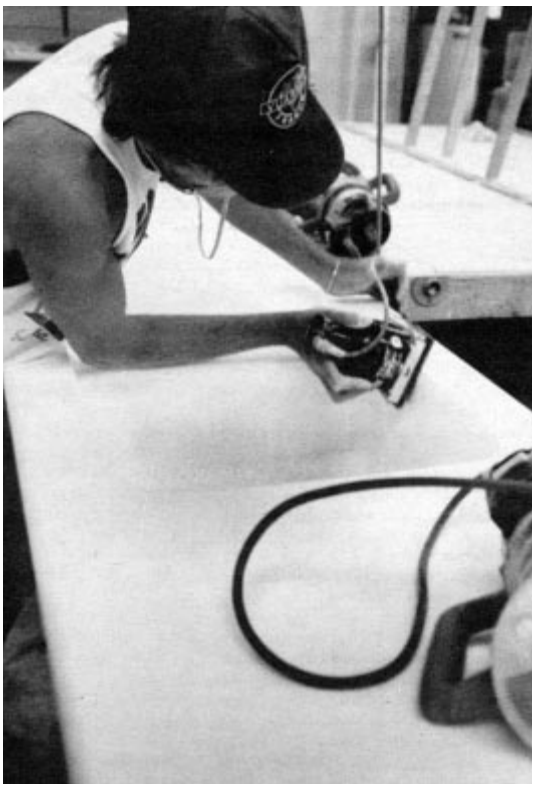
SOLID SURFACING

by Ryno Wretling



As these products grow in popularity, so does the sophistication required to fabricate and install them

All surfaces of this counter and its double sink are sanded thoroughly before the top leaves the fabricator's shop. Solid surfacing's homogeneous nature means that nicks and scratches —whether they're created in fabricating, installation, or use by the client—can be quickly sanded out.

It wasn't very long ago that *solid surfacing* was represented by a single brand that came in two shades of white, and was glued up with silicone. Now it's an industry with four major manufacturers (and lots more entering the field), over 50 colors, and fabrication techniques that include near-invisible seaming, inlaying, and thermoforming.

This rapid evolution has made fabrication and installation of solid surfacing a lot more complex. Although manufacturers still advertise that the materials can be shaped with ordinary woodworking tools, in most cases you're best off leaving the work to a specialist.

Working With a Fabricator

Many solid surfacing fabricators are cabinet shops or countertop specialists. I've limited myself to solid surfacing—Dupont's *Corian* in particular. I have two separate shops; one for custom orders and the other for production jobs. About 40% of my work is residential.

Although we bid most jobs from blueprints, we don't fabricate anything without measuring it ourselves unless it's a "will call" item like a small vanity top. In residential work, we prefer to help the homeowner with design decisions even when it's the contractor's job because we know the material, its tolerances, and how it can be used creatively.

But we don't deal with the client of a contractor or kitchen and bath dealer on money. We deliver a price to the designer or builder that's based on a retail, unit pricing list less 20%. (We're always surprised how many contractors don't take that markup, but pass it along to their clients.)

Our pricing is broken down into basic charges by lineal foot, task, square inch, etc. For instance, our retail price for a Corian countertop in solid colors up to 26 inches in width is $100 per lineal foot; this includes a 3-inch backsplash. (Granite colors run $114 per lineal foot. This 14%-15% premium is typical of most brands of solid surfacing; when labor is added in, granite colors end up raising the job price by about 8% to 10%.)

If the backsplash is to be coved, we add $45 per lineal foot. Edge detailing runs from $11 per foot for a 1-inch build-up with a simple sculpted profile, to $39 per lineal foot for a 2-inch edge with an unusual, multi-pass profile. Sink inlays and underlayment installation are flat charges.

One of the reasons for this unit pricing list is the care we take in bidding uniformly on jobs. We frequently give prices to competing contractors on the same set of plans, and I don't want somebody losing a job because the bid he got from me was $500 more than the one I gave his competitor.

We typically need four to six weeks of lead time, and a 50% deposit. This puts the contractor on the scheduling board. When his cabinets are permanently installed, we take our field measurements and we are back to install within four to five days.

