SOLID SURFACE Matters

'Know When To Hold And When To Fold'

By Dwight Griffin, Grifform Innovations Inc. • Sometimes it can be hard to know whether it is better to approach a project from the front or the rear. Or maybe you can find a new shortcut or route to work. While on a recent trip we were navigating in an area we hadn't visited in several years and the city had been in a constant period of growth and expansion. Things were vaguely familiar but clearly not providing us a clear and distinct view of exactly which way we had traveled before. However, I used a descriptive approach to satisfy my traveling companion's exasperation. Simply stated, all roads lead to our destinations if we combine the right number of turns along the way.

It certainly is true that there are many ways to skin a cat, as the familiar statement suggests, and so it is in our craft. When asked to provide this article on the subject of "when to thermoform or not," I was sure there would be many disputable arguments on the subject and all I have to support my remarks are the experiences of my past and what I have learned from my successes and failures with the thermoforming process. I need to clearly point out that I have never explored all the possibilities or prospects, but have simply built on what I and others have found effective and have learned from those experiences.

Having provided a reference point, let's jump in. What makes one approach to any project better or more appropriate than another has to be the result being sought. If it is the fastest and least expensive, if it requires a substantial investment in equipment or maybe almost none at all, and then add to that foreknowledge, all are subjective avenues that have to be considered. Anyone have an optimizing program? What are the basic criteria that have to be supplied to start any optimization? The method, how do you want the project processed, least material waste, least labor expense, is the material directional or non-directional, smallest parts size allowed, largest parts range . . . all these critical issues will determine the best answer, which very likely could and would all be different.

I have read some of the different forums on the subject of thermoforming and have heard of disappointments and failures as well as a relative number of adventures that have produced reasonable results. Bank all that knowledge and pledge it against your future approach to the subject. So, when should I thermoform a project or build it with ordinary stack applications? Let's establish how or what elements are available for your best successes. What type of heating sources do you have at your disposal? Do you have an oven built for the processing of solid surface, which is built with top and bottom elements and a convection capacity for very even temperature control? Or perhaps a thermoplatens press specifically designed and built to transfer the exact and most direct energy into the material in the shortest and most even means established? These two primary energy sources will be one of the main barriers of entry into this field of production and one will hold advantage over the other.

The materials are undisputedly expensive and the prospect of

The benefits of thermoforming can be seen here in a close up of this shower pan.

failure and disappointment can only be made more painful with the financial losses that are contributed by lost materials. Overheating, underheating and uneven heating are all major contributors to basic failure and the need for repeatability. If the project requires larger size parts, then understand, too, that handling the heated parts will require additional fixtures and handling equipment to transfer the large dangerously hot (roughly 340 F) material while now in a rubberized format. When brought into contact with human flesh, burns occur instantly and are a very real and serious safety consideration.

My suggestion, start with small parts and learn how difficult the parts are to handle in a different physical state than you are familiar with. Once the original shape has been altered and the sheet is no longer flat it cannot be returned to the platen heater for reheating. Yes, reheating is very possible and should be explored especially when you cannot get the part to the fixture or mold in time to make the component conform to the mold or shape required. Every time speed and a rehearsal of transfer are an important consideration and should be calculated carefully. Sometimes preheating of the mold must be done in facilitating the application correctly. The best means then to reheat is an oven with a mouth receiver larger than the material shape after the part has cooled in an incorrect form. Reheating then can be accomplished; the materials, if not damaged in the failed process, are subject to another attempt. What kind of damage? Tears, whiteout or fracturing are some of the issues that will deem the material expended from this fabricator's view.

Now, about the shape or size of the part: The fabrication manuals are fast to point out a suggested radius that can be expected with different thicknesses of materials. These are not hard and fast rules and every material and/or color has differing values. What does that mean to you, the thermoformer? Every time you bend a material you should expect a differing result with that recipe.

