

Adhesive Newsletter #46

Because To Err Is Human...

Bonding agents for the befuddled, the confused, the technique-challenged, and everyone else –

From Nelson Gendusa, D.D.S. – Director of Research

I recently read an article about bonding agents authored by a well-known materials guru. Using the strongest words, he cautioned dentists about the technique-sensitivity of these new self-etch materials.

“They require just as much attention to detail as their predecessor. There are no short-cuts or special techniques that permit less chairtime.”

He then warned readers that self-etchers

- 1) Won't bond dual-cure core materials...
- 2) Are useless for indirect restorations...
- 3) And can cause wicked sensitivity if applied to dentin that was accidentally acid-etched.

As many of you know (but apparently the guru didn't), not ONE of these comments applies to **Brush&Bond®** or **Touch&Bond®**. Both agents bond to most core materials. They're terrific for indirect restorations. And if you accidentally etch the dentin, they behave exactly the same as if you hadn't.

And concerning his warning about technique-sensitivity...

I'm the last one to suggest that you deviate from our instructions. That said, **Brush&Bond** and **Touch&Bond** may be the two most forgiving bonding agents ever created.

Independent studies suggest that:

- They don't care if the dentin is damp or dry.¹
- They don't care if dentin has been acid-etched or not²
- They don't care if your bur creates a thick smear layer – or a thin one³
- They don't care if you use a dam to control humidity – or not⁴
- The precise drying time isn't critical⁵ (Some other self-etchers can produce

excruciating sensitivity, brown marginal staining or discoloration of the overlying composite if they're not air-blown precisely according to instructions.)

- **Brush&Bond** and **Touch&Bond** don't even seem to care if some minor residual caries remain (more about that in a minute.)
- And if you don't adequately light cure them, they even cure on their own.*

To demonstrate just how forgiving they are, here's a true story –

Last month I received two separate calls from dentists who'd failed to use the **Brush&Bond** brush. One said he'd been bonding that way for a full year! Seems he'd hired a new assistant, and somehow she never got the word about the chemistry in the brush. So for a year she'd been handing the dentist a conventional **MicroBrush** dipped in **B&B** (I guess in this case, we should just call it “B”).

Anyway, despite this really massive screw-up, the restorations were looking good (great, actually) at recall, and he couldn't remember any failures.

Please don't misunderstand. To get the most dependable, long-term service out of your materials, you must follow the instructions. **Brush&Bond** and **Touch&Bond** just allow for a little human fallibility.

Will DuraFinish affect the occlusion?

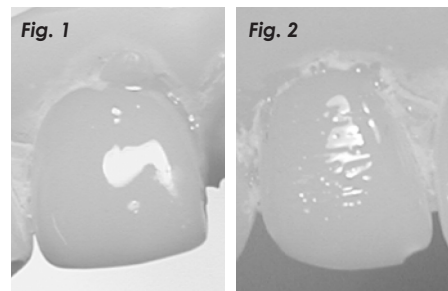
A number of dentists have asked whether our **DuraFinish®** glaze is thick enough to affect the bite on posterior occlusal surfaces. Theoretically, if you apply it straight from the bottle, it could. So if I were faced with a super-equilibrated case, I'd apply **DuraFinish** using the technique we suggest for fast, super-glossy anteriors.

- 1) Set up the mixing dish with a drop of **DuraFinish** in one well and some acetone in the other.
- 2) Dip the brush into the acetone and wet the composite surface.
- 3) Immediately (before the acetone evaporates), dip the brush into the **DuraFinish** and apply to the surface. The **DuraFinish** will ride the acetone, creating a very thin, very even, very smooth film with a shine that will knock your eyes out.
- 4) Zap the surface with your halogen light.

But what if you don't want a super smooth glass-like shine? Suppose, for example, you're glazing an anterior surface, and prefer some light-diffusing horizontal striations (When was the last time you used the word “perikymata”?)

- 1) Apply the **DuraFinish** without an acetone primer.
- 2) After you've covered the entire composite, brush the surface mesio-distally.
- 3) Before the brush strokes slump, zap the surface with your light.