We do something a little unusual when it comes to measuring—we use full-size, corrugated cardboard or 1/4-inch door skin templates. The salespeople scribe them to the walls with a knife, and bring them back to the shop. The lightweight cardboard is particularly handy, because by scoring the top layer of paper, you can fold an entire U-shaped kitchen into the cab of a truck.

Using templates helps reduce error and allows us to mark exactly where cabinet supports fall (so we can plan where to put field seams for the support they need) and mark centers on sinks and cooktops. It also allows us to do as much of the fitting as possible in the shop. Fabricating solid surfacing is a very dusty business, and the less of this we can bring into the homeowners' lives, the happier they and their designer or general contractor are.

We charge a flat fee for putting down underlayment, but in many ways it's a nuisance charge—we're happy to have the contractor do it. Corian only requires a perimeter underlayment (in fact, you'll void the warranty by putting down continuous plywood over the cabinets because it doesn't allow heat to dissipate rapidly around stoves or when the homeowner forgets and puts a hot pan down on the counter).

The height of the underlayment should be discussed early on. We typically use 3/4-inch plywood to bring the countertop up to 36 inches, and to provide drawer clearance under the built-up edge. European cabinets allow as little as 1/8 inch clearance even with 1-inch plywood. In our area, many homes have bow windows whose sills are near countertop height; they can be included in the surfacing if everything planes out correctly.

Design Options

The creative possibilities with solid surfac-

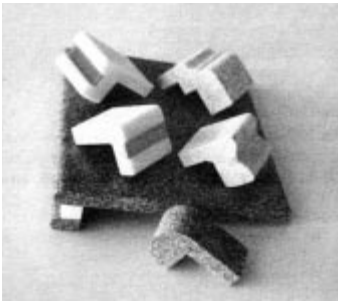


Figure 1. *The author offers his customers four price levels in countertop edge details. Those shown here are from the second highest category. All are 1 1/2 inches thick (built up from the top plus two 1/2 inch strips) and require at least two router passes. Wood or acrylic inlays run an additional $9 per foot.*

ing are limited only by the client's budget and imagination. However, the items I've listed here are fairly typical of our standard residential work.

Edge details. To price our edge work, we've divided it into four categories according to the thickness (1 inch, 1 1/2 inches, 2 inches or more laid up with 1/2-inch laminations), and the difficulty of routing and sanding the profiles. Like most shops we offer radiuses of 3/16, 1/4, 3/8, and 1/2 inch, along with coves, beads, bevels, ogees, and combinations of these. Some of our more creative standard options are shown in Figure 1.

Inlays and inserts are popular in edges, but I'm very particular about how we detail these. We use thin acrylic or laminate color strips or brass recessed slightly in a dovetail dado to keep them in place and protect them. We also use oak and other woods in solid surface edges, but as a 1/4-inch thick inlay (in the 1/2-inch material) rather than a full-width lamination. In fact, the only thing we will laminate to a piece of Corian is another piece of Corian.

Backsplashes. The standard solid surfacing backsplash is 1/2-inch material, 3 to 4 inches high, siliconed to the deck and wall. A coved backsplash looks nicer and provides a stop for water and a much easier intersection to wipe with a dishcloth.

There are several different ways of doing a coved backsplash. A common method involves rabbeting the back edge of the deck to accept the coved splash (see Figure 2). This creates a tight joint, but because you're dealing with a straight channel, it doesn't allow you to scribe the splash to the wall. This leaves gaps at the top of the splash to fill with silicone. I hate to see silicone showing anywhere on one of my jobs, so I use a profile that sits flat on the deck but conforms to the wall. A slight disadvantage of this cove is that you are cutting the glue joint at a very steep angle which shows a slight line in the granites. I use a 1/2-inch cove and sand it with a Makita narrow-belt sander whose front pulley fits snugly in the cove. A 3/8-inch cove is more common.

Another cove that I began fabricating out of Corian about five years ago is what I call a 1/2-inch or *tile* cove. It rises above the deck just 1/2 inch, providing a ledge for tile in the kitchen or mirror in the bathroom.

