Vertise Flow
Self-Adhering Flowable Composite

Vertise™ Flow greatly simplifies your direct restorative procedures by incorporating a bonding agent into a flowable, which is powered by Kerr’s renowned OptiBond® adhesive technology. Our leadership in resin restorative dentistry comes after decades of advancements in composites and expertise in adhesives—both of which come together in Vertise Flow.

The Evolution of Adhesive Technology

1950s – Buonocore discovers that successful bonding to phosphoric acid-etched enamel can be achieved. But the first three generations of bonding agents provide only weak bonds to dentin.

1990s – 4th-generation bonding agents achieve reliable bonding to dentin due to the discovery of phosphoric etching and the use of a solvent-based hydrophilic primer.

1992 – Kerr introduces OptiBond, the first filled bonding agent to etch, prime, and bond to the tooth. Today, almost 20 years later, OptiBond is still upheld as the industry gold standard to which all bonding agents are compared.

1996 – Kerr expands its adhesive innovations with OptiBond Solo, a system that combines primer and adhesive in one liquid so dentists no longer have to do these steps separately. OptiBond Solo Plus is unique with its ethanol-based solvent, which enables tolerance to moisture much more than other 5th-generation systems based on acetone solvents.

2006 – After years of researching self-etch technology, Kerr brings to market OptiBond All-In-One, a system combining all 3 steps into a single component – etch, prime, and bond in one bottle. The self-etch technology reduces post-op sensitivity significantly to allow for maximum patient comfort while saving time for busy practitioners.

2009 – Kerr takes innovation to the next level by introducing Vertise Flow, a unique self-adhering flowable composite that combines the resin technology of composites and adhesives into one, eliminating the need for a separate bonding application step.
The Power Behind Vertise Flow: OptiBond Adhesive Technology

One common element in all Kerr bonding agents is the GPDM adhesive monomer, a phosphate functional group that creates a chemical bond with the calcium ions of the tooth. GPDM monomers ensure a tenacious bond to both dentin and enamel, evidenced by the strength known to all generations of the OptiBond adhesive family. A GPDM adhesive monomer acts like a coupling agent. On one hand, it has an acidic phosphate group for etching the tooth structure and also for chemically bonding to the calcium ions within the tooth structure. On the other hand, it has two methacrylate functional groups for copolymerization with other methacrylate monomers to provide increased crosslinking density and enhanced mechanical strength for the polymerized adhesive.

Vertise Flow Filler System

The type, proportion, and size of each filler were carefully chosen for optimized wetting, mechanical strength, and polishability. Vertise Flow consists of 4 filler types: 1) a prepolymerized filler, 2) a 1-micron barium glass filler, 3) a nano-sized colloidal silica, and 4) a nano-sized Ytterbium fluoride. The average particle size of Vertise Flow is 1 micron. The prepolymerized filler (PPF) enhances the handling characteristics of the material, making it smooth and easy to manipulate. Furthermore, PPFs help minimize shrinkage due to a “pre-shrunk,” or prepolymerized, nature. Nanoparticles enhance the polishability of the material and achieve special rheological property, or thixotropic, non-slumping behavior. Nano-ytterbium fluoride particles give Vertise Flow a superb radiopacity index of 320% for easy detection with X-rays. See the diagram below for an illustration.
Bond Strength

Solid bond strength is critical as Vertise Flow no longer needs a separate bonding step. The material acts as both an adhesive and a flowable composite. Bond strength tests were performed comparing Vertise Flow to other self-etch adhesive systems.

Vertise Flow shear bond strength to dentin and enamel was tested by various research institutions and compares favorably to other self-etch bonding agents used in conjunction with traditional flowables.

Shear Bond Strength of Vertise Flow Compared to Self-Etch Adhesive/Flowable Composite Systems

Dentin Shear Bond Strength of Vertise Flow Compared to Self-Etch Adhesive/Flowable Composite Systems

Study conducted by E.J. Swift, Jr. and R. Walter from University of North Carolina, Chapel Hill, NC, USA and Kerr Research & Development. Data available upon request.

Study conducted by C.A. Munoz-Viveros and M. Campillo-Funollet, School of Dental Medicine, State University of New York at Buffalo, Buffalo, NY, USA. Data available upon request.
In addition to dentin and enamel, Vertise Flow bonds well to other dental substrates such as porcelain, which makes it a suitable material for porcelain repairs. Vertise Flow does not need HF-etch or silane primer to bond to porcelain—a great advantage to both dentist and patient.

