sound dentin was significantly higher than the other two. The adhesives did not show a difference from each other. Ultrastructural examination revealed that for both adhesives, the hybrid layer was thicker but more porous in caries-affected dentin than in sound dentin. **The authors concluded that the tested adhesives performed more poorly when applied to carious dentin than to sound dentin, and recommended against their being used in those cases.**

DIS Comment: This type of study has obvious relevance to the clinical situation, where adhesives are used to bond resin-based materials to teeth that are carious. Some dentists believe in aggressively removing all carious dentin (both affected and infected), while others choose a more limited approach by removing the soft, moist, infected dentin while leaving the harder, affected dentin. Regardless, it is often difficult or impossible to distinguish between the two types, so at times we are all bonding to affected and infected dentin. Therefore, it is important that we know how today's adhesives perform when used to bond to carious dentin. Unfortunately, this laboratory study found that they perform relatively poorly. These results are probably due to the altered nature of carious dentin, because it is less heavily mineralized, more porous, and softer than sound dentin. As pointed out by the authors, the clinical import of their work is somewhat lessened by the fact that in most clinical cases, we have sound dentin and enamel surrounding the carious dentin, so better results than those seen in the study are probably produced.

FLUORIDE IN RESTORATIVE MATERIALS: DOES IT MAKE A DIFFERENCE?

A clinical comparison of glass ionomer, resin-modified glass ionomer and resin composite restorations in the treatment of cervical caries in xerostomic head and neck radiation patients. McComb D, Erickson RL, Maxymiw WG, Wood RE. Oper Dent 2002;27:430-437.

The purpose of this clinical study was to examine the incidence of secondary caries in Class V restorations in xerostomic patients using a conventional glass-ionomer (Ketac-Fil, 3M ESPE), a resin-modified glass-ionomer (Vitremer, 3M ESPE) and a resin composite (Z-100, 3M ESPE). Forty-five patients received three restorations of each type in the same arch. The patients were instructed in the use of neutral fluoride gel in custom trays and recalled every six months for two years. The restorations were evaluated for material loss, marginal integrity and recurrent caries. Patients were categorized as fluoride compliant or non-compliant. The conventional glass-ionomer demonstrated a significantly greater number of restoration failures overall than the resin-modified glass-ionomer or resin composite restorations. The conventional glass-ionomer failures were due to loss of anatomic form secondary to the erosive effect of topical fluoride use. However, no conventional glass-ionomer restoration failures due to marginal caries could be documented throughout the study. For patients not using topical fluoride, recurrent caries reductions for both the conventional glass-ionomer and resin-modified glass-ionomer restorations were 80% greater than that of resin composite restorations. **Results suggest that fluoride-releasing restorative materials can provide local therapeutic caries inhibition in non-compliant fluoride users.**

DIS comment: Secondary caries remains the primary reason for the replacement of all restorations. The ability of fluoride-releasing materials to reduce the incidence of secondary caries formation in patients remains controversial. An abundance of laboratory research confirms the ability of fluoride-releasing materials to reduce the demineralization of adjacent tooth structure. However, clinical evidence is much more equivocal, with smaller controlled studies suggesting an increase in caries inhibition and larger surveys unable to show any significant effect. The authors suggest that the caries inhibition by fluoride-releasing materials could be limited or easily masked by multiple variables in study design such as case selection, diagnosis, and operator differences. Clinical studies have shown the excellent retentive abilities of glass-ionomer restorative materials, although loss of anatomic form has been a common problem. Xerostomic patients display an unusually hostile environment for restorative materials and especially conventional glass-ionomer restorations. The resin-modified glass-ionomer restorative materials are typically less technique sensitive and have better mechanical properties. This study supports the continued use of glass ionomer-type restorative materials as a viable option in Class V lesions in non-compliant patients at high risk for caries.

REPAIRING ENDODONTIC ACCESS OPENINGS: A POSSIBLE SHORTCOMING?

Fracture strength of amalgam crowns with repaired endodontic access. Hachmeister KA, Dunn WJ, Murchison DF, Larsen RB. Oper Dent 2002;27:254-258.

This *in vitro* study measured the fracture resistance of complex amalgam restorations which had repaired endodontic access openings to that of intact (i.e., non-repaired) complex amalgams in endodontically-treated teeth. The researchers were trying to determine if repairing an endodontic access opening in a molar weakens the complex amalgam restoration. Two groups of 30 extracted human molars were used in the test. Group 1 teeth had their crowns removed and received an endodontic access opening. They were then restored with amalgam (Dispensalloy, Dentsply/Caulk) using chamber retention and four TMS Regular pins (Coltene/Whaledent). Group 2 teeth were also decoronated but were restored with complex amalgam restorations using TMS pins. After storage, each of the Group 2 teeth received an endodontic access opening which was then repaired with amalgam. The teeth were loaded to failure in a testing machine. Group 1 specimens had a mean fracture strength of 2297.5 Newtons, while the Groups 2 teeth failed at 1586.1 Newtons. Statistical testing found a significant difference between the two groups. In addition, the authors reported that 73% of the Group 1 (unrepaired, intact) specimens failed catastrophically (i.e., through the pulp chamber) and were judged to be nonrestorable. However, of the Group 2 teeth, only 23% failed catastrophically. **The authors concluded**

that complex amalgam restorations that were subsequently accessed endodontically and then repaired with amalgam were significantly weaker than intact, unrepaired complex amalgams in endodontically-treated teeth.

DIS Comment: This laboratory study evaluates a clinical situation commonly encountered in the federal dental services. Occasionally, a molar with a large existing amalgam restoration will require endodontic treatment, and the access is made through the restoration. Following endodontic treatment, the access opening is then usually repaired with amalgam. Does restoring the access opening with amalgam weaken the restoration? This study found that it does. As pointed out by the authors, readers need to remember that this is a laboratory study and that it may not correlate well to the clinical situation. Also, the mean fracture loads for the two groups were quite a bit greater than functional loads normally encountered clinically. It is interesting, however, to note that when failure occurred with the unrepaired restorations, the majority of the failures resulted in nonrestorable teeth. That was not the case with the repaired teeth. Despite the study's limitations, it does present some potentially-relevant information. As the researchers noted, the true test of this study's relevance will only be determined through clinical research.

GRINDING IT OUT: DO NEW ADHESIVES BOND TO UNCUT ENAMEL?

Microtensile bond strength of self-etching adhesives to ground and unground enamel. Ibarra G, Vargas MA, Armstrong SR, Cobb DS. *J Adhes Dent* 2002;4:115-124.