To demonstrate the two effects, we made a model out of temporary resin. Then we super-glossed a central and perikymataized a lateral. Total time involved for both teeth combined? About 75 seconds. (And 60 of those were the curing time.)



(Fig. 1) With Acetone for a Smoothy
(Fig. 2) Without Acetone for Striations

* We haven't mentioned this self-cure property before because we didn't want to give the wrong idea. **T&B** and **B&B** take a long, long time to auto-polymerize (30-minutes to an hour.) That's far too long to be used as “self-cure” bonding agent. However, if you inadequately cure the bonding agent (say at the bottom of a deep post hole), a polymer film will eventually self polymerize to protect the tooth surface.

“Hey there’s nothing in my DuraFinish bottle!”

We’ve received a couple of calls from surprised DuraFinish customers complaining that they didn’t get a full bottle of DuraFinish – one even reported that he received an empty bottle!

Here’s the scenario

Excited dentist attempts to use DuraFinish for the first time.

- 1) So the dentist or assistant squeezes the bottle over a dappen dish and ... nothing happens. No drop. So they squeeze harder. Still no drop.
- 2) Getting annoyed, the dentist pulls off the dropper tip, looks into the bottle and sees nothing. No material.

Okay, here’s the deal. Every 6ml DuraFinish bottle comes loaded with 5ml of glaze. Let me repeat – “6ml bottle” – “5ml of glaze.” That leaves 1ml of nothing. We don’t do that to mislead you. We do that because resinous materials require some room for vapor.

By the way, this is true also of resinous liquids like your bonding agent. For example, there’s a little extra space in the Brush&Bond bottle. You don’t notice it because the instant you invert the bottle the fluid flows into the tip.

However, DuraFinish is viscous. It takes some time to flow into the tip for dispensing. Squeezing harder won’t speed the process, it’ll only hurt your fingers. You just have to wait for Dr. Newton’s gravity thing – or you can do what Dr. Rich Goldman (our VP of Clinical Dentistry) does and simply store the bottle upside-down.

However, we’ve just come up with a new bottle insert, so the DuraFinish we’re now shipping is a lot easier on the fingers.

How important is it to remove the last scintilla of caries?

When you etch dentin, you leave the surface covered with a blanket of collagen fibrils. To create a good stable hybrid layer, the bonding agent must penetrate this gooey layer and encapsulate the hydroxyapatite crystals beneath it at the surface of the sound dentin.

If your acid is too aggressive – or you etch too long – you may expose so much collagen that the bonding agent can’t penetrate all the way through it. Even super adhesives like [Amalgambond](#) and

[C&B-Metabond](#) are susceptible to this “over-etched” phenomenon.

Brush&Bond and Touch&Bond are much better penetrators than earlier generations of adhesives. When researchers examined their performance on etched and unetched dentin, the only difference they could detect was the thickness of the hybrid layer.

“Nature’s etch”

Studies presented at the recent IADR meeting showed that C&B-Metabond bonded beautifully to sound dentin — and also to caries-affected dentin (That’s the leathery dentin that remains after you remove the active caries.) But on carious dentin everything fell apart. The bond strength dropped precipitously, and microscopic evaluation revealed a chaotic structure wherever the adhesive met the infected tooth.⁶

When they performed a similar study using Touch&Bond and Brush&Bond, the sound dentin and caries-affected dentin showed similar results. But the results to carious dentin were astonishing.⁷

Unlike C&B-Metabond, there was no drop in retention on caries-infected dentin. And unlike C&B-Metabond, the microscopic evaluation revealed a recognizable hybrid layer.

In other words, both Brush&Bond and Touch&Bond bonded to the dentin right through the caries!

When you think about it, this makes sense. If Brush&Bond and Touch&Bond can penetrate the blanket of collagen left by phosphoric acid etching – I guess we shouldn’t be surprised that it also penetrates the soft mixture of collagen, bacteria and heterogeneous schmutz in carious dentin.

Am I suggesting you skip caries-elimination? Of course not. But if you’re a conservative, minimally-invasive sort of dentist, Brush&Bond and Touch&Bond would appear to be superb for your philosophy. Or if you use one of those new polymer burs that may or may not leave some soft caries behind (depending on whose research you believe), Brush&Bond and Touch&Bond fit beautifully.