I use 1/2-inch material for all backsplashes because there are typically a lot of cutouts for outlets (each of these has four inside corners which create stress points) and wall movement. In fact, on full-height backsplashes, I don't go over 12 inches in height without creating a break. This shouldn't be a hard seam (glued with proprietary adhesive), but a butt joint with dabs of silicone to the wall. I usually disguise this joint as a feature stripe by beveling the edges of the material or introducing a contrasting color.

Sinks. One of the advantages Corian has had for many years is their shaped products: bar sinks, lavs, and kitchen sinks that can be undermounted, top-mounted, or *inlaid* (seamed) into a counter or vanity top. Other manufacturers are now coming out with bowls in their own materials.

The two most dramatic treatments are the *flush-seamed mount* (this style requires an absolutely perfect cutout), and the *seamed undermount* (see Figure 3). Most manufacturers also have an integral top and bowl (ITB). Dupont also makes a kitchen model with an integrated drainboard. But given a good fabricator, independent bowls allow you much more flexibility because you can put them almost anywhere in any combination.

Although it takes most homeowners and contractors by surprise, using a solid surface sink with its ten-year warranty comes within $100 or so of undermounting a cast iron one (if you add together the cost of a good sink, the fabricator charge for an undermounting cutout, and the labor to support the sink in the cabinet).

If the customer does opt for an undermounted, cast iron sink, it has to be chosen with this application in mind. Many sinks have a slight rise at the outside edge of the lip which creates a gap between the sink and the underside of the solid surfacing where it lips the bowl.

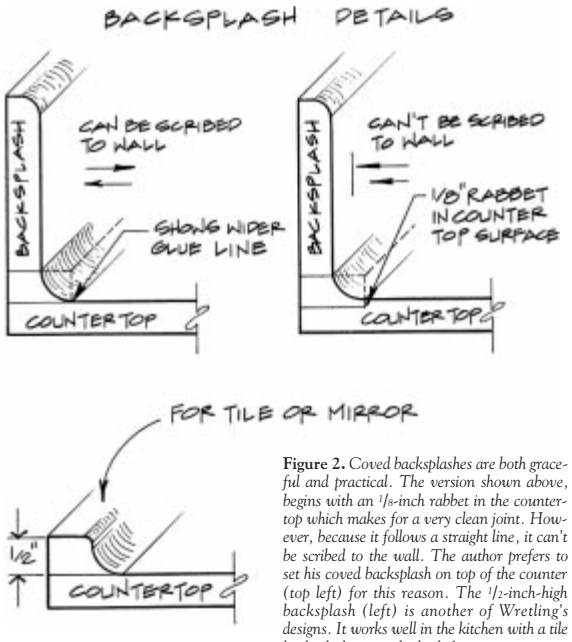


Figure 2. *Coved backsplashes are both graceful and practical. The version shown above, begins with an 1/8-inch rabbet in the countertop which makes for a very clean joint. However, because it follows a straight line, it can't be scribed to the wall. The author prefers to set his coved backsplash on top of the counter (top left) for this reason. The 1/2-inch-high backsplash (left) is another of Wretling's designs. It works well in the kitchen with a tile backsplash, or in the bath for a mirror.*