This study tested the bond strength of three types of bonding agents to ground and unground enamel, and examined the specimens after testing to see where they had failed. Seventy-two bovine incisors were used in the research. Half of the teeth were assigned to the Ground Enamel Group and were prepared by grinding the facial to produce a flat surface for bonding. The other 32 teeth (the Unground Enamel Group) were bonded without prior grinding. The three tested bonding agents were: a three-step product (Scotchbond Multi-Purpose, 3M ESPE) consisting of an etchant, primer, and adhesive; a two-step, self-etching primer product (Clearfil SE Bond, Kuraray/J. Morita) consisting of a self-etching primer and an adhesive; and a one-step, all-in-one, self-etching product (Prompt L-Pop, 3M ESPE) consisting of a single solution. Each bonding product was used to bond a button of composite resin to teeth in each group (unground and ground enamel), and their microtensile bond strength was measured. **The results were that no differences in bond strengths were found among the three dentin bonding products. Also, there were no differences between bond strengths to ground and to unground enamel for any of the bonding agents.**

DIS Comment: Bonding agents with self-etching primers (e.g., Clearfil SE Bond and Clearfil Liner Bond 2V, Kuraray/J. Morita; Touch & Bond, Parkell) have been shown to bond well to dentin and to cut (i.e., prepared or roughened) enamel. Their ability to bond to uncut or unprepared enamel is questionable, however. Some research found that some self-etching primers produce a more shallow and less well-defined etching pattern on unground enamel than does phosphoric acid.^{1,2} This makes sense because most of the self-etching primers are not as acidic as traditional enamel etchants, which are typically 32% to 37% phosphoric acid. The manufacturers of many of the self-etching primer bonding products do, in fact, recommend that uncut enamel be separately etched with phosphoric acid before the bonding agent is applied. Although this study found no difference in bond strength to unground enamel for the self-etching primer products compared to the one that used phosphoric acid, other research has shown a difference.³ It is always wise to follow the specific product's instructions when faced with conflicting research findings.

References

1. Hayakawa T, Kikutake K, Neomoto K. Influence of self-etching primer treatment on the adhesion of resin composites to polished dentin and enamel. *Dent Mater* 1998;14:99-105.
 2. Perdigão J, Lopes L, Lambrechts P, Leitao J, Van Meerbeek B, Vanherle G. Effect of self-etching primer on enamel shear bond strengths and SEM morphology. *Am J Dent* 1997;10:141-146.
 3. Kanemura N, Sano H, Tagami J. Tensile bond strength to and SEM evaluation of ground and intact enamel surfaces. *J Dent* 1999;27:523-530.
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SHRINKING...SHRINKING...SHRINKING...

Reduction of polymerization contraction stress for dental composites by two-step light-activation. Lim BS, Ferracane JL, Sakaguchi RL, Condon JR. *Dent Mater* 2002;18:436-444.

The purpose of this study was to assess the reduction in polymerization contraction stress of two resin composites during a two-step light-activation process. The authors measured the composites polymerization stress using a servohydraulic machine and their shrinkage using a mercury dilatometer. The degree of conversion of the resin's double bonds was also measured using spectroscopy. Three composites were tested: Herculite (SDS/Kerr), Heliomolar (Ivoclar Vivadent), and Z100 (3M ESPE). Two light-activation procedures were used for curing each composite. The first technique used a 60-second continuous light exposure at 330 mW/cm², while the second used a two-step technique involving an initial 5-second exposure at 60 mW/cm² followed (after a two-minute waiting period) by a 60-second exposure at 330 mW/cm². The influence of varying thicknesses of composite was also assessed but only with Herculite. **The authors found that using the two-step light-activation technique significantly reduced the polymerization stress compared to the continuous technique.** The percentage reduction ranged from 19.0% for Z100 to 29.7% for Heliomolar. **Total volumetric shrinkage and degree of conversion were not significantly affected for any of the composites by the light-activation techniques.**

DIS Comment: Although resin composites have functioned well clinically for many years, one of their shortcomings is that they shrink when polymerized. This creates polymerization stress in a restoration that can disrupt the marginal integrity between the resin and tooth structure. The loss of marginal integrity could conceivably result in microleakage and its associated problems of post-treatment sensitivity, marginal staining, and recurrent caries. To minimize this disruption, some manufacturers have marketed quartz-tungsten-halogen (QTH) light-curing units that use a soft-start method of curing the resin. Although there are several types of soft-start light curing, the one that this study is based on is called pulse-delay cure. Bisco has marketed the VIP (Variable Intensity Polymerizer) light unit which employs this technique (see DIS 60-11). It initially emits low-intensity light (200 mW/cm²) for 3 seconds and then, after a 3-minute waiting period, emits high-intensity light (600 mW/cm²) for 30 seconds. It is believed that this reduces stress in the restoration and helps maintain the integrity of the restoration/tooth interface. This study found that polymerization stress was, in fact, reduced when this type of protocol was followed. Importantly, the authors also reported that the degree of conversion, which is an indicator of how well the resin has cured, was not adversely affected. This means that the resin's physical properties such as strength and rigidity should not be reduced. Of course, as with all laboratory research, these findings will have to be tested in the clinical environment to determine if such light-curing techniques yield meaningful benefits. But at least it gives credence to the theory behind some types of soft-start polymerization lights.

DENTAL UNIT WATERLINE REVIEW

A review of the science regarding dental unit waterlines. Depaola, LG, Mangan D, Mills SE, Costerton W, Barbeau J, Shearer B, Bartlett J. J Am Dent Assoc 2002;133:1199-1206.

Experts from the National Institute of Dental and Craniofacial Research, the American Dental Association, the Organization for Safety and Asepsis Procedures, the U.S. Food and Drug Administration, the Centers for Disease Control and Prevention, the U.S. Department of Defense, academia, and private industry met to determine if a research agenda in the area of dental unit waterlines (DUWL) should be pursued and what questions such an agenda should involve. The members reviewed the scientific literature on the topic of DUWLs in an attempt to determine the evidential basis for management of DUWL contamination and the potential health risks, if any, of using contaminated water as a coolant in dental procedures. **The workshop yielded four questions to be addressed in future research: What is the safest and most effective agent(s)/device(s) for achieving microbial levels of no more than 200 colony forming units per milliliter (CFU/mL), in dental effluent water? How should these products be evaluated and by whom? What are the adverse health effects, if any, of chronic exposure to dental bioaerosols or to the agents introduced into the dental unit to treat the waterlines for both dental staff members and patients? How could these health issues be evaluated?**

DIS Comment: Standards for safe drinking water quality established by the Environmental Protection Agency, the American Public Health Association, and the American Water Works Association set limits of no more than 500 CFUs of heterotrophic bacteria per mL of drinking water, and the American Dental Association (ADA) recommends that dental manufacturers provide the ability to deliver treatment water of 200 CFU/mL of unfiltered output from waterlines. It is well documented that microorganisms colonize and multiply on the interior surfaces of DUWL resulting in the formation of biofilms. The levels of bacteria in water from untreated dental units often exceed 100,000 CFU/mL of water. Despite the lack of documented adverse health effects, exposing patients or dental health care personnel to water of uncertain microbiological quality is inconsistent with generally accepted infection control principles. Current dental unit water systems cannot deliver water of optimal microbiologic quality without some form of intervention (e.g., use of a disinfectant). In addition to providing an agenda for DUWL future research to assist with developing evidence-based parameters for the management of biofilm, the article is an excellent review of the science of DUWLs, the effects of biofilm on human health, and modalities and technology for DUWL treatment.

HOW MANY LEDs DOES IT TAKE TO CURE A COMPOSITE?

Polymerization efficiency of LED curing lights. Leonard DL, Charlton DG, Roberts HW, Cohen ME. J Esthet Restor Dent 2002;14:286-295.

The purpose of this research was to compare the curing efficiency of three light-emitting diode (LED)-based light units to that of a traditional quartz-tungsten-halogen (QTH) unit. The study also involved measuring the intensity of the lights and examining their spectral emission plots. The light units tested were two LED-only units (LumaCure, Luma-Lite and VersaLux, Centrix), one LED/QTH hybrid (ZAP Dual Curing Light, CMS-Dental), and a traditional QTH unit (Optilux 401, Kerr/Demetron). To measure curing efficiency, a microhardness test was used to measure how hard the top and bottom surfaces of 2-mm-thick specimens of resin composite were after they had been cured using the lights. Two different composites were used; a hybrid (Z-100, 3M ESPE) and a microfill (Silux Plus, 3M ESPE). The lights intensities were also measured using a laboratory-grade laser power meter. **The authors found that the**

LED-based units took from 18 to 40 seconds longer to cure the hybrid composite than did the QTH light, and from 41 to 89 seconds longer for the microfill. The LED-based units emitted light that more closely matched the absorption spectrum of the resin's photoactivator than did the QTH light, but they were much less intense.

DIS Comment: The latest development in light curing has been the marketing of light-emitting-diode units. These have several potential advantages compared to QTH lights, such as smaller size, greater portability, less heat production, and longer bulb life. However, they are usually more expensive than a QTH unit. This study reports on how well two of these units (LumaCure, Luma-Lite and VersaLux, Centrix) cured composite resin compared to a QTH light (Optilux 401, Kerr/Demetron) and to a light that had both a QTH bulb and LEDs (ZAP Dual Curing Light, CMS-Dental). The bottom line is that the light units with LEDs were considerably less efficient than the QTH unit, and they took longer to adequately cure the tested composites. It is important to note that the LED units in the study were first-generation products. Manufacturers now realize that a second generation of LED lights must be produced to address this question of reduced efficiency. To that end, some are marketing units with greater numbers of LEDs (e.g., GC e-Light, GC America) or that are corded (Ultra-Lume LED 2, Ultradent). These units may prove capable of achieving the same degree of cure as a QTH unit in the same amount of time.

GUTTA PERCHA AND NATURAL RUBBER LATEX

Cross-reactivity between gutta-percha and natural rubber latex. Hamann C, Rodgers PA, Alenius H, Halsey JF, Sullivan K. J Amer Dent Assoc 2002;133:1357- 1367.

As awareness of allergy to natural rubber latex (NRL) has increased, concerns have been raised about possible cross-reactivity of gutta-percha and NRL antigens. To date, no study has conclusively demonstrated that gutta-percha is a causative agent of adverse allergic reactions. The authors undertook an investigation of the immunological cross-reactivity between NRL and gutta-percha using both *in vitro* and *in vivo* methods to help dental professionals better understand the allergic potential of endodontic materials. The authors analyzed aqueous extracts of commercial gutta-percha points and raw gutta-percha samples for cross-reactivity to NRL by radioallergosorbent test (RAST) inhibition; immunoblot inhibition; direct enzyme-linked immunosorbent assay (ELISA); and ELISA inhibition using sera from NRL-allergic people as the source of anti-NRL immunoglobulin E (IgE) antibodies. To confirm the *in vitro* results, the authors conducted skin prick testing (SPT) on a patient with type I NRL allergy using aqueous extracts from raw gutta-percha and gutta-percha points. **The authors found no detectable cross-reactivity between NRL and commercial gutta-percha points. However their ELISA and SPT results demonstrated that some allergic cross-reactivity exists between raw gutta-percha and raw NRL.**

DIS Comment: Clinically, gutta-percha alone is not likely to induce symptoms in patients with type I NRL allergy. However, since these patients often have a lengthy history of allergies, they may react to other materials used during dental procedures. When treating patients with suspected or documented type I NRL allergy, dentists should pay attention to potential reactions to dental chemicals and materials, including gloves, rubber dams, rubber anesthetic cartridge stoppers, methacrylates, anesthetics, and disinfectants. Dental healthcare personnel should be able to recognize and treat the complications of latex exposure. Consultation with the patient's primary care provider may be indicated for optimal patient management.

HIV POSTEXPOSURE PROPHYLAXIS USE AMONG DENTAL HEALTH-CARE PERSONNEL (DHCP)

Cleveland JL, Barker L, Gooch BF, Beltrami EM, Cardo D, NaSH Group. Use of HIV postexposure prophylaxis (PEP) by dental healthcare personnel: an overview and updated recommendations. *J Am Dent Assoc* 2002;133:1619-1630.

In June 2001, the U.S. Public Health Service (USPHS) published updated guidelines for managing occupational exposures to bloodborne pathogens, including recommendations for postexposure prophylaxis (PEP) after certain occupational exposures to human immunodeficiency virus (HIV). The objective of this study was to describe the use of HIV PEP among DHCP enrolled in the Centers for Disease Control and Prevention's (CDC) National Surveillance System for Healthcare Workers (NaSH). From June 1995 to August 2001, 208 exposures were reported (199 percutaneous injuries, six mucous membrane exposures, and three skin exposures) by DHCP to NaSH. One-third of percutaneous injuries were caused by small-bore hollow syringe needles, and most (66 percent) were moderate in depth. About half of the devices (46 percent) were visibly bloody at the time of injury. Twenty-four (13 percent) known source patients were HIV positive; 14 had symptomatic HIV infection or a high viral load. Three in four DHCP exposed to an HIV-positive source warranted a three-drug PEP regimen, based on the exposure type and stage of the disease of the source. Twenty-nine (24 percent) DHCP exposed to a source patient subsequently found to be HIV negative took PEP; six took PEP for 5 to 29 days. No exposures resulted in transmission of HIV. **Findings of this study are consistent with earlier reports indicating that the risk of HIV transmission in dental settings is low. Strategies such as rapid HIV testing and follow-up counseling may reduce unnecessary use of PEP.**

DIS Comment: All dental practices should develop a comprehensive written program for preventing and managing occupational exposures to blood. (Note: USAF Dental Services are not required to prepare a separate, comprehensive, exposure control plan if they are covered under a Medical Treatment Facility or installation plan.) Resources should be available to facilitate prompt reporting and medical evaluation, including rapid access to clinical care, PEP, counseling, and testing of exposed DHCP and counseling and testing of source patients. This article focused on occupational exposures to HIV, but most exposures will also require evaluation and clinical management for hepatitis B virus and hepatitis C virus. The CDC Updated U.S. Public Health Service guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for postexposure prophylaxis can be found at: www.cdc.gov/ncidod/hip/Guide/phspegp.htm.

GENERAL DENTISTRY

67-07 M-Bond Adhesive Resin Cement

(Project 02-05)

M-Bond is a self-cured, two-part (powder/liquid), methacrylate-type resin cement that is provided with a self-etching bonding agent. It is recommended by its manufacturer for the luting of:

- metal inlays, onlays, crowns, and fixed partial dentures
- all-ceramic/porcelain inlays, onlays, crowns, veneers, and fixed partial dentures
- all-resin inlays, onlays, crowns, and fixed partial dentures
- cast and prefabricated posts
- resin-bonded fixed partial dentures (i.e., Maryland bridges)

Nonluting uses of M-Bond include repairing fractured metal-ceramic restorations and temporary fixation of mobile teeth. M-Bond comes in two shades (Clear and Ivory), both of which are included in the kit. The product is packaged in a compact paper box with a flip-open lid; written instructions are provided in a multi-language paper sheet and a booklet.

Manufacturer:

Tokuyama Dental Corp.
38-9, Taitou 1-chome
Taitou-ku
Tokyo, Japan

Distributor:

J. Morita
9 Mason
Irvine, CA 92618
(888) 566-7482
(949) 581-9600
(949) 465-1095 FAX
www.jmoritausa.com

Suggested Retail Price:

\$240.00 M-Bond Adhesive Resin Cement Kit (item number 26-17301) contains:

- one 4-g bottle of Clear Powder
- one 4-g bottle of Ivory Powder
- one 8-mL bottle of Liquid
- one 3-mL bottle of Primer A
- one 3-mL bottle of Primer B
- mixing well
- accessories

Government Price

\$144.00 M-Bond Kit (item number and contents as listed above)

ADVANTAGES:

- + Working time is long enough to allow users to mix and use the cement without hurrying.
- + Setting time is appropriate.

- + Easy to clean excess cement from margins.
- + No post-cementation sensitivity reported during clinical-user evaluation.
- + Provided with a very easy-to-use self-etching primer for preparation treatment.
- + Expiration dates and lot numbers are provided for all items in kit.
- + Summary instructions are on inside cover of product box.
- + Recommended storage temperature range is given on box.
- + Material Safety Data Sheet (MSDS) is included in kit.

DISADVANTAGES:

- Kit does not contain components necessary for all types of cementation.
- Film thickness is considerably greater than that of other resin cements evaluated by DIS.
- Has insufficient degree of radiopacity.
- Powder and liquid are messy to mix.

SUMMARY AND CONCLUSIONS:

M-Bond was reported by the clinical users to have an appropriate viscosity, and is easy to mix, handle, and clean up. Because it is in powder/liquid form, it is a bit messier to mix than most resin cements, which come as two pastes. M-Bond has a generous working time but sets relatively quickly in the mouth. The cement is provided with well-written instructions, and its two shades were judged to be adequate for the majority of cases treated during the evaluation. It lacks radiopacity, though, which will make the cement difficult to radiographically detect. It also has a greater film thickness than other resin cements evaluated by DIS. M-Bond's main disadvantage, however, is that it does not come with two important primers that are required for proper cementation of noble-metal, all-ceramic, and all-resin restorations. Although the product handles well and has several useful features, the kit's lack of completeness limits the cement's usefulness. As a result, **M-Bond** is rated **Marginal** for use by the federal dental services.

(Col Charlton)

67-08 Opalescence Xtra Boost

(Project 02-12)

Opalescence Xtra Boost is a chemically-activated in-office bleaching agent. It is primarily indicated for whitening discolored vital teeth but can also be used on nonvital teeth and for intracoronal bleaching. The manufacturer, Ultradent, notes that the product can be used as a stand-alone treatment or in conjunction with a standard at-home bleaching agent. The active ingredient in Opalescence Xtra Boost is 38% hydrogen peroxide. The product is packaged as two syringes, one containing the liquid hydrogen peroxide and the other a dry, proprietary chemical activator. Prior to use, the marginal gingival tissues are isolated and protected from the bleaching agent by using either a rubber dam or Ultradent's OpalDam, a light-activated resin barrier material that is supplied with Opalescence Xtra Boost. After the teeth have been isolated, the syringes are joined together and the dry material is expressed from its syringe into the syringe containing the hydrogen peroxide. The resulting material is then expressed back and forth from one syringe to the other to thoroughly mix it. After mixing, the syringes are separated and the mixture is expressed directly onto the involved teeth in a 0.5- to 1.0-mm-thick layer using a supplied disposable dispenser tip. The mixed bleaching agent is red to make it easier to see during use. A bite tray (i.e., split), the IsoBlock, is provided against which the patient can rest his/her teeth for comfort during treatment. After 10 to 15 minutes, the bleaching agent is removed from the teeth using suction and rinsing. Instructions indicate that if the desired shade has not been achieved, a new mixture can be made and the material reapplied. Ultradent claims that Opalescence Xtra Boost has the advantages of not requiring a curing light, has a neutral pH that helps prevent post-treatment sensitivity, and maintains freshness because it is mixed immediately prior to use.

Manufacturer/Distributor:

Ultradent Products, Inc.
505 West 10200 South
South Jordan, UT 84095
(800) 552-5512
(800) 842-9024 FAX
www.ultradent.com

Suggested Retail Price:

\$99.95 Opalescence Xtra Boost Intro Kit (item number REF/UP 387) contains:

- 4 0.96-mL syringes of Opalescence Xtra Boost
- 4 0.24-mL syringes of Activator
- 2 1.2-mL syringes of OpalDam
- 10 Black Mini Tips
- 10 Micro 20-gauge Tips
- 2 IsoBlocks

Government Price:

\$84.96 Opalescence Xtra Boost Intro Kit (item number and contents as listed above)

ADVANTAGES:

- + Product generally produced desired results for patients.
- + Produced no post-treatment thermal sensitivity during the evaluation.
- + Gel does not require light activation.
- + Easy to mix and apply.
- + Syringes dispense gel without clogging.
- + Is thick enough to keep it from running after being placed.
- + Bright red color makes it easy to see during placement and removal.
- + Easy to remove after treatment using water and suction.
- + Recommended treatment time is only 15 minutes.
- + Gel has no offensive odor.
- + Recommended storage conditions are provided on box.
- + Comes with Material Safety Data Sheet (MSDS).

DISADVANTAGES:

- Usually more than one treatment is required to achieve the desired result.
- No expiration dates marked on product syringes or box.
- Instructions are user-unfriendly; no graphics-containing instruction card is provided.

SUMMARY AND CONCLUSIONS:

Opalescence Xtra Boost was judged to be effective by clinicians, and patients reported being satisfied with the results it produced. The product has very good handling characteristics, being easy to mix, place, and remove. It also has adequate viscosity, which prevents it from running or slumping after placement. Mixed material has a one-month shelf life, however none of the users reported this to be a practical problem. No post-use thermal sensitivity was reported during the evaluation. Some disadvantages were noted, however. The product's unwieldy, multi-language, instruction sheet was user-unfriendly, and clinicians should be aware that proper isolation is required during treatment because the gel's relatively high concentration of hydrogen peroxide can cause tissue irritation and burning. Clinicians should expect that they will usually have to treat a case more than once to achieve the desired results, or provide patients with an at-home bleaching product after a single in-office treatment with Xtra Boost.

Opalescence Xtra Boost is rated **Acceptable** for use by the federal dental services.

(Col Charlton)

67-09 Salli Saddle Chair

(Project 01-52)

The Salli Saddle Chair is an ergonomically-designed chair marketed for dental professionals. The chair's name is derived from its shape, which is similar to that of a horse saddle. The chair's main advertised objective is to place the user into a more natural position to relieve back, shoulder, and neck musculoskeletal strain. The Salli Saddle Chair does not have traditional back or arm support familiar to most dental chairs. The seat places the thighs downward at a 45-degree angle that is designed to align the user into a more ergonomic position. The chair is available in two configurations, a single seat (Model 7) or a split seat (Model 4). Both seats can be used by either gender, but the split seat is advertised as being more adaptive for male users. The chair weighs 20 pounds with a frame constructed from 3-mm, cold-rolled steel. The standard leather seat is over high-memory foam padding and is available in five colors. However, ten additional color schemes are optional. Depending on user height, three piston-gas spring configurations (short, medium or long) are available which allows for chair height adjustment from 18-35 inches from the floor. The five-caster base is designed to add stability to the chair and is available in either black or chrome colors. Caster wheels are available to accommodate either hard or carpeted floor surfaces and a foot pedal ring is an available option for dental assistant chairs. Purchasers of the chair must specify the desired color, piston gas spring height, base color, and wheels.

Manufacturer:

Hager Worldwide, Inc.
13322 Byrd Drive
Odessa, FL 33556
(800) 328-2335
(813) 926-7474
(800) 573-9392 FAX
www.hagerworldwide.com

Suggested Retail Price:

Salli Saddle Chair (Model 4 & Model 7)
\$699.95
\$825.90 (with optional Foot Ring)

Government Price:

Salli Saddle Chair (Model 4 & Model 7)
\$384.97
\$460.54 (with optional Foot Ring)

ADVANTAGES:

- + Operating manual is well written, easy to read, and complete with graphics for easy assembly, disassembly and operator use.
- + Unique design aligns user into a more natural sitting position.
- + Available in both single- and split-seat configurations.
- + Available in three different height configurations to adapt chair to provider height.
- + Assembly and disassembly is easily accomplished in less than 5 minutes.

- + Solidly constructed of high-quality materials, with contoured, smooth, rounded edges.
- + Five-caster base provides excellent stability and ease of movement.
- + Optional foot pedal ring is available that configures chair for dental assistant use.
- + Equipped with height-adjusting lever.
- + Easy and convenient to maneuver in dental operatory.
- + Operated reliably during the course of this evaluation.
- + Allows for close provider/patient proximity
- + Single-Seat cushioning provided adequate comfort to dental providers.
- + Lack of back support was not a hindrance to dental providers
- + Seating does not stain with the use of approved disinfectants.
- + Three-year limited warranty

DISADVANTAGES:

- Unique design may not be adaptable to a wide range of individuals.
- Special tools required for disassembly are not provided with chair purchase.
- Required side access to chair is awkward and cumbersome.
- Lack of front armrest results in increased dental assistant fatigue and impedes the ability to assist the dentist.
- Split-seat configuration lacks adequate cushioning for inner thigh region.
- Chair working position is 10-16 inches higher than a traditional chair.
- Potential for initial muscle adjustment soreness that may last for up to two weeks.
- Manufacturer recommends that wheel casters be changed every two to four years.
- Height-specific chair is impractical for clinics with high provider turnover.
- Requires disassembly when adding or removing foot pedal ring.
- More expensive than other dental chairs in federal service inventory.

SUMMARY AND CONCLUSION:

The Salli Saddle Chair features an innovative design that is marketed to improve posture and ergonomics in the dental environment. The chair was found to be constructed of high-quality materials and was easily assembled with no special tools required. The chair's acceptance was found to be dependent upon the user's job description. Dentists, for the most part, were ambivalent toward it. The dental assistants found the chair less than satisfactory, reporting that it increased fatigue due to the lack of a wrap-around arm support, which is commonly found on assistant's chairs. Hygienists appreciated the Salli Saddle Chair the most, citing its ease of operation and maneuverability. Due to its higher cost and limited applicability for general federal service use, the **Salli Saddle Chair** is rated **Marginal** for use by the federal dental services.

(TSgt Sutter)

67-10 Vitalescence Resin Composite

(Project 02-08)

Vitalescence resin composite is an esthetic, micro-hybrid, light-cured restorative material intended for use in the anterior and posterior dentition. The Bis-GMA based product is filled to 75 weight percent (58 volume percent) with filler particles having an average size of 0.7 microns. Among the many advantages claimed by Ultradent Products for Vitalescence are that it is radiopaque, extremely esthetic, and exhibits a low wear rate. The company stresses the esthetics of the product and claims that it results from the material's unique fluorescence and opalescence. Vitalescence is available in a total of 33 shades (18 dentin and 15 enamel), however the kit evaluated by DIS contained 12 shades (5 dentin and 7 enamel), each packaged in a 2.6-g screw-type syringe. The specially-designed Quadraspense® syringes are

intended to facilitate dispensing small amounts of the composite. Ultradent is in the process of making Vitalescence available in capsules as well. The shades are identified by Vita shade guide number for the dentin shades; the enamel shades have been given names rather than Vita letters/numbers. Instructions call for placing the material in 1½- to 2-mm increments and using a 20-second light-curing time. Included with the product is a shade guide made of Vitalescence. Each tab is wedge shaped, and two different shade guide tabs can be overlaid to simulate the clinical result if the composite is used in layers to restore a tooth. While the Advanced Kit DIS evaluated did not contain a dentin bonding agent, the more complete Masters Kit does.

Manufacturer:

Ultradent Products, Inc.
505 West 10200 South
South Jordan, UT 84095
(800) 552-5512
(800) 842-9024 FAX
www.ultradent.com

Suggested Retail Price:

\$369.95 Vitalescence Advanced Kit (REF/UP 515) contains:

- five 2.5-g syringes, one each of shades A1, A2, A3, A4, B1
- seven 2.5-g syringes, one each of shades Opaque Snow, Pearl Frost, Pearl Natural, Pearl Smoke, Trans Mist, Trans Blue, Trans Smoke

\$95.95 Vitalescence Advanced Shade Guide (REF/UP 1171)

Government Price:

\$314.46 Vitalescence Advanced Kit (item number and contents as listed above)

\$81.56 Vitalescence Advanced Shade Guide (item number as above)

ADVANTAGES:

- + Good strength; tensile strength is similar to that of Z250 (3M ESPE).
- + Laboratory testing found that after polishing, Vitalescence was as smooth as several tested microfills.
- + Users rated the product highly for polishability and overall esthetics.
- + Is adequately radiopaque for radiographic detection.
- + Relatively hard; should resist scratches and maintain a well-polished surface.
- + A 2-mm thick increment of the composite can be adequately cured using only a 20-second light exposure.
- + Quadraspense® syringe design allows for removal of small amounts of composite for placement.
- + Shade guide allows users to predetermine the results of overlaying different shades of the material.
- + The kit's 12 shades were judged as adequate by the clinical users.
- + Instructions contain nicely done graphics showing product use.
- + Comes with Material Safety Data Sheet (MSDS).

DISADVANTAGES:

- Users felt the resin slumped excessively after placement.
- Sticks to instruments.
- More expensive than several other popular microhybrid resin composites.
- Not currently available in unit-dose capsule form.
- Is difficult to maintain proper infection control using syringe dispensing system.
- Evaluated version of the product is not packaged with a dentin bonding agent.

- Shade guide must be purchased separately.
- Shade guide is very expensive.
- Instructions are minimal when describing how to use the shade tabs to simulate resin layering.
- Expiration date is not printed on the product box or syringes.

SUMMARY AND CONCLUSIONS:

Overall, Vitalescence did well in laboratory testing, with many of its properties at least comparable to those of other popular hybrid resin composites. Vitalescence's polishability, esthetics, and shade matching were rated highly by users. Some time is saved when using Vitalescence because a standard 2-mm thickness requires only a 20-second light exposure for proper curing. Users noted some problems with its handling characteristics, however. They reported that the resin often stuck to their placement instruments and slumped after being placed. To the evaluators, the fact that Vitalescence is currently not available in unit-dose capsules was a significant shortcoming. It is also more expensive than several other currently-marketed microhybrids, and its rather expensive shade guide must be purchased separately.

Vitalescence Resin Composite is rated **Marginal** for use by the federal dental services.

