Preventing Cracks in Solid-Surface Countertops

by Russ Lee

Some years ago, I installed a small section of solid-surfacing that, by all rights, should have served as a hardy worktop for several decades. It was located in an out-of-the-way corner of the kitchen, and contained no cutouts or heat-producing appliances. It was also well supported on all four edges by secure and level cabinets. Yet the very next day, when the homeowner laid a couple of heavy books on the top, it cracked — splitting it right through the middle.

Stress Risers

Upon close examination of the countertop, I found that, in the course of fabrication, I had pieced and glued together strips of material to build up the front edge and had left a void in one of the joints. This tiny gap was barely wide enough to slide in a piece of paper, yet it acted as a focal point for the stress introduced by the weight of the books and became the straw that broke the countertop's back. I had created what we refer to in the industry as a "stress riser." This term refers to any error in fabrication that will cause a stress crack, including voids in a seam, square inside corners, or even something as small as saw marks in a cooktop cutout.

Lenny Elbon, a research chemist for Fountainhead, explains how stress risers affect solid-surfacing: "A good example of the effect of stress risers is demonstrated with glass, which has very high strength, provided the sample is smooth and defect-free," says Elbon. "But if the surface of the glass is scratched, the strength is greatly reduced. That is why glass cutters always score a glass pane before breaking it. The same thing happens to solid-surface."

This is not to say that introducing a scratch on the surface of a finished countertop installation will cause any damage other than a cosmetic blemish. But it does explain why solid-surfacing fabricators may appear almost fanatical about identifying and eliminating stress risers in their countertop installations, taking care to sand smooth any chips or cracks that may have occurred during fabrication, and easing all inside corners with a minimum half-inch radius (see Figure 1). It's also the reason why all cutouts are made with a dust-churning but smooth-cutting router instead of a jigsaw. The jigsaw produces less dust, but its saw teeth would leave microscopic cracks, or stress risers, in the material. In fact, just about anything that creates a sharp corner or crevice in the solid-surface material has the potential to set up a stress riser.

Thermal Effects

You may already be aware that solid-surfacing absorbs heat and cold readily,

Inside Corner Cutout

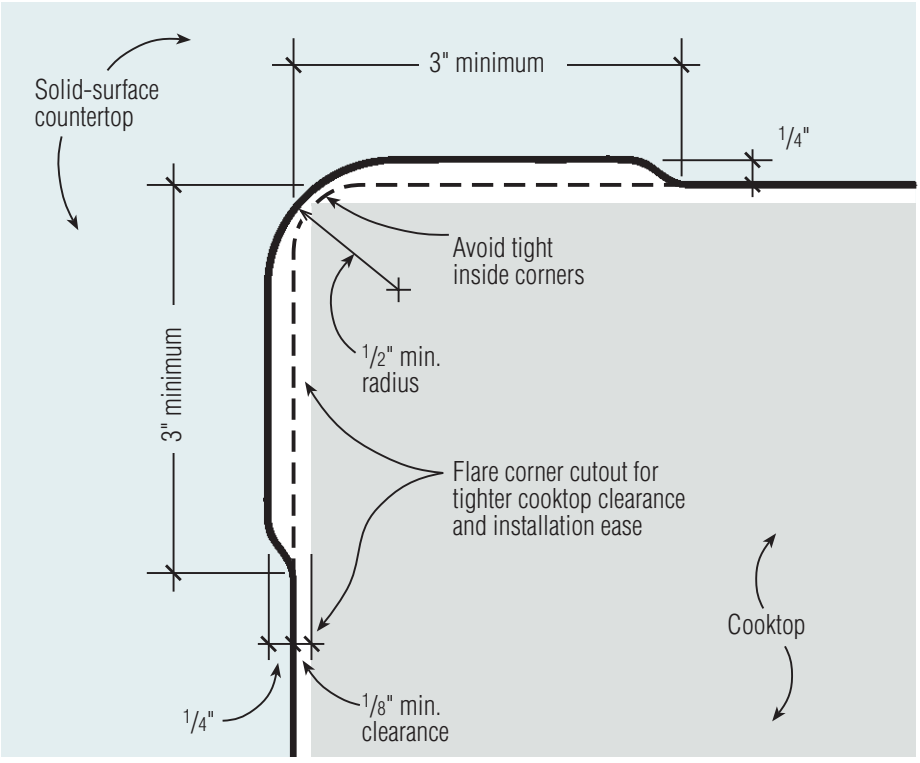

Figure 1. Abrupt angles in a cutout give release to internal stress in solid-surface material, resulting in cracks. It's critical to radius the corners of a cutout to prevent cracking.

Figure 2. Square blocks of solid-surface material are glued to the underside of the counter (above) to reinforce the corners of the cutout (right).

Figure 3. Two layers of special aluminum conductive tape, applied to the perimeter of a cooktop cutout, help deflect cooktop heat away from the solid-surfacing and into the supporting cabinet box.

and it will expand or contract in direct proportion to its temperature. An extreme example of this phenomenon is the Alaskan fabricator whose 10-foot-long countertop shrinks by 1/2 inch on the trip from his shop to the job site during a period of bitter cold. After acclimating to normal room temperature again, inside the house, the top will return to its original size.

