

Cerinate® Porcelain and Ultra-Bond® Dual-Cure Luting Agent Research Reference Guide

Bonded Porcelain Veneer Restorations

1. Strassler, H.E. and Weiner, S., “Long Term Clinical Evaluation of Etched Porcelain Veneers,” University of Maryland Dental School, presented at the American Society for Clinical Research Meeting, March 2004.



The purpose of this study was to evaluate the clinical performance and durability of anterior etched porcelain Lumineers™ by Cerinate®*. The study population consisted of 30 patients with discolored or malpositioned teeth. A total of 167 Cerinate Lumineers (Den-Mat® Corp.) were placed with Ultra-Bond®. The patients were recalled for collection of long-term data at periods of 140 months up to 232 months (19.3 years) with a mean of 174.8 months (14.6 years). Modified U.S.P.H.S. criteria were used to evaluate color, cavosurface marginal adaptation, and marginal discoloration. The data at the last recall are as follows:

	Alpha	Bravo	Charlie	Delta
Color	143	14	—	—
Marginal Adaptation	128	12	3	14
Marginal Discoloration	133	22	2	—

There was 100% retention of the Lumineers over the period of the study. Over the duration of the study, of the patients that were able to be recalled, 94% of the restorations were clinically successful (157 of 167) with only 10 Lumineers needing replacement. Replacement was usually due to chipping or cracking on stress bearing surfaces. In some cases, the Lumineers were replaced not due to the severity of the fracture, but because the protocol called for the Lumineers to be replaced if any fracture occurred.

Results indicate that the Cerinate Lumineers cemented with Ultra-Bond were highly successful over the period of the study.

2. The Dental Advisor, “Clinical Evaluations,” Volume 20, Number 10, December 2003.

Clinical consultants awarded Ultra-Bond® Plus a 4 1/2-PLUS rating after completing over 226 cementations. The consultants highly rated the overall ease of use and convenience of the system, especially the ease of mixing and dispensing using the auto-mixing tips. They commented, “Good viscosity of cement makes restoration seating easy.” And, they rated the final esthetics of the restorations very good.

3. Ouellet, David, “Using Rembrandt Veneers in my Daily Practice”, DentalTown, May 2003.

This article describes two case studies where Cerinate® Lumineers™* are used with little to no tooth preparation. Both cases were examples when it is necessary or not necessary to modify (prepare) teeth—standard veneer replacement and cuspid-guided occlusion with bonded porcelain. The end result showed a dramatic improvement in proportion and tooth positioning in Case 1. After an 11-year recall, the Lumineers in Case 2 showed no debonding and complete patient satisfaction.

4. CRA Newsletter, Volume 27, Issue 5, May 2003.

This study focused on materials used for metal-free, 3-unit prostheses. One of the materials in the evaluation was Cerinate Pressable. It received a CRA excellent rating in the “Esthetic Potential” category.

5. Malcmacher, Louis, “No-Preparation Porcelain Veneers,” Dentistry Today, April 2003.

This article discusses the benefits of porcelain Lumineers that do not require the removal of sensitive tooth structure and produce no post-operative sensitivity. The three case reports used Cerinate Porcelain Lumineers and all required no tooth reduction. Each case report used Lumineers for different restoration purposes; Case 1—Esthetic smile improvement (linguoverted with discolored restorations, Case 2—Instant orthodontics, and Case 3—esthetic smile improvement (bruxism).

6. Ibsen, Robert, “Conservative Treatment Provides Outstanding Long-Term Results,” DentalTown, March 2003.

This case study is about the use of Cerinate Porcelain Lumineers and a resin labial bridge/splint. The patient had idiopathic periodontosis with mobile teeth. The purpose for the treatment choice was a functional, esthetic restoration that would prolong tooth structure. After a 13-year recall, functionality had been maintained with an optimistic prognosis for the patient’s teeth.

7. Sapp, Jr., Baxter., Sapp, H.T. Macon, "The Evolution of the Esthetic Veneer: A 20-Year Case Study," Contemporary Esthetics and Restorative Practice, Vol. 6, No. 12, December 2002.

The study reviewed an initial veneer placement of Lumineers™ by Cerinate®* with Ultra-Bond® in 1985 and then evaluated the Lumineers after 17 years when they were replaced due to esthetic wear. The 17-year old case showed no evidence of microleakage, no evidence of gingival recession, and no cracks or fractures.