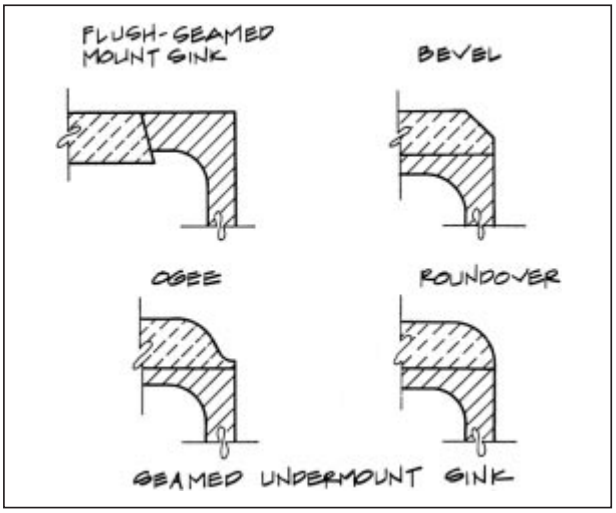


Figure 3. *Two different ways of "inlaying" Corian sinks are the flush-seamed mount, which requires an absolutely perfect cut-out, and the seamed undermount. In the latter case, the top perimeter can be sculpted with a bevel, ogee, or roundover bit. If seamed by an experienced fabricator, the transition from bowl to countertop is invisible when the same color is used.*

The Big Four

By Paul Spring

Although the major brands of solid surfacing are priced and marketed in similar ways, there are some differences in their offerings. Here's a quick synopsis:

Corian. (Dupont, Corian Products, Wilmington, DE 19898; 800/4-CORIAN.) Corian, the grandaddy of them all, is generally known for its reliability and very good company support. It thermoforms easily. Because it's been on the market almost 20 years, many fabricators are comfortable with the procedures it requires and its excellent instructional literature.

Colors. Corian currently comes in 15 colors—11 solids and four granites ("Sierra").

Sheet stock. One-quarter-inch material comes in 30-inch sheets in 5-, 6-, and 8-foot lengths in solid colors only. One-half and three-quarter stock also comes in 30-inch widths in 8-, 10-, and 12-foot pieces.

Other products. Dupont has always been strong in "shaped product," although other manufacturers are beginning to produce sinks in their material. Dupont makes 13 sizes of individual or double-bowl sinks including three with integral drainboard. They also manufacture five lav bowls and two integral bowl tops, all in solid colors.

Fountainhead (Nevamar Corporation, 8339 Telegraph Road, Odenton, MD 21113; 301/551-5000). This respected laminate maker has found a niche with fabrication techniques similar to Corian, but with a wider range of granite colors. Limited thermoforming is possible. New production runs will end the necessity of end matching sheet stock and produce Fountainhead's first sinks.

Colors. Eleven total with three solids and eight granite ("matrix") patterns.

Sheet stock. Fountainhead comes in 30- and 36-inch widths in 8-, 10-, and 12-foot lengths in 1/2 inch and 3/4 inch. Quarter-inch material is limited to the 30-inch width.

Other products. Nevamar now manufactures a deep, double-bowl kitchen sink in solid colors, bar sinks in both granites and solids, and cabinet hardware.

Avonite. (5100 Goldleaf Circle, Suite 200, Los Angeles, CA 90056; 800/4-AVONITE). This company made an early splash with its colors and remains the leader in that category; it markets heavily to the design trade. Its seaming techniques are somewhat different than those of the other solids. Thermoforming is common. Gemstone colors require full underlayment.

Colors. Twenty-three standard colors. Six are marble imitations (these are without mineral filler and carry a Class III fire rating); others are Class I products that come in 15 granite colors and two shades of white.

Sheet stock. Avonite doesn't have a 1/4-inch material. Half-inch and three-quarter inch sheets come in 30- and 36-inch widths, 10 feet long.

Other products. Avonite's Vancouver, B.C., plant is now producing a cast single lav bowl in five granite colors and the two solid shades of white.

Surell. (Wildon Industries, Formica Corporation, P.O. Box 176, Mt. Bethel, PA 18343; 800/621-2009). Formerly called 2000X, Surell was completely reformulated when the name was changed last year. It is now available in granite colors, but isn't recommended for thermoforming.

Colors. Surell comes in five solids and three granites.

Sheet stock. Quarter-inch material (solid colors only) is available in 30-inch widths at 5 feet and 8 feet long, and 36-inch widths come as 8-footers. One-half and three-quarter sheets come in 8-, 10-, and 12-foot lengths in 30-inch wide material; and 8- and 10-foot lengths in 36-inch wide sheets.

Other products. Formica makes lots of cast accessories in solid colors including eight single-bowl and two double-bowl vanity tops, and a lav bowl that can be top or undermounted. They also manufacture shower bases and surround kits.

