These solid surface sinks were created by Grifform innovations through the use of thermoforming.

Right Around the Bend

Thermoforming offers promise for solid surface fabricators

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With customers requesting increasingly complex designs in solid surface, fabricators are searching for a solution. Thermoforming may provide the best answer to these and other problems.

We have all seen how much and how quickly business changes today, and thus we are acutely aware how diligent we must be to meet those changes. But when looking at means to grow our existing business opportunities, products and capacities, the answer may be found right around the bend.

First, let's look at what the solid surface industry has been up to for the last decade. Many went into the surfaces industry as a sideline from the cabinet, millhouse or laminate countertop industries. Whatever our past might be, we are likely to see even more change as we launch into a new century of surprise and innovation. Most of us could not have predicted the major advances in Internet, CNC, CAD or even telephone communication, to name a few, that this generation has experienced and how they have changed the way we do business. So what can we expect? More importantly, what can we do to influence the way the world views our products and industry? It wasn't long ago that very few customers had any idea what solid surface was, much less the vast benefits that it offered. The fact is, solid surface is possibly one of the miracle products of the 20th century when taking into account the impact it has already had. What plastic laminate did to form and function in the '50s and '60s, solid surface has already surpassed.

Times Are Changing

As we become more serious about being better craftsmen, business managers, salespersons and marketers, we have to learn to do more with less as well as keep up with the pack. Even a cursory look at our equipment shows that change is constant, and yet our ideas still sometimes lag behind. "That's the way we've always done it" is a sentence of doom. So what can we do to move into a new frontier? Soft forms as well as gentle and graceful shapes are what seems to be the new trend. Square, blocky, structured, harsh and/or hard are all words that could be used to describe solid surface at the beginning.

Then came the computer age, and now what we didn't do because of complexity before we do easily with the simple click of a mouse. CNC has forever changed the world of today's craftsmen. One of the many advantages of solid surface is the character of its soul. It speaks to its beholder with a spectacle of color and dimension. It responds to heavy use as if challenged to stand up to the task. It rejects the most penetrating stain as if to say, "Begone!" and yet it is as warm and comforting as any material made by nature. Let's now examine its heart: what makes this material is resin, filler and color pigments, all uniquely blended to create a material that has a glass transition temperature we can reach with ordinary equipment. This presents us with a gateway to a new solid surface dimension — thermoforming.

The Advantage

Thermoforming is a convenient means to create new shapes and forms we wouldn't want to try laminating. Besides the time required for the layers, the quantities of adhesive alone in laminating send the project's

cost to the moon. Thermoforming allows us to use much less to achieve the same result. Remember all the radius corners that created vast amounts of cutting board and coaster materials? Remember the weight of that top with the 5-in. bull nose ticket counter that took four men and a forklift to load onto the truck? Not anymore! I can hear your reply: "What is this adventure going to cost? I have kids to educate and I want to leave the plant this summer for a trip!" Believe me, I have the same concerns. But just as we have learned how to use spreadsheets to examine accounting realities, we can also examine potential. Now you can be the judge for your particular application. Examine the prospects and see if they hold benefits. So you've made it this far — what next?

The Learning Curve

Well, let's first examine the properties of thermoforming. I myself didn't start out with all the benefits we have today; I had to wait for an opportunity. It was Saturday and my wife and daughters were out for a day in town. My wife's nephew was working for us at the time, and we got the idea to explore some wild and reckless adventure on the battlefield of the kitchen. On the menu was solid surface and the recipe was straight from the material training bulletin: Heat until soft and spread onto the form of choice. Without much preparation we soon learned that it was a challenge to hold onto and soon found several pieces on our vinyl flooring. Did I mention that potholders are difficult to use in holding on to that newfound rubbery substance? We learned that cool forms chilled the materials quickly, so back into the oven. It seemed that we could work faster if we turned up the heat so we just turned it up (you guessed it) all the way to high. We just worked faster from then on to accommodate our naiveté. I had to assume all responsibility from that point because I was the adult in the situation. The ins and outs of this episode were intriguing, and I learned a lot about what not to do. By late afternoon the kitchen was clear of all evidence of the adventure that had unfolded only minutes before. All seemed normal as my wife and daughters walked in with all the things they bought in town. And then it happened: They looked at each other, and then at me (my nephew had wisely departed earlier in the trauma of battle) and I was quickly exposed. As those strange and quizzical looks flashed between them, I tried to look innocent. Then my dear and understanding wife asked "What is that awful smell?" Well, learn from my misfortune and remember to open the windows and doors! That day has been a constant reminder to me that you can't move forward unless you step outside the familiar. I have never looked back with regret but only studied the possibilities and recorded what works and what doesn't. Equipment can be as varied as materials, and techniques can change things to a point where they are not recognizable.