(Col Charlton)

67-11 Virtual VPS Impression Material

(Project 02-07)

Virtual is a poly(vinyl siloxane) impression material that, according to its manufacturer, features excellent wettability, tear strength and dimensional stability. In addition it is claimed that its setting is heat-activated, which should allow clinicians to use as much or as little of its working time as needed and then be assured of a rapid intraoral set. As for most currently-marketed impression materials, Virtual is available in cartridges that are used in an automix gun dispenser. Virtual is available in five viscosities (Putty, Heavy Body, Monophase, Light Body, Extra-Light Body) as well as in a bite registration form. All except the bite registration material are sold in regular-set and fast-set versions. The product's beige and blue colors are purported to enhance readability. Virtual is sold in a wide variety of packaging forms. In this evaluation, the Heavy/Light Introductory Package was evaluated. Both regular-set and fast-set versions were tested in the laboratory and used by clinical evaluators.

Manufacturer:

Ivoclar Vivadent
 175 Pineview Drive
 Amherst, NY 14228
 (800) 533-6825
 (716) 691-0010
 (716) 691-2285 FAX
 www.ivoclarvivadent.us.com

Suggested Retail Price:

\$199.00 Virtual Heavy/Light Introductory Package, Regular-Set (item number 562865) contains:
 -four 50-m L cartridges, (2 of Heavy Body, 1 of Light-Body, and 1 of Extra-Light Body)
 -two automix gun dispensers
 -one 10-mL bottle of Tray Adhesive
 -accessories

It is also available in a Fast-Set version (item number 562866)

Government Price:

\$92.60 Virtual Heavy/Light Introductory Package, Regular-Set
(item number and contents as listed above)

ADVANTAGES:

- + Handling characteristics were rated favorably by users.
- + Working times are long enough to permit unhurried mixing and use.
- + Setting times are appropriate and short enough to enhance patient comfort.
- + Detail reproduction and dimensional change meet requirements of pertinent standards.
- + Contrasting colors facilitate reading critical areas of impression.
- + Is shipped with two automix gun dispensers, something greatly appreciated by our clinical evaluators.
- + Acceptable odor and taste.
- + Available in five viscosities and two setting times.
- + Included graphics instruction cards were extremely well done and users found them very helpful.
- + Comes with tray adhesive.
- + Considerably less expensive than several other popular and comparable impression materials.
- + Lot number, expiration date, and recommended storage conditions are listed on product components.
- + Shipped with a Material Safety Data Sheet (MSDS).

DISADVANTAGES:

- Transparency of light-body material can make it difficult to read.
- Material tends to slump a bit after placement.

SUMMARY AND CONCLUSIONS:

Virtual was very well-received by our clinical users who found it easy to mix and place. It had a working time that enabled them to use it without undue hurrying, and a setting time that was acceptably short. The material's colors make it easier to read critical areas of impressions as the manufacturer claims, although the light-body material can be a bit difficult because of its high degree of translucency. Virtual performed well in the laboratory and met necessary requirements for this type of impression material. Unlike some other products, Virtual is shipped with tray adhesive and two gun dispensers. The latter makes it possible for the dentist and assistant to mix different viscosities simultaneously. Virtual is sold in a variety of viscosities as well as two setting times. The price of refill material is considerably less than that of several of its competitors. **Virtual VPS Impression Material** is rated **Recommended** for use by the federal dental services.

(Col Charlton)

67-12 Composi-Tight Gold System with Placement Forceps (Project 02-28)

The Composi-Tight Gold System with Ring Placement Forceps is a sectional matrix product for establishing proper interproximal curvature and contact for resin composite and amalgam restorations. It consists of 2 sizes of G-Rings which act to wedge the teeth apart and adapt the sectional matrix to the interproximal curvature of the tooth. The rings differ only in the length of their interproximal prongs (tines). Two sizes of sectional matrixes are included: small (for preparations that are shorter occlusogingivally) and standard (for preparations that are longer occlusogingivally). Short and standard bands having a gingival extension are also provided in the kit. A smaller pedodontic band is available separately. DIS evaluated an earlier version of this product in 1998 and rated it Recommended. Since then, it has been modified in several ways. First, the rings are now purportedly more resilient and two times stronger, which is said to provide greater tooth separation for a more effective contact. The sectional matrixes have been made approximately 15% longer buccolingually and have a modified curvature. Garrison claims this

makes them easier to place and better able to reproduce the tooth's actual interproximal contact. A new placement forceps is also provided with positive ring engagement to enhance stable placement.

Manufacturer/Distributor:

Garrison Dental Solutions
110 DeWitt Lane
Spring Lake, MI 49456
(616) 842-2244
(616) 842-2430 FAX
www.garrisdental.com

Suggested Retail Price:

\$199.00 Composit-Tight Gold System Kit with Ring Placement
Forceps (item number AUK2). Each kit contains:
 -3 standard G-Rings
 -3 long-tine G-Rings
 -100 small bands
 -100 standard bands
 -25 extended small bands
 -25 large bands
 -Ring Placement Forceps

Government Price: same as retail

ADVANTAGES:

- + Rings provide very effective wedging which results in excellent proximal contacts.
- + Rings are very stable after placement.
- + Dimension of rings tines allows good interproximal access for matrix adaptation.
- + Two tine lengths enhance system's effectiveness, regardless of tooth height.
- + Forceps securely hold the rings and facilitate their placement and removal.

DISADVANTAGES:

- Somewhat cumbersome to use with MOD restorations.
- Sectional matrix not well suited for use if the preparation extends very far facially or lingually.
- Thinness of matrix makes it susceptible to folding (bending) during placement.

SUMMARY AND CONCLUSIONS:

The Composit-Tight Gold System was very well received by clinical evaluators who found it easy to use and extremely effective at producing a tight proximal contact for composite resin and amalgam restorations. The variety of matrix sizes/shapes and the two tine lengths of the rings enhance the systems usefulness and effectiveness. The rings were easy to place using the included forceps and were very stable after placement, eliminating the need for using compound for added stability. The rings fit intimately into the interproximal areas and, as a result, facilitated good matrix adaptation to the tooth. Only two minor disadvantages were noted: the difficulty in using the system when placing MOD restorations, and the thinness of the matrixes which made it difficult to place them without bending or folding them. All five users recommended the product be purchased for their clinics. The **Composit-Tight Gold System with Placement Forceps** is rated **Recommended** for use by the federal dental services.
(Col Charlton)

67-13 Tyrian SPE Unit-Dose/One-Step Plus System

(Project 02-27)

Tyrian SPE is an ethanol-based, self-etching, two-solution primer that is applied to dentin and to cut/uncut enamel prior to the use of Bisco's fifth-generation dentin bonding product, One-Step Plus. In effect, it replaces the use of phosphoric acid as an etchant. Tyrian SPE is available in an innovative unit-dose container that is used to mix the two solutions prior to placement. It is also sold in two separate bottles. Provided with Tyrian SPE are plastic foam pellets, plastic applicators, and a bottle of One-Step Plus. The product is recommended by Bisco for a number of clinical applications, including: prior to cementation of posts, indirect restorations, and orthodontic brackets; desensitization of hypersensitive tooth structure; and prior to placing a resin composite.

Tyrian SPE is used by mixing the two solutions using the unit-dose capsule, and then applying one to two coats of the mixed solution for 10 seconds to the dried enamel and/or dentin. A foam pellet is then used to blot the preparation dry. It should be noted that when mixed, Tyrian SPE is purple; the color disappears as the primer is blotted. The bottle of One-Step Plus is then shaken for up to five seconds, and the bonding agent is applied to the preparation in two coats. The procedure is finished by air drying the treating area for 10 seconds and then light activating it for another 10 seconds.