Paul Spring is editor of the western edition of The Journal of Light Construction.

The Many Faces of Plastic Stone

by Paul Spring

Although solid surfacing borrows its look from marble and granite, it's plastic through and through. In fact, that's part of its appeal. Because it is the same color and density throughout—with no voids, grain, or irregularities—there are few limitations on fabricating it. It cuts with carbide tools and seams almost invisibly with proprietary adhesives. It can be sculpted, inlaid, and in some cases, thermoformed.

It's beautifully suited for interior surfaces. Solid surfacing is very chemically resistant, doesn't burn easily (most carry a Class I rating), won't support mold or bacterial growth, and is almost unstainable. It also has good impact resistance—Corian's psi of 6,000 pounds makes it bullet resistant when backed with ¾-inch plywood. Unlike cultured marble or plastic laminate, there is no surface coating, gel-coat, or melamine to wear out. This is the other key to its acceptance. Because it has the same composition throughout, it is easily maintained with an abrasive pad and is even repairable.

And despite its very high price—the customer is looking at $50 per square foot minimum ($100 lineal) for a standard kitchen countertop with installation—its sales are growing at a reported 15% to 20% per year. And each year it gains acceptance in some new application. It's now relatively common to see solid surfacing used to make furniture, flooring, columns, and moldings for commercial settings.

The curved front of this vanity is made of ½-inch Corian heated to 325°F and postformed. The sink, also Corian, is seamed from beneath. The mountainscape in the background was created with careful router work and different colors of Corian.

Lots of Players, Some Differences

Although all solid surfacings are made with plastic resins, there are some differences. Dupont's *Corian*, which began all of this fuss nearly 20 years ago, is made of acrylic, a durable thermoplastic. The other major solid surfacing products—*Avonite*, *Fountainhead*, and *Surell* are made of polyester, which is a thermoset plastic, or an acrylic/polyester combination. All four use a ground mineral filler—alumina trihydrate—to increase the strength, durability, and fire rating of their products. (Avonite's Gemstone colors are the one exception. These translucent marble patterns are a Class III product.)

But there are also a number of other manufacturers that have entered the field or are in the wings. A major laminate producer (it would be the third) is actively testing a solid surfacing product with a few fabricators. Guardsmen has a solid sheet product on the market called *Solidex*, Duraglas makes sheet stock and cast products such as lavs and sinks under the *Karadon* name, and Swan makes *Swanstone* lavs and sinks in granite colors using tiny fiberglass strands as reinforcement in the resin.

Currently, the fledgling industry hasn't developed ANSI specifications or industry standards such as the ones NEMA (National Electrical Manufacturers Association) sets for plastic laminates. This tends to put more importance on a material's track record, the degree of support manufacturers lend their products, and the familiarity fabricators have with these materials.

But despite the intense jockeying within the industry, the bottom line for most builders and remodelers is that the major manufacturers all have viable products if they are worked by a fabricator/installer who is familiar with them and who follows current factory standards. The four largest manufacturers provide 10-year warranties on their material. You may end up with a preference—based on color choice, accessories, track record, or fabricator loyalty—but ultimately your customer will be served by any of the materials *if* they are handled properly.

Fabricator Training

The key to a good installed solid surfacing product is fabrication. Unfortunately, there are some differences in how the different solid surfacing materials are seamed, etc. All manufacturers require the use of proprietary seam adhesive, although some of these products need you to maintain a certain temperature and humidity during the curing process. One manufacturer recommends the use of clear plastic splines and a biscuit joiner for most seaming; others discourage it. It goes on and on.

The only way to keep up with these requirements—many of which are critical—is to be trained by the manufacturer or distributor of the product, and to stay current on technical bulletins. All manufacturers offer training on two different levels. Most of the basic seminars are available to interested contractors.