**Shear Bond Strength of Vertise Flow to Various Dental Substrates**

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Shear Bond Strength, MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentin</td>
<td>25.1</td>
</tr>
<tr>
<td>Enamel</td>
<td>24.9</td>
</tr>
<tr>
<td>Porcelain (No HF/Silane)</td>
<td>33.9</td>
</tr>
<tr>
<td>Composite</td>
<td>34.2</td>
</tr>
<tr>
<td>Rexilium</td>
<td>26.2</td>
</tr>
<tr>
<td>Gold</td>
<td>21.9</td>
</tr>
</tbody>
</table>

Internal data. Available upon request.

**Enamel Shear Bond Strength of Vertise Flow Compared to Self-Etch Adhesive/Flowable Composite Systems**

Study conducted by C. A. Munoz-Viveros and M. Campillo-Furollet, School of Dental Medicine, State University of New York at Buffalo, Buffalo, NY, USA. Data available upon request.
**SEM Analysis**

SEM generated by Kerr Research and Development shows the tight interfacial adaptation of Vertise Flow to the tooth, indicating good wetting and bonding that would ensure durable restorations.

![Composite -dentin interface](image)

**Microleakage**

Microleakage testing measures the extent of dye penetration along the margins after thermocycling. A lower microleakage score means better marginal seal and less gap formation, which would reduce the chance for debonding and secondary caries in the long run.

![Dentin tubules](image)

**University of Siena data shows Vertise Flow has a microleakage score comparable to self-etch adhesives used with traditional flowable composites.**

**Microleakage of Various Flowable Composites and Dental Adhesives (Class I)**

![Bar chart](image)

Study conducted by M. Ferrari, University of Siena, Siena, Italy. Data available upon request.
**Flexural Properties**

Flexural strength, also known as “bend” strength, is defined as a material’s ability to resist fracture under flexing load and represents the highest stress experienced within the material at the moment of rupture. Flexural strength is an important measure for flowable composites that shows bulk fracture tendency. A high flexural strength enables the material to withstand stress and force applied to the restoration in the mouth.

NOVA University data shows the flexural strength of Vertise Flow as comparable to that of traditional flowable composites.

For a flowable composite, there is a delicate balance when it comes to flexural modulus. The flexural modulus is a measure of the rigidity (or flexibility) of the material. A composite with a higher modulus is more rigid, and a composite with a lower modulus is more flexible. A flowable composite needs to be rigid enough to avoid excessive deformation due to mastication forces encountered in the mouth, but flexible enough to deform with the tooth under flexing load to minimize interfacial stress at the bonding interface between the composite and tooth.

NOVA University data shows the flexural modulus of Vertise Flow as comparable to that of traditional flowable composites.
Radiopacity

Radiopacity is important for a clinician because it allows you to trace restorations and detect any cavity via X-ray. A radiolucent or non-radiopaque material will appear black on X-rays, leading the dentist to believe there are cavities. Thus, using a radiopaque material is critical for proper diagnosis and treatment in a timely manner.

Photos courtesy of Dr. Stephen D. Poss
Patient presented with existing amalgam restorations that needed to be replaced. Dr. Poss used Vertise Flow to restore accordingly. X-rays illustrate the clear visibility of Vertise Flow.

Live Applications

Technique
Unlike traditional flowables, which have a bonding agent layer underneath to bond to the tooth, Vertise Flow is self-adhering, and thus needs proper contact with the tooth to bond to it. Brushing the material onto the prep with moderate pressure creates such contact.
Small Occlusal Restoration

Original tooth with cavities
Prepped, isolated tooth
Vertise Flow dispensed into prep
Initial layer of Vertise Flow brushed onto prep for 15-20 seconds with moderate pressure
Vertise Flow is light-cured for 20 seconds (Additional layer added to fill cavity—not shown)
Final restorations

Small Class I Restoration
Photos courtesy of Dr. Ara Nazarian

Original amalgam restorations
Prepped teeth to be restored using Vertise Flow
Final restorations

Class II Restoration (as Liner)
Photos courtesy of Dr. Sam Simos

Original restoration with new decay
Prepped teeth to be restored using Vertise Flow
Cavity is restored using Vertise Flow
Final restoration