A Beginning

Many things affect thermoforming: temperature, molds, feed rates, cooling times, and even agility. Where to start? First of all,with an understanding of what you are trying to accomplish. The objective will determine the path. For the simplest projects it is easy to cut out a form and simply bend by hand the part over the mold and either clamp or weight it into place to hold the part until it cools below the glass transition point. Then slowly return the material to room

More complex 3-D forms such as this shower pan are possible through thermoforming

temperature, which will allow you to handle it comfortably. This is a good sign that it is time to start the next segment of your task in fitting the part into or onto your project. At this point it can be treated just like any other part to be cut, planed, glued or sanded. You should hardly notice any variation in the material after forming, other than some possibility of some color variation dependent on the material, your temperature and the time exposed above the glass transition temperature. More complicated three-dimensional forms are challenging and require expertise, expensive equipment, molds and a lot of research and development. And in the end, like Thomas Edison, we will learn many things that don't work while finding out what will. All materials are created with different formulas and what works with one will not always work with others. That being said, there are some general rules for material choices. Acrylics and acrylic solid surfaces are in a separate and more suitable group for forming. That is, they have properties that allow them to bend more than the polyester family of materials. Does that mean you can't bend polyesters? No, you can, however to only a limited degree and with differing results. I would consider it hands-off for the beginner because of the negative results if handled incorrectly. I have seen it disintegrate into small crumbs with little value unless you want material for casting into material mixes or some landfill. Nearly all material manufacturers will post the forming temperature recommended. Start there, and just like any chef, make up some recipes as you move along. I have always found it a great help to write it all down as you go because records can be a great deal of help later on. Bending flat stock into curved shapes has a major effect. Push on the part and the long side is being stretched and the short side

If you want a tight radius bend, reduce thickness. Thickness to tightness is a fairly consistent ratio

is being compressed. So the long side is going to be lengthened, making it stretch, which if not done slowly and carefully enough may cause blushing or whiteout. This in many cases means that the part is not redeemable. The compressed side will be tighter than before, which other than some increased thickness is of little consequence. Subsequently the stretched side will likewise be thinner and, if bent too tightly using the largest particulate materials, may even cause the material particulates to pop out. This, if not completely dislodged, can be filled with adhesives and sanded to be repaired. However, don't expect fractured material to retain its full function. Thickness also affects the capacity of the materials to respond to bending. If you want a tight radius bend, reduce thickness. Thickness to tightness is a fairly consistent ratio. I had to learn patience when training my children: "righty tighty," or now, thinny bendy.

Some Dos And Don'ts:

Do not seam before bending. Why? Well, examine what we are subjecting the part to and it will be easy to understand the properties that contribute to the danger of doing so. One of the first rules about solid surface materials we learned when we started fabricating was that the material expands when warm and shrinks when cool. You might remember the general rule is 1/8 ft. per 10 ft. for expansion. During manufacture, acrylic materials are rolled out onto a line from a blender and spread into a continuous sheet. The nature of this process creates a longitude property to the material. In simple terms, it has a built-in structural difference on the long dimension as opposed to the short dimension. This difference affects the shrink when heated and cooled following thermal forming. That alone should be enough reason not to seam before bending. I have known companies that insisted they have not had any adverse effects doing so for years. However, have they ever considered that the adhesive is not made with the intent of being warmed to such extremes? If it does survive the initial stress, I can only imagine the result of someone bumping that edge with a heavy article. Again you are the judge, but should you take the chance?

Do expect some disappointments. Not everything will work for your set of circumstances. That means we must always apply what we have learned and adjust to the conditions. Planning is a must if you expect to regularly succeed in thermal forming, as it requires discipline to master the techniques.

Do avoid shocking the material: It's a good idea to preheat your mold or forms if possible to avoid thermal shock, which can add a considerable amount of internal stress. I think most of us have seen what a nasty thing stress can be on solid surfaces. It can cause what seems and looks like a normal solid surface part to explode, similar to a piece of tempered glass — not a happy day for that particular customer.

Do rebend if possible: One redeeming value of solid surface is that sometimes you can start over by simply reheating and beginning again. Remember that some of the original integrity may be lost in the process, so proceed with caution.

A New Frontier :

I would hope to see your results in thermal forming provide you with new product opportunities. This new frontier will allow us to see that with imagination and fortitude we are going to enter new galaxies of opportunity. Forming can make us more creative, and produce results more affordably. Big opportunities generally start with small ideas and massive amounts of determination. It should be interesting in the next decade to see where this all will take us. As for me, I expect to be in the thick of the challenge. I admire those who have been the pioneers in this avenue of fabrication and with respect and appreciation herald their contributions to an advancing and inspiring industry.

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