- Dupont uses certified instructors to teach one-day seminars in cities across the country. They also hold two-day classes at their training headquarters in Kennett Square, Pa., and Torrance, Calif., which result in certification.
- Nevamar has a basic and an advanced course they teach through their distributors, as well as a separate program that inspects the work of a shop and grants them accredited fabricator status.
- Avonite also has a certification program that involves attendance of a two-day intensive training at their plant in Belen, N.M. In addition, their distributors run half-day seminars to introduce the basic fabricating techniques.
- Formica teaches a one-day seminar for Surell in various cities, and also relies on distributors to teach both basic and advanced techniques.

All of this points someday to manufacturers extending their warranties to include not only the material, but the seaming and installation as well (provided it's done by one of their certified fabricators).

In the past, these manufacturers emphasized their materials' ease of fabrication to get the material in use and to build a market. To maintain the reputation of solid surfacing, they picked up the bill for projects that had problems—whether the material was at fault or not. But now that the material is in demand, the industry seems ready to move gradually to protecting these high standards by encouraging fabrication as a specialty.

Paul Spring is editor of the western edition of The Journal of Light Construction.

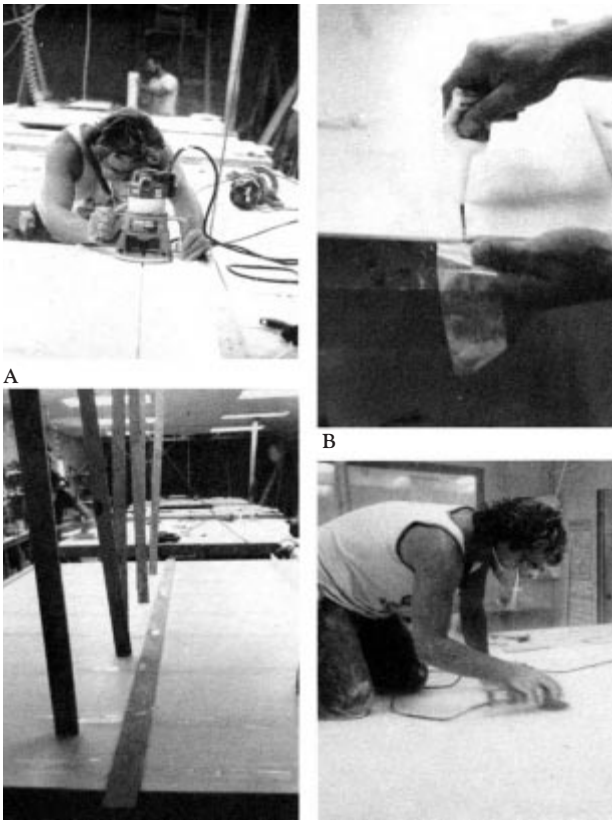


Figure 4. *This sequence shows a 62-inch tub-enclosure panel being made up from two smaller pieces of 1/4-inch material.*
A: *A fabricator dresses both sides of his joint in a single pass with a router guided by a straightedge. The panels are held in place by a full-length piece of clear packing tape they share underneath.*
B: *Two-part proprietary seam adhesive is squeezed into the joint in one pass to avoid bubbles that leave voids. The tape creates a dam that keeps the adhesive from dripping out the ends.*
C: *A quick but effective clamping system holds the seams together with clear packing tape stretched over a strip of solid surfacing that's temporarily spot glued in place with hot-melt glue. The plywood strips wedged against the ceiling keep the two sides of the joint in the same plane.*
D: *Once the adhesive cures—about 45 minutes at room temperature—the seam can be block planed or ground lightly, then finished with orbital sanders using silicon-carbide paper, and eventually a 3M Scotch-Brite pad.*

With this kind of sink, I have to hold the material back to the rise.

Breakfast bars and overhangs. The different solid surfaces vary in their cantilever ability. Half-inch Corian is good for 6 inches unsupported; 3/4-inch material is specced at 12 inches, but I keep it to 9 inches. When I need to bring the material out farther, I use 3/4-inch or 1-inch square aluminum stock to support the counter rather than corbels.

Tubs and showers. Showers are a perfect application for solid surfacing, and I think we will see a real switch to this material in the near future. Although Dupont shows a two-piece back wall, I hard-seam my material 60 inches or even wider to eliminate the batten and silicone look. But the panels are kept independent of each other behind corner pieces. We build soap dishes and shampoo storage out of Corian as well.