What is a recipe? When different materials are made, they have differing properties that don't change the fact that they are acrylic solid surface. But let me ask: Have you ever cut different brands and even families of material and smelled a difference in the "fragrance" (some even call it odor, as if it were offensive)? The same differences occur in the binder and filler composition. They have differing properties when heated. The amount of compression, the bend on the small side, and

Thermoforming proved to be useful in the edge treatment seen here.

the expansion, stretch on the long side, are different, and some materials agree better to the new outside forces of heating and bending than others. Simply, some bend better than others and some are less forgiving when variables are applied. Variables? The heat, mold temperature, the speed of conforming and the cooling rate are all variables that control the end result.

I am sure by now questions are being raised as to what does all this have to do with whether I should thermoform or not? Sorry, but I am not finished establishing the criteria that allows us to make this decision just yet. Consider the shape and size. Are the parts bigger than the 30/36-in. limited sheet material size? Can we seam and form after the seamed part has been made? All are good questions.

I have read and heard from fabricators that have practiced this process of seaming before forming, but I have to ask the question: Are you willing to take the chance? It can be a gamble. Let's review the reason for the risk. The adhesives are made with the intent of chemically fusing the material's molecular structures to crosslink the two surfaces together. Most of us know that not all will work equally well with all materials and adhesives, which is what generally causes those seam failures.

Let's suppose we have a good bond and we subject that to excessive temperatures such as in thermoforming. The adhesives could hold up to the process but certainly are not designed with that in mind. Now, let's twist and bend the seam that has been partially chemically fused and further stress the joined material structure. Get the picture? We are really pushing the prospects of distress and in great part adding additional risk of failure, if not right now, in the future. Also consider this: Time does cause change in the properties of the project. Have you ever made seams that were near perfect and years later been clearly able to see the seams? I am suggesting that could be a result of the adhesive properties aging and causing change. Some subscribe to this process of bending after seaming as within the risk zone of acceptable procedure. It is similar to what insurance deductible you would like to carry.

Next, do you have the capacity to shape and cut the materials after forming to join them with good joinery? One more in the list of critical criteria. Some shapes are straight and easy to cut for perpendicular or parallel joints. And I think we all know that joint adhesive isn't what makes good seams — good joinery is. If you are faced with parts that have irregular shapes, they will require additional and sometimes complex joinery fixtures along with clamping devices. Then these, too, are added to the list of critical criteria.

Now we know some of the processes that may or may not be required to answer the question of should I thermoform; and we must ask them, add up the score and make an educated decision. Sometimes the answers are driven by limitations, other times the decision can be controlled by financial situations. I have several projects that have a threshold of cost equations that help make the choice. Do I have to resize the material to ¼-in. thick in order to bend the selected small radius bend that cannot be accomplished using ½-in. thick material? That has added cost that very often changes the financial criteria and rejects the process.

I hope you are getting the picture. Sure we can get it done, but is it reasonable? Reasonable and logical decisions are what make us effective. Yes, I have done the same things I'm sure you have, by doing a project just to show that I could achieve it; but experience does have associated cost and I am the first to add that there is no substitute for experience. It is just how much can we afford and are willing to pay for.

Sometimes it is a matter of looking at all the aspects with an open and clear mind assessing the risk and maybe even gambling a little on the outcome. There was a popular song some years ago by Kenny Rodgers in a movie about an early western gambler where the lyrics tell the story so well. The song is telling the story of the tricks of his trade and how he has to apply everything he knows about gambling. Is that so different from this? He is looking at the situation, the cards he is holding and the ones he by deduction knows are still at large, the players he is challenging and their capacity and wit, the stakes that are being posted and the logical prospect of winning are all being assessed. That is all summed up in this simple repeated line, "Know when to hold and when to fold." I have done it. Sometimes I win, sometimes I lose, but ask yourself this: Are you ready for tomorrow where everything will be made of solid surface? Let's help that day be sooner than later; bend a little and replace a lot. ■

About the author:

Grifform Innovations Inc. has been committed to developing methods and products to replace existing materials with solid surface applications. It provides components to fabricators for allowing the added benefits that others might not have achieved yet or haven't the present capacity. This is helping to expand sales opportunities for the fabrication base by allowing added sales offerings that might have been overlooked before. Dwight Griffin can be reached at 541-496-0313 or dwight@grifform.com.