Manufacturer:

Bisco, Inc.
1100 W. Irving Park Road
Schaumburg, IL 60193
(800) 247-3368
(847) 534-6000
(800) 959-9550 FAX
www.bisco.com

Suggested Retail Price:

\$115.00 Tyrian SPE (item number U-2220K), includes:
-25 0.15-mL unit dose containers of Tyrian SPE
-one 6-mL bottle of One-Step Plus
-accessories
-instructions
-Material Safety Data Sheet (MSDS)

Government Price:

\$69.00 Tyrian SPE (contents and item number as listed above)

ADVANTAGES:

- + No separate enamel etching step is required by instructions.
- + Can be applied to dried tooth structure, which helps standardize application procedure.
- + Purple color makes it easy to see during placement.
- + Packaged in innovative, self-mixing, unit-dose capsule.
- + Provided with all components necessary to perform clinical applications described in instructions.
- + Comes with nicely-done summary instruction card.
- + Expiration dates and lot numbers are stamped on individual components.
- + Is shipped with a Material Safety Data Sheet (MSDS).

DISADVANTAGES:

- Bond strength was significantly lower than values measured for a number of dentin bonding agents recently evaluated by DIS.

- Takes longer to apply than several other self-etching primer products.
- Requires more steps than many other self-primer products.
- Components must be mixed prior to placement.
- Some patients may object to the product's odor.
- Relatively expensive per mL.

SUMMARY AND CONCLUSIONS:

Tyrian SPE/One-Step Plus performed adequately during the laboratory and clinical-user evaluation, but did not distinguish itself by having significant advantages compared to other recently-evaluated self-etching products. In fact, users felt it was less straightforward and not as time saving as other products with which they were familiar. Tyrian SPE/One-Step Plus is relatively quick to apply but other similar products are faster. To Bisco's credit, all uses for the product can be performed as called for by the instructions. Also, Tyrian SPE is packaged in an innovative, well-designed, unit-dose, mixing capsule. Another positive feature of the product is that it eliminates the need to ensure the dentin and enamel are in a particular state of moistness prior to application. This is advantageous because many clinicians are unsure of the degree of moisture tooth structure should have at the time of bonding. The product is more expensive per mL than four other popular products with which it was compared. Although it performs its basic functions adequately, other products currently available are easier and faster to apply, require fewer steps, and are less expensive. **Tyrian SPE/One-Step Plus** is rated **Marginal** for use by the federal dental services.

(Col Charlton)

67-14 Osteopower 2i Modular Surgical Handpiece System (Project 01-64)

The Osteopower Modular Surgical Handpiece System is an electrically-driven handpiece marketed by the Osteomed Corporation. The Osteopower System consists of the 2i Power Control Console that can sequentially power up to two electrical motor units. Each of the motor units can be used with ten different handpiece attachments (1:1 Straight Drill, 1:1 Contra Angle Drill, 18:1 Contra Angle Drill, 100:1 Contra Angle Drill, Reciprocating Saw, Sagittal Saw, Oscillating Saw, VRO Saw, and Wire/Pin Driver).

The microprocessor-controlled power control console offers six power levels and also powers an optional, integrated irrigation pump that is designed to provide sterile irrigation directly from the handpiece. The Osteopower Modular Motor Unit contains a sealed, brushless motor with a permanently attached power cord. The motor unit is available in two versions: one that is hand-activated and one that is controlled by a foot pedal. The hand-controlled handpiece has touchpad-type pressure controls, which eliminate the need for a traditional control lever. This purportedly improves surgical site access and visibility. Another reported advantage of the handpiece controls is that they allow the user to easily control the speed, direction, and speed percentage of the motor entirely from the handpiece. If operators prefer foot-pedal control, a bi-directional foot switch is available that controls the handpiece speed and permits speed-feathering for delicate procedures.

For exodontic procedures, the 1:1 Straight and Contra Angle Drills offer a speed range of 0-70,000 RPM. For safe operation and control, the power console's microprocessor features specially-designed circuitry that is supposed to brake the speed of the motor from 70,000 to 0 RPM in 0.1 seconds. Osteomed's latest straight drill, the 777, is said to contain an "auto-lock" mechanism that secures the bur in the event that the bur has not been properly locked prior to operation. Furthermore, the 777 is advertised to be the first surgical straight handpiece that functions without a distal bearing assembly, which has been reported to cause burns to patients during surgical procedures.

Manufacturer:

OsteoMed Corporation
 3750 Realty Road
 Addison TX 75001
 (800) 456-7779
 (972) 241-3401
 (972) 241-3507 FAX
 www.osteomedcorp.com

Suggested Retail Price:

Price (\$)	Item	Part Number
2,500	Power Control Console 2i with Irrigation	450-0005-00
1,600	Power Control Console 2i without irrigation	450-0021-00
1,600	Modular Motor Unit and Cord	450-0030
1,500	Modular Motor Unit and Cord, foot switch control only	450-0084
1,600	Series III Straight Drill	450-0777
1,600	1:1 Contra Angle Drill	450-0215
1,400	18:1 Contra Angle Drill	450-0222
1,500	100:1 Contra Angle Drill	450-0232
2,500	Reciprocating Saw	450-0240
2,500	Sagittal Saw	450-0255
2,500	Oscillating Saw	450-0261
2,500	V.R.O Saw	450-0270
950	Bi-directional Master Foot Switch	450-0390

Government Price: The Osteomed Corporation is in the process of procuring government contracts and should be contacted directly for government pricing of individual items.

ADVANTAGES

- + Handpiece system supports a wide range of surgical procedures.
- + Function-specific connectors simplify unit set-up while also preventing improper power cord connections to power console.
- + Allows two surgical handpieces to be operated sequentially.
- + Has integral safety modes designed to prevent inadvertent handpiece activation.
- + Handpiece connection is color-keyed for proper coupling to the power console.
- + Handpiece connectors are positive locked which prevents inadvertent disconnection during use.
- + Allows bi-directional handpiece use.
- + Foot switch controls can be arranged in tandem, allowing control from both sides of an operating room table without requiring that the foot switch be moved.
- + Contra Angle Drill enhances access to surgical site.
- + Contra Angle Drill attachment accepts all standard latch-type dental burs.
- + 777 Straight Drill design does not contain distal bearings which can cause the patient to be burned.
- + 777 Straight Drill features an auto-locking mechanism that safely hold unsecured burs upon motor activation.
- + Meets all electrical safety requirements.
- + Supplied Operating Instructions and Maintenance Manual is easy to read and complete with detailed graphics that emphasize important features.

- + Optional autoclave trays are available to minimize corrosion by allowing quick drainage.
- + One-year warranty on all components, excluding Contra Angle drill and irrigation components.

DISADVANTAGES

- Straight Drill attachments accept only proprietary Osteomed burs.
- Osteomed cutting tools are designed for single-use only and are not recommended for sterilization and reuse.
- Irrigation system is difficult to set up and use.
- Proprietary Osteomed irrigation tubing must be used with optional handpiece irrigation feature.
- Use is contraindicated in the presence of flammable gases and anesthetics.
- Manufacturer's recommended usage time (duty-cycle) parameters are unrealistic and impractical.