While solid surfacing runs a good 15% more than tile on kitchen counters, in the shower it's competitive. In my area, I charge 22¢ per square inch which includes the panels, finish edge trim, and installation.

Thermoforming. This technique is really still in its infancy, and it is not encouraged by all of the solid surface manufacturers. I have installed two heat boxes in my shop; one for small pieces and one for 8-foot sheet stock. A temperature of approximately 325°F gives Corian the flexibility to be post-formed to fairly tight radii. We've used this technique so far in creating rounded skirts for bathroom basins, teller windows, and round table edges. This is an area that I think will take off in the next few years after more fabricators have learned where the limits are with the material.

Fabricating Standards

All of the major solid surfacing manufacturers hold training classes for fabricators, but even a two- or three-day seminar doesn't allow enough time to pass along all you need to know. When I hire an inexperienced fabricator to work in my shop, it's six months before I let him do all fabricating and installation tasks on his own. Even something as rudimentary as seaming the material can be made much less risky by learning advanced techniques and tricks of the trade that are developed over time (see Figure 4).

Of all of the problem installations I've seen in the field (both my own and ones I troubleshoot for Dupont), 90% were caused by fabricator or installer error. The worst of these involved warping at the seams and stress fracturing. The causes were a lack of proper support, stress points at interior corners that weren't relieved with radiusing and finishing, and the failure to isolate the heat from cooktops. Only 1% of the problems were caused by the material, and the remaining 9% were homeowner abuse: roasting pans straight from the oven, heavy objects dropped from upper shelves, etc.

Dupont and some of the other manufacturers of solid surfacing have been very generous in taking care of problems in the field in order to maintain the reputation of their products. But as the network of experienced fabricators builds, the manufacturers are warning that they will be less tolerant of errors in fabricating and installing that are covered in their technical bulletins. Three years from now, I think you will see much tougher standards in enforcing the warranty clauses.

Installation

Installation is in some ways more critical than shop fabrication. We install all our own work for that reason. The most disastrous installation mistakes usually involve cooktop cutouts. Other common mistakes include not paying enough attention to interior corners; gluing down backsplash with seam adhesive or Superglue; and not allowing enough expansion space between walls.

A standard rule of thumb for us on most kitchens is that cutouts, field seaming, and setting the countertop and splash pieces (the latter two rely on dabs of silicone) is a day's work. If the backsplash is coved, we're looking at two days.

We do all of our cutouts on-site in custom work. We insist that sinks and cooktops—not paper templates or a list of dimensions—be on site for us. If the job calls for an undermount cast-iron sink, we ask that the contractor have it installed since it must be supported by blocks attached to the sink cabinet. It has to be absolutely even with the top of the underlayment in this case. Because there is less weight involved, we undermount lav bowls in the shop using brass brackets supplied by Dupont.

All cutouts are made with a router for the smoothest possible cut. Because cooktop cutouts have to deal with heat as well as normal stress, every edge has to be as smooth as possible to keep from establishing fracture points. Even the slightest surface crack or tool mark will hold heat and could cause the surface to fail. So we use a 3/16-inch roundover bit on the perimeter of the cutout on the top (and the bottom if we have access), and polish the inside of the opening as smoothly as the front edge of the countertop.

Inside corners are always radiused. We use a one-inch diameter bit and actually go out beyond the cutline by 1/2-inch on the sides (this is covered by the cooktop trim) for as much relief as possible. Then we use 4-mil aluminum conductive tape to line the perimeter of the opening as shown in the literature.

We keep the stove and sink cutouts, but bring the customer two small, finished cutting boards from the same dye lot. This way we have something nice to give them when we're finished with the job. And because they'll use the cutting boards, there is more likely to be a matching piece of stock available on the site if for some reason we have to seam in a patch at a future date. ■

Ryno Wretling is the owner of BYGG, Inc., a Greenbrae, California-based fabricator. Wretling, a native of Sweden, has contributed many details and procedures to Dupont's fabrication manuals.