8. Ibsen, Robert, "Bonding Cerinate Veneers to Existing PFM Crowns," Dental Town, October 2002.

This case report discussed techniques and products used for bonding Cerinate Porcelain Lumineers to three cosmetically-compromised PFM crowns. The case report also discussed post placement, periodontal health, and oral hygiene maintenance—tasks made easier because the veneer margins did not extend subgingivally.

9. Putter, H., Huberman, A., Scherer, W., "Diastema Closure: A Case Report," Journal of Esthetic Dentistry, Vol. 4, 1992: 9-11.

Two modalities of treatment, with orthodontics and porcelain veneer placement with Ultra-Bond, were combined to achieve an excellent esthetic effect and eliminated a long-lasting cosmetic problem.

10. Nash, R.W., "Minimal Preparation as an Option with Porcelain Veneers," Dentistry Today, Vol. 11, Sept. 1992.

A technique in minimal preparation to preserve tooth structure achieved quality aesthetic results using Ultra-Bond with Cerinate Porcelain Lumineers.

11. Putter, H., Ibsen, R.L., "Simultaneous Placement of Multiple Porcelain Veneers," Journal of Esthetic Dentistry, Vol. 4, 1990: 67-69.

Alternative techniques to cementing porcelain Lumineers with Ultra-Bond is presented. The technique demonstrated that multiple porcelain Lumineers can be cemented simultaneously with Ultra-Bond.

12. Minato, K.S., "Esthetic Porcelain Veneers," Hawaii Dental Journal, Vol. 17, 1986: 1-5.

This article presented a step-by-step guide for the preparation, impression, and cementation of porcelain Lumineers. The article discussed the use of Ultra-Bond as the cementing medium.

Restoring Worn Dentition

1. Shuman, Ian E., "Aesthetic Correction of a Damaged Occlusion Using Varied Preparation Designs and Pressed Ceramic Restorations," Dentistry Today, March 2004.

The article presents a case report in which minimally invasive treatment methodology and a laboratory-fabricated, indirect restorative material (Cerinate® Porcelain Crowns and Lumineers™*) were used to restore failing restorations, PFM crowns with exposed metal margins, and severe enamel wear with fracturing and dentinal exposure. Dr. Shuman gives an in-depth explanation of each appointment, along with laboratory communication tips. Den-Mat® products are used for everything, from fabricating temporary crowns to cementing the Lumineers and permanent crowns, to final finish. He reiterates that while there are a myriad of restorative choices available, use of a "proper restorative material that provides the required aesthetics, strength, and reliability in high-stress occlusal situations, the rewards are many."

2. Ibsen, Robert L., "Cuspid-and anterior-guided occlusion achieved with Cerinate® Porcelain withstands test of time," DentalTown, August 2003.

This article reviews a case of Cerinate Porcelain Veneers placed 14 years ago on a patient with significant wear of his enamel, showing exposed dentin and cupping in the incisally-eroded areas. Minimal reduction of tooth structure was performed only to create clearance between the mandibular and maxillary teeth. The placement of Cerinate Lumineers, created anterior disclusion to compliment cuspid guided disclusion. Fourteen years later, the Cerinate Porcelain Lumineers have performed well. Wear of the natural tooth structure has been stopped, and the teeth were ultimately strengthened.

3. "Less-Preparation Cerinate® Porcelain Veneers for Worn Dentition Restorations," Tech-Specs From the Manufacturer, Contemporary Esthetics and Restorative Practice, August 2001.

This article demonstrates how Cerinate Porcelain Lumineers can be used to restore worn dentition in a patient with extreme dental phobia; anesthetic and tooth preparation were not an option. A full-arch (1st Impression, Den-Mat) was taken. No temporaries were required. The Lumineers were fabricated with Cerinate Porcelain, a feldspathic porcelain with a strength approaching that of aluminum oxide-reinforced porcelains. The completed post-operative view shows the polychromatic appearance, which is a result of the thinness of the Cerinate Lumineers. The exceptional strength of Cerinate Porcelain, bonded with the Tenure®/Ultra-Bond® combination produces durable and reliable esthetic restorations with an established success record.

- Ibsen, R.L., Ouellet, D., "Restoring Worn Dentition," Journal of Esthetic Dentistry, Vol. 4, 1992: 96-101.

V-shaped Cerinate® Porcelain crowns were bonded with Ultra-Bond® to halt severe tooth wear and restore normal occlusal relations.