Because there’s evidence that if you over-look a little caries in a hard-to-reach area, these new agents (unlike earlier generations) will penetrate it, “fix” it, and bond to the sound dentin below it.

Do you have this regulated substance in your operatory?

Ethyl Alcohol is an excellent general solvent for intraoral cleaning. It has great dentin-wetting properties... and it’s safe.

It can remove handpiece oil from preparations and unwanted oxygen inhibition from composite or temporary crowns. Over the past decade, numerous studies have shown that it’s also excellent for removing eugenol contamination. (Acetone and chloroform are good too, though they can attack certain resins.)

Several issues ago I mentioned some research suggesting how effective Brush&Bond is for sealing endodontic access preps.⁸ Nevertheless, self-etch bonding agents are just as vulnerable to eugenol-contamination as the prior generations. So if you use a eugenol-containing sealer (Grossman’s, for example), even a small amount of sealer on the prep walls will prevent effective hybridization.

To prevent this, simply clean the coronal prep with a cotton pledget saturated with ethyl alcohol. Then rinse – dry – and apply Brush&Bond. This is precisely what folks at the University of West Virginia did, and they found that cleaning contaminated dentin this way restored Brush&Bond’s sealing properties.⁹

Unlike methyl and isopropyl alcohol, ethyl is a regulated substance (not because it’s dangerous, but because it goes so well with Tomato juice and a celery stalk.) So you may have to do some shopping around to find it. Your local pharmacy or liquor store may have it. It’s also available through the Sullivan-Schein catalog.

Gendusa reveals ALL (Brace yourself. This could get ugly.)

We may be shameless here at Parkell – but there are two things we refuse to do in our advertising.

- 1) We will not make a big deal out of the number of stars, checks or pluses Parkell products receive from the various rating organizations.
- 2) We will not make a big deal out of our adhesives’ bond strength numbers.

That’s because we’re convinced that neither of these has any significant comparative value for the serious dentist looking for product information.

While thumbing through magazines recently I ran across an ad for Dentsply's new Xeno IV bonding agent. The headline caught my eye ("One bottle. One Brush.") "Gee." I thought. "That sounds a lot like Brush&Bond." Then I noticed in the ad's obligatory comparative bond strength graph that Xeno IV just barely beat Brush&Bond.

That's it? That's the best they could do? In their OWN study? Performed by their OWN people?

A couple issues ago I broke down and published a one-time-only, never-to-be-seen-again listing of our product ratings.

Now, prompted by Dentsply's ad, I am (for the first and last time ever), revealing Brush&Bond's bond strength. Or I should say "bond strengths." Because the graph below shows every composite-to-dentin bond strength ever published for Brush&Bond. These numbers are from Dental Journals, papers presented at the past 3 IADR meetings, as well as those newsletters I like to joke about.

The studies were performed by different researchers. They used different protocols and different composites. Most of the numbers represent the bond between dentin and light-cure composite, but about 20% use dual and self-cure composites.**

And not one of these numbers was generated by Parkell.

I am doing this to make 3 points –

- 1) If you really care (and I hope you don't), Brush&Bond's bond strength numbers compare favorably with anything out there.
- 2) This wild fluctuation in bond data from study to study is typical for all bonding agents.

- 3) Any manufacturer who unhesitatingly lists his bonding agent's "dentin bond strength" – is yanking your chain.

So if you absolutely have to know what Brush&Bond's bond strength to dentin is – pick a number that makes you feel good. (That's what the manufacturers do.)

10 things the authors of a dental research paper won't tell you

1) "This research has no clinical significance whatsoever."

At this year's IADR meeting, eighty-five percent of the adhesive research papers involved some kind of bond strength (BS) testing. 85%! Yet no study has ever found that bonding agents with high BS clinically outperform bonding agents with low BS. Furthermore, there has never been any research that showed what minimum bond strength is necessary for success.

After listening to 6 presentations in a row focusing on BS, one of our Parkell attendees pointed this out to the moderator. The moderator granted that the link between BS and success was speculative. Nevertheless, he continued, BS is still very important because "clinical studies take too long to conduct." I have no idea what he meant.