Should the Alaskan fabricator build stress into the countertop by leaving jagged edges or sharp inside corners at cutouts, the top would never survive such drastic environmental changes without cracking. Even in more temperate climates, solid-surfacing constantly moves in response to temperature, allowing stress to build in the material. This stress can literally break free with disastrous result, given the outlet of a defect, or stress riser.

Cooktop heat. In the case of a flush-mounted cooktop, especially one incorporating a grill or other high-output burners, the heat introduced to the countertop during use will be only partially dissipated in the narrow air space between the appliance and the countertop; the rest will be absorbed by the solid-surfacing. The area immediately surrounding the cooktop will expand, while the more remote area of the top remains static. This creates a situation of unequal forces that will seek release somewhere within the structure of the top.

If all the inside corners are rounded and smooth, and no cracks or fissures are present at the outside edges of the countertop, the stress will distribute throughout the material until it reaches a state of equilibrium. If a stress riser is present, all the unequal forces will gravitate to that spot. The result will be a crack.

Stress-Free Fabrication

The solid-surfacing industry has put a lot of time and effort into developing fabrication methods for range cutouts that virtually eliminate stress cracks. The most popular of these is the "high strength cutout" developed by several solid-surface sheet manufacturers for their certified fabricators (Figure 2, above). This method uses beveled and sanded corner blocks, laminated to the underside of each of the four corners of the cutout. At the same time, the inside radii at these four corners are enlarged. Then the edges of the entire cutout are beveled, top and bottom, and sanded smooth. Finally, a minimum of two layers of specially designed heat-reflective tape are applied to the top area of the countertop that is covered by the appliance flange, and draped inside the cutout and allowed to hang freely below the surface of the deck (Figure 3). This heat reflective tape acts as a type of radiator fin, or heat sink, which helps direct heat into the surrounding air inside the cabinet box, where it can dissipate more rapidly.

This type of stress-busting cutout is best built under the controlled conditions of a fabricator's shop. You'll need to provide the fabricator with all cutout information and preferably the appliance itself, before he starts production on the top. If you ask him to wait until

delivery to make his cutouts, you are asking for trouble.

It's also a good idea to consult your fabricator about the range of options when you have to deal with a difficult installation, such as a cooktop whose flange is only 3/8 inch wide or smaller. The solution may be to use a decorative steel or tile flange around the perimeter of the cutout, or even a layered solid-surface ledge (Figure 4). Anything that allows the fabricator to build in a generous radius will help.

The same principles apply to the fabrication of any inside corner, as when you wrap solid-surfacing around architectural moldings and cabinetry, or when you hard-seam backsplashes to a countertop deck. If you build a radius into the designs, the finished product should last indefinitely.

Russ Lee *is a former solid-surfacing fabricator, and the editor of* SolidSurface Magazine.

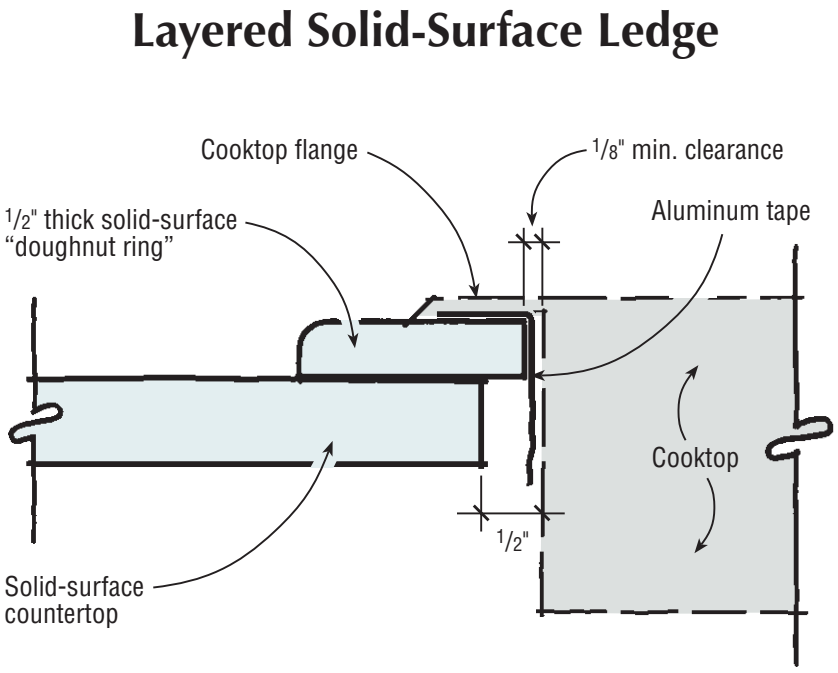

Figure 4. A decorative solid-surface "doughnut ring" provides one custom solution for a problem cooktop whose narrow installation flange doesn't permit sufficient space around the appliance for cooling airflow. Small blocks of material elevate the appliance and permit air to circulate.