SUMMARY AND CONCLUSION

The Osteopower Modular Surgical Handpiece System is an electrically-powered handpiece system that can be configured with a variety of components that support a wide range of surgical procedures. The product met all electrical safety standards and was found to be easy to assemble and operate. The system has an intelligent, safety-featured engineering design that allows for efficient operation and control. The sealed, brushless motor unit should tolerate sterilization better than other motor designs and no obvious negative effects of autoclaving were noted during this evaluation. However, a longer track record of clinical use will be required before definitive results regarding this handpiece's tolerance of sterilization will be known. The latest 777 straight handpiece drill attachment design allows function without requiring a distal bearing, whose failure has been implicated in burns to patients during surgery. Potential users need to be aware that the manufacturer requires annual factory preventive maintenance, and the cost for this service should be programmed into the dental facility budget. In addition, some handpiece time usage parameters as recommended by the manufacturer are unrealistic and impractical. Clinical users were impressed with the control, power, and torque of the handpiece but reported that the integral irrigation system was cumbersome to use. Evaluators found that the versatility of Osteopower system allows the delivery of a wide range of surgical care and unanimously rated it Excellent. The **Osteopower Modular Surgical Handpiece System** is rated **Recommended** for use by the federal dental services.

(Lt Col Roberts)

LABORATORY

67-15 Diamond Quartz

(Project 01-77)

Diamond Quartz is a polyurethane-based master model die material. According to its manufacturer, Hi-Tec Dental Products, Diamond Quartz has the hardness and stability to be ideal for prosthetics dies with implant cases, lower anteriors, and other difficult cases. It is advertised as having high abrasive resistance, a low rate of die fracture, and excellent die reproduction. The material is also said to have a timely, easy-to-use technique. To use Diamond Quartz, the distal end of the impression should be boxed, as the material is less viscous than dental stone. Next, a separator (debubbler) spray is used. The material is thoroughly mixed using 10 mL of B liquid (base) with 1 scoop of filler in a mixing cup. Then 10 mL of A liquid (catalyst) is added and mixed thoroughly and poured into the impression without vibration. The manufacturer states it is optional/recommended to place the poured impression into a dry pressure pot at 2-4 bars of pressure for curing. After one hour the impression is separated from the model. To finish the master cast, excess material is trimmed, followed by pinning the removable dies, and basing the model in the usual manner. Diamond Quartz is supplied in a kit that contains 480 mL of base (B liquid), 480 mL of catalyst (A liquid), and 450 gm of filler.

Manufacturer:

Hi-Tec Dental Products, Inc.
P.O. Box 240
Greenback, TN 37742
(800) 859-2006
www.hi-tecdental.com

Suggested Retail Price:

\$85.95 Kit (480mL liquid A, 480mL liquid B, and 450gm filler)

Government Price:

\$68.76 Kit (480mL liquid A, 480mL liquid B, and 450gm filler)

ADVANTAGES:

- + Smooth sealed surface allows unfired shoulder porcelains to separate easily.
- + Resists fracture when separating model from the impression.
- + Maintains marginal integrity throughout crown fabrication.
- + Excellent reproduction qualities.
- + Reported shrinkage of only 0.020%.

DISADVANTAGES:

- Materials low viscosity may make it necessary to box parts of the impression.
- Must use a dry pressure pot to achieve a porosity-free model.
- High cost compared to Type IV and V dental stones.
- No MSDS provided with the kit.

SUMMARY AND CONCLUSIONS:

Diamond Quartz is a polyurethane-based master model material that is marketed as a material best used for lower anterior, implant, and problem cases. It was found to resist fracture and is reported by the

manufacturer to have very little shrinkage. The smooth sealed surface of the material was also well suited for use with porcelain shoulders as raw porcelains were found to separate easily. The cost of Diamond Quartz is significantly higher than Type IV or V dental stones currently used for master models. Therefore, it would be best used for crown preparations that are at high risk of fracturing during model fabrication, fabricating porcelain margins, or problem cases. Evaluators reported no problems with the seating of crowns that were fabricated on Diamond Quartz models. The manufacturer states Diamond Quartz is compatible with all polyvinyl impression materials, but not compatible with polysulfide materials. **Diamond Quartz** is rated **Acceptable** for use by the federal dental services.

(MSgt Osborn)

67-16 Axcent 15-Minute Acrylic

(Project 01-61)

Axcent 15-Minute is a new heat-cured denture resin acrylic marketed by Garreco, Inc. that is advertised to fully cure in 15 minutes. The manufacturer further claims that Axcent 15-Minute cures without porosity, and has strength comparable to most premium denture base acrylics on the market today. It reportedly can be used for any denture base application as well as other indications such as nightguards. For denture processing procedures, Axcent 15-Minute uses conventional compression-molded processing techniques familiar to most laboratory technicians and usually does not require additional equipment. The product is mixed at a ratio of 1 part monomer (liquid) to 3 parts polymer (powder) for 1 minute. The manufacturer states the pre-pack dough time (working time) is 3-5 minutes and that trial packing steps can be done if necessary. Following final closure of the flask, the acrylic is cured by flask placement directly into boiling water for 15 minutes, removed, and then bench cooled. After suitable cooling, Axcent 15-Minute is deflasked and finished using the usual finishing and polishing techniques. This product is available in seven denture base shades: light fiber, dark fiber, purple fiber, light characterized, A-99 (matches Lucitone 199®), plain pink, and clear.

Manufacturer:

Garreco Incorporated
P.O. Box 1258
Heber Springs, AR 72543
(501) 362-6261
(800) 334-1443
(501) 362-2264 Fax
www.garreco.com

Suggested Retail Price:

(4) - 1 lb Axcent 15-Minute powder - \$64.50
(4) - 5 lb Axcent 15-Minute powder - \$302.10
(1) - 20 lb Axcent 15-Minute powder - \$299.00
(4) - 8 oz Axcent #2 liquid - \$32.40
(4) - 1 qt Axcent #2 liquid - \$69.90

Government Price:

(4) - 1 lb Axcent 15-Minute powder - \$43.00
(4) - 5 lb Axcent 15-Minute powder - \$201.40
(1) - 20 lb container Axcent 15-Minute powder - \$199.50
(4) - 8 oz Axcent #2 liquid - \$21.60
(4) - 1 qt Axcent #2 liquid - \$46.60

ADVANTAGES:

- + Quick 15-minute curing time.
- + Met specifications for porosity, translucency, and plasticity.
- + Comparable surface hardness to other acrylics.
- + Possesses adequate bond strength to denture teeth.
- + Less expensive than comparable acrylics.
- + Minimal initial learning curve.

DISADVANTAGES:

- Sticky consistency after mixing and during packing.
- Working times not included in instructions.
- Slightly lower flexural strength than comparable acrylics.

SUMMARY AND CONCLUSIONS:

Axcent 15-Minute Cure Acrylic is a heat-cured acrylic that offers an accelerated method to process denture bases and other appliances. The material can be cured immediately following final packing using boiling water and a 15-minute curing period. Axcent uses the familiar compression-molded denture packing technique and does not have a steep initial learning curve. The short curing time was highly appreciated by evaluators but its handling characteristics were not as user-friendly as familiar acrylics in use. Evaluators reported Axcent had an adequate working time (3-5 minutes), however it displayed a sticky consistency during trial packing. DIS laboratory testing revealed Axcent met standards with regards to porosity, translucency, and plasticity. Testing also revealed Axcent's flexural strength was slightly lower than two other tested acrylics, but its hardness, and bond strength to denture teeth were comparable. Axcent is less expensive per unit than other currently-used denture base acrylics. Although evaluators did not recommend its purchase to replace their currently-used acrylic, users did note that it would be an excellent material to have on hand for situations that require expedient completion. **Axcent 15-Minute Cure Acrylic** is rated **Acceptable** for use by the federal dental services.

(MSgt Osborn)