- Ibsen, R.L., Yu, X.Y., "Establishing Cuspid-Guided Occlusion with Bonded Porcelain," Journal of Esthetic Dentistry, Vol. 1, 1989.

Step-by-step procedures for Cerinate Porcelain restorations bonded with Ultra-Bond showing a new method for cuspid-guided occlusion is presented.

Inlays/Onlays

- Jordan, R.E., Suzuki, M., "The Porcelain Inlay Technique for Posterior Restorations," Journal of Esthetic Dentistry, Vol. 1, 1989: 41-44.

A method for restoring a stable posterior occlusion using the porcelain inlay technique is discussed. Restorations were bonded using Ultra-Bond.

- Minato, K.S., Strassler, H.E., "Posterior Etched Porcelain Inlays and Onlays: Treatment Planning and Technique," Hawaii Dental Journal, Vol. 19, 1988: 8-13.

The use of etched porcelain for posterior inlays and onlays requires correct treatment planning, preparation design, and technique using Ultra-Bond to achieve clinical success.

- Feder, B.A., "Combining Etched Porcelain Inlays and Onlays with Composite Resins to Restore Posterior Teeth," General Dentistry, Nov-Dec. 1988: 478-481.

A technique description and a case report involving the combined use of etched porcelain inlays and onlays with composite resins in restoring posterior teeth is presented. Ultra-Bond is used as the luting agent to permit complete polymerization.

- Jordan, R.E., Suzuki, M., Boksman, L., "Clinical Evaluation of Den-Mat Porcelain As Inlay-Onlay Restorations in Posterior Teeth: Two and Four Year Recalls," Den-Mat Corporation. Unpublished data available on request.

Evaluation of Cerinate porcelain inlay/onlay restorations luted with Ultra-Bond. After all parameters of the study were considered, the Cerinate inlay/onlay restorations demonstrated overall excellent results after a period of four years.

Porcelain Repair Studies

1. Yu, Xinyi, "Successfully Placing Porcelain Veneers To Save Porcelain-Fused-to-Metal Bridges and Crowns," Contemporary Esthetics and Restorative Practice, May 2003.

This article discusses the technique of using Cerinate® Lumineers™* to bond fractured porcelain-fused-to-metal (PFM) porcelain surfaces. A step-by-step procedure describes the placement process. The superior flexural strength of Cerinate Lumineers allowed the Lumineers to be made esthetically thinner and acceptable over the PFM restoration.

2. Strassler, Howard E. and Cloutier, Paul C., "A New Fiber Post for Esthetic Dentistry," Compendium, October 2003.

This case study shows the use of a fiber-reinforced post to strengthen the maxillary left central incisor, along with the placement of Cerinate all-ceramic crowns to improve the appearance of the maxillary teeth. Cerinate, a fired feldspathic porcelain, was chosen for its masquing ability, since the patient's teeth were tetracycline stained. The etched porcelain crowns and Lumineers were treated with Cerinate Prime® (Den-Mat) and a resin adhesive, Tenure® S (Den-Mat). Tenure® MP (Den-Mat) was applied to the crown preparation, and Ultra-Bond Quik® (Den-Mat) was used to cement the crown in place with a 20-second LED light cure. The author stresses the need for practitioners to understand the chemistry and instructions of the dental materials to make the best choice for each clinical situation.

3. Strassler, H.E., "Achieving Predictable Crown and Bridge Repair," General Practitioner May 1992: 71-74.

The use of Ultra-Bond to affect repairs for worn acrylic facings without having to replace an entire bridge is presented.

4. Ferreira, M.R., "Intra-Oral Repair of Dental Porcelain," Journal of Dentistry Association of South Africa, Vol. 35, 1980: 361-364.

This article discusses methods to repair dental porcelain intra orally. The author has found that the Den-Mat Porcelain Repair Kit containing Ultra-Bond proved quite acceptable and over the repaired period no surface discoloration, marginal staining, or chipping of repairs were observed at recall visits.

5. Eames, W.B., Rogers, L.B., "Porcelain Repairs: Retention After One Year," Operative Dentistry, Vol. 4, 1979: 75-77.

The Den-Mat® Porcelain Repair Kit containing Ultra-Bond® was found to give clinically acceptable retention when tested dry, when soaked in mouth-temperature water for 24 hours, for seven days and when cycled for 24 hours in temperatures ranging from 2° C to 60° C.