Another example: Bonds are frequently "stressed" by thermocycling from very cold to very hot. This is done anywhere from 500 to 1 million times, even though there's no evidence that t-cycling simulates anything that has occurred in the mouth since the inquisition.

And another: One study concluded that to remove posts cemented with resin

cement you should vibrate it for a total of 4 minutes with an ultrasonic scaler with the water turned off. A couple of clinical hints: Hold the handpiece with a kitchen mitt, and be prepared for the patient to RUN screaming out of the office.

2) "I don't bother to read other people's research -

because if I did, I'd know that my results are totally unlike those of countless similar studies. Since I don't acknowledge that, I don't have to explain it."

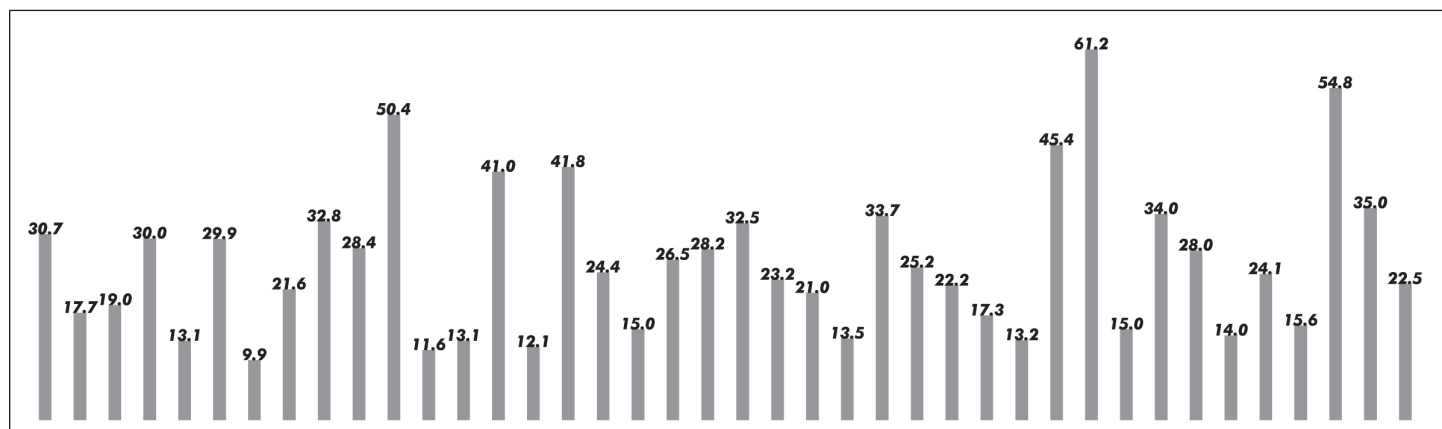
At the latest IADR meeting, different papers concluded that flexible posts are either more gentle or more stressful to the root. Prompt L-Pop had the highest bond strength of the materials tested ... or the lowest.

3) "My conclusions have nothing to do with my data."

Some researchers become so attached to a theory that all evidence to the contrary (even data in their own study!) is ignored. One group of researchers believes so passionately that self-etch systems cannot bond to dual-cure composites, that they overlooked their own data for Brush&Bond showing very respectable bonds to dual-cure core material.

4) "This study was specifically designed to produce the results we wanted."

In "supported" research the materials in the study are sometimes chosen because the sponsor knows his product will compare well with them. Sometimes the companies that paid for the research are identified at the end – in small type. Sometimes not.



** Most of the bond strengths under 30MPa are conventional shear bond or tensile bond tests. Most (but not all) of the strengths above 30MPa are microtensile tests, which generally yield higher numbers. By the way, I didn't indicate the sources for these numbers because they include data from CRA. That organization asks not to be cited. But if I footnoted everything except CRA — that would indicate which data were CRA's!

5) **“I haven’t placed a restoration in 35 years.”**

This may explain #1.

6) **“My grand conclusions are supported by a very modest experiment.”**

It’s not unusual for researchers to examine just one or two materials and then draw grandiose conclusions.

