

Technote #6

Understanding Cracking and Breaking

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Cracks are a real problem in salons. Preventing them is easier if you know some basics. Liquid monomer is a unique blend of many of millions of tiny molecules. As the nail enhancement hardens, these millions of tiny molecules link together to create thousands of long polymer chains. These chains are like long strings of microscopic spaghetti. Some of the molecules are highly specialized. These special molecules can link the spaghetti-like chains together into netlike structures. The result is a gigantic, intertwining mass of cross-linked polymer chains that we call... the nail enhancement!

Liquid & powder, wraps and UV gels, all cure in this fashion, without exceptions. Interestingly, when more than 50% of the molecules have joined together into a chain- the enhancement will click when tapped with a brush handle. That click means the product is "set", which occurs after about 2-3 minutes of cure. When the client leaves the salon, her freshly applied enhancement product is about 60-80% cured, depending on your mix ratio. As the wriggling mass of polymer chains gets longer, it gets harder for the molecules to find the end of a chain, so the chemical reaction slows down. At the correct mix ratio, full cure will normally take 24 hours. Slightly wetter mix ratios take twice as long. Extremely wet mix ratios create nail enhancements that will never fully cure.

Freshly applied product is more sensitive to damage. The nail enhancement is a little softer and shouldn't be subjected to punishment. Warn clients to be especially careful during the first 24 hours after applying a new nail or full set. Fresh product applied during a rebalance is fully supported, so it isn't as likely to break. Still, cracks are more likely to occur in old product. These cracks start as an extremely small tear in the mass of polymer chains.

The tiniest cracks that can form in the enhancement are called micro-cracks. These are much too small to see with the naked eye, but they are visible under very powerful microscopes. Sudden impacts or other unusual strains (bends or twists) will drive these micro-cracks together into even larger cracks. These cracks will join with others to create still larger cracks. Before you know it, there is a visible crack in the nail enhancement. That same crack started as an invisible micro-crack.

Only one thing can create a micro-crack. It is the same thing causes a crack to become a broken nail. It is called "force". Force creates energy and energy causes cracks to grow. Whenever the force becomes excessive, the chance of creating a micro-crack or break will greatly increase. *In short, things that create increased force, create micro-cracks: the seeds of all cracks.*

Here are some "rules of thumb" that will help you locate the sources of these excessive forces in your salon:

- As filing pressure increases, so does the force.
- The lower the grit number, the more force the file creates.
- Drill bits spinning at high speeds create lots of force.

- ☒ Nipping forces just create more lifting and cracking.
- ☒ Lengthening the extension increase the effect of all forces.

Heavy filing applies excessive forces to the nail, no matter what the grit size! Conversely, 100 grit and 60 grit files can create tremendous damage with very little pressure. Nipping is the most traumatic of these forces. It damages both the nail plate and the remaining enhancement. Each of these should be avoided or you can look forward to spending more time fixing cracks.

Drill bits can create excessive damage. When used on an enhancement, this damage is generally localized to the area where the drill bit actually touches the polymer. This isn't true for the natural nail. Using a drill bit on the nail plate can create a friction burn on the bed. This often leads to onycholysis (plate separation from the bed) and/or infection. Drills should never be used on the natural nail.

The forces created by a drill bit are awesome! There is enough force to knock and carve out hundreds of thousands of tiny "chunks" of polymer from the surface of an enhancement and throw them at you. That's no small feat. It takes a lot of force to do that. These powerful forces do something else. They create micro-cracks near the point where the bit touches the enhancement. The faster the bit is spinning and/or the more abrasive the bit- the greater will be the forces. Also, pushing down harder will greatly magnify these forces.

These micro-cracks will permeate any surface that the bit touches. The greater the forces, the deeper the micro-cracks. Of course, many of these micro-cracks will file off during finishing, but the deepest ones are left behind. Probably most damage occurs to the enhancement while carving out product for a rebalance. When carving out the product, the remaining product takes on a whitish appearance. That whitening effect is caused by millions of micro-cracks joining to make cracks large enough to see. When this area grows far enough to reach the free edge, it will often cause the product to lose adhesion go the nail and curl away. They can even increase center pocket lifting if micro-cracking is severe.

Micro-cracking on the upper surface of the nail is less important. Also, micro-cracking on the surface is even less important if the nails are thicker. So, for tech's striving to create thin, natural looking nails- drills are not the tool of choice. Micro-cracks that stay inside the enhancement can be the root cause for many service breakdown issues. However, most of these issues can be with education! If you choose to use a drill, make sure you receive a proper education. Some States now require special certification, so check with your State Board.

All abrasives create damage- this can't be avoided. But minimize the forces on the nail while we work, minimizes cracking and breaking. This is why Creative Nail Design has always taught "*sculpt with the brush, not the file*". These words are still true today. This is also why we recommend less abrasive files, a gentle touch and if you use a drill, please do it safely, wisely and properly.

Universal Truth: All filing creates forces. The greater the forces, the greater the cracking.