6. Eames, W.B., Rogers, L.B., Feller, P.R., Price, W.R. "Bonding Agents for Repairing Porcelain and Gold: An Evaluation," Operative Dentistry, Vol. 2, 1977: 118-124.

The Den-Mat Porcelain Repair System containing Ultra-Bond produced acceptable values for repairing porcelain.

7. Litkowski, L.J., Swierczewski, M., Strassler, H.E., McDonald, N.J., "Marginal Microleakage of Three Porcelain Repair Systems," Den-Mat Corporation. Unpublished data available on request.

Microleakage evaluation of three porcelain repair systems for access-like preparations in porcelain. Mean leakage values were: Cerinate® Ultra-Bond 32.8%, Clearfil 45.1%, and Scotchprime 63.8%. A significant difference was noted between groups.

Bond Strength Studies

1. Hsu, C.S., Stange, I., Nathanson, D., "Shear Bond Strength of Resin to Etched Porcelain," Oral Presentation International Association of Dental Research and American Association of Dental Research, March 1985.

This study investigates the In-Vitro shear bond strength of composite resin Ultra-Bond to porcelain using various porcelain surface treatments and bonding modalities. The results indicated that shear bond strength of resin to porcelain clearly varied as a function of the porcelain surface treatment.

2. "Battle of the Bonds," Course hosted by Northwestern University School of Dentistry 1990.

Tenure®/Ultra-Bond showed the highest bond strength, a system that produced 98% retention rate. Additionally, Tenure/Ultra-Bond produced the lowest standard deviation for 36 specimens.

3. Nathanson, D., Hassan, F., "Effect of Etched Porcelain Thickness on Resin-Porcelain Bond Strength," Boston University School of Graduate Dentistry 1987.

The purpose of this study was to determine how porcelain thickness effects resin photocuring and resin to porcelain bond strength. The results indicated that Ultra-Bond® and Marathon® with Infinite Cure had significantly higher ($p < .001$) bond strengths than all other groups.

Infinite Cure

1. Newman, S., "A New Version of Light Polymerized Composite Resins," Journal of the Tennessee Dental Association, Vol. 6, 1984: 36-38.

The author states that there is a definite post-light exposure curing that takes place in Ultra-Bond compared to the other materials tested.

Physical Properties

1. Cattell, M.J., Chadwick, T.C., Knowles, J.C., Clarke, R.L., Lynch, E., "Flexural Strength Optimization of a Leucite Reinforced Glass Ceramic," St. Bartholomew's and the Royal London School of Medicine and Dentistry.

The purpose of this study was to process a ceramic material with a fine leucite particle size using hot pressing techniques, to increase the flexural strength, reliability, and ease of use. Cerinate® Pressable Porcelain exhibited significantly higher biaxial flexural strength than Empress® Pressable Porcelain. It was concluded that Cerinate can be pressed in different press furnaces without compromising its superior strength.

2. Cattell, M.J., Clarke, R.L., Lynch, J.R., "The Transverse Strength, Reliability, and Microstructural Features of Four Dental Ceramics - Part I," Journal of Dentistry, Vol. 25, No. 5 1997: 399-407.

The demand for more esthetic dentistry and concerns about biocompatibility of restorative materials have led to a revival of all ceramic restorations—with Cerinate taking the lead. The results of this study showed Cerinate Porcelain to have a mean strength of 118.2 ± 8.7 , with a highly significant result of $P > 0.05$. Cerinate Porcelain exhibited a uniform distribution of fine leucite crystals $1 \mu\text{m}$ using secondary electron imaging. The conclusion proves Cerinate was the strongest and the most reliable of materials in contrast to Empress®, Corum®, and Alpha®, possibly due to the fine crystal size.

3. Cattell, M.J., Clarke, R.L. Lynch, J.R., "The Biaxial Flexural Strength and Reliability of Four Dental Ceramics - Part II," Journal of Dentistry, Vol. 25, No. 5, 1997: 409-414.

No statistical differences of Weibull mean strengths existed between Empress®, Cerinate®, Corum®, and Alpha® ceramics; yet Cerinate continued to have the highest m-value ($P > 0.01$) and good dependability.

4. Wassenaar, P., "The New Porcelains - Are They Any Better?" Australian Prosthodontic Journal, Supplemental Vol. 4, 1990.

Cerinate proves that it is as strong as aluminous-oxide reinforced porcelain, and furthermore, it is a highly esthetic material. The study credits leucite for its high expansion coefficient.