For example, one group of researchers attempted to compare the technique sensitivity of a single self-etcher (Xeno III) with a 5th generation material (Prime&Bond NT). They found similar variation among the 6 operators in the study. So they concluded “... we can affirm that the new self-etching all-in-one systems do not show less operator-variability comparing with one bottle total-etching systems.”

So you see, a perceptive researcher can study just two bonding agents, and draw conclusions concerning 63 adhesives (The approximate total of all self-etchers plus all 5th generation systems.)

7) **“Instructions are for sissies.”**

Many years ago at a research meeting in Acapulco, the owner of a small dental company (Not Parkell) totally lost control and started screaming at a young researcher –
“Yeah, RIGHT! You people ALWAYS say you follow instructions, but you NEVER do. WHAT IS WRONG WITH YOU IDIOTS?!!!!”

Back then I felt sorry for the cowering researcher. Now I feel sorry for the manufacturer.

8) **“I didn’t bother looking up the original references. But someone told me they support my argument.”**

You’d be astonished at how many times the references at the end of a paper have nothing whatever to do with the statement they’re supposed to support. (Sometimes they actually contradict it!)

“It is generally believed that blah, blah, blah.1,2,3” really means “I think.”

Especially when “1,2,3” has nothing to do with the “blah, blah, blah.”

9) **“I’m as bewildered as you are by statistics.”**

The primary importance of statistics in research is to indicate when apparent differences in data could be due to random variation.

In other words, if you redid the tests, the data might just as well be reversed.

Yet after a statistical analysis that clearly suggests that no reliable difference exists between the groups, many authors feel compelled to speculate why the data for the two groups are different.

If the results aren’t significantly different, there’s nothing to explain.

10) **“This research was the first time I ever touched most of these materials.”**

Ever notice how a material works better the longer you use it? That’s because every product has a learning curve. When a researcher discovers that one product generates better data, it may mean that particular material is the only one he used correctly. One study this year compared the bond strength of 13 adhesives. What do you suppose the chances are that all 13 of those materials were used precisely according to the manufacturer’s instructions?

**ATTENTION READERS:
We’re Soliciting Cases
Where Brush&Bond Let You
Down (No, seriously)**

“I’ve been a devoted user of Brush&Bond ever since its debut, and now find myself using it for virtually everything. I even use it on all-enamel preps after acid etching or a little prepping to roughen the surface.

Since you’ve never promoted B&B as an EVERYTHING bonding agent, this makes me a bit nervous. Have you received any feedback to suggest not using it for certain applications? Right now the only thing I’m not using it for is bonding over

silanated porcelain...but what if I did?”

– Jeff Kosoris, DDS

No, Jeff, you’re not alone in using Brush&Bond for everything. But you bring up an interesting question: Are there any applications where B&B DOESN’T work well?

I can only think of three –

1) **B&B does not bond well to amalgam**, so it won’t improve retention of your alloy restorations. For that you need Amalgambond. Nevertheless, about 20% of our B&B users report using it under amalgam just to seal and desensitize.

2) **Brush&Bond’s usefulness in repairing old restorations** is limited. It doesn’t bond well to metal or unsilanated porcelain. And though it bonds to set composite, [Add&Bond](#) does it much better.

3) **B&B isn’t indicated for resin pulp-caps**. Unlike Amalgambond and C&B-Metabond, Brush&Bond isn’t indicated as a pulp-capping material. That’s because a couple of the ingredients could impair healing of the injured pulp. Furthermore, we prefer that resin pulp-caps be self-curing – not light-curing.

Beyond those, I really can’t think of any limitations. However, I’m now going to harness the vast power of this newsletter and ask our readers.

How about it, B&B-users? Have you run across any applications where Brush&Bond just didn’t seem to perform well? If so, drop us an e-mail (info@parkell.com).

Concerning Jeff’s question about using it on silanated porcelain. I’m skeptical that any bonding agent will add much to the bond of composite to silanated porcelain. It certainly won’t do any harm, but it may be a waste of expensive material. If you’re using a viscous composite and want to assure good wetting, a bonding agent should help. But I suspect you’d accomplish the same thing for a lot less money by using a generic unfilled resin.

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