

Emerging Markets in Thermoforming

— by Michael P. Alongi —

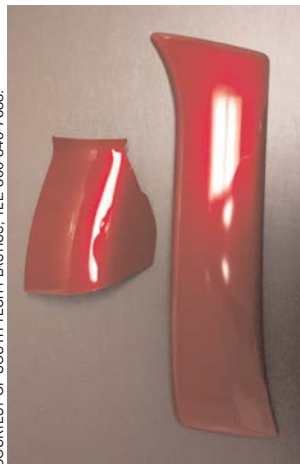
The cut sheet thermoforming market is improving rapidly. Many new markets are being created and applications that were not possible or feasible in the past are now being innovated, offered and in some cases demanded!

These improvements and new markets are being driven by several recent advancements in material, material processing, more advanced thermoforming equipment, more elaborate tooling and of course our industry's ever growing creativity and determination.

As new applications are discovered and implemented it is difficult for every thermoformer to be aware of all the technical advancements. Manufacturers must continually learn from different markets and utilize or apply new technologies. As the market appears to be running at full speed we will briefly explore some of the newer markets or developing markets in the current generation of thermoforming technology.

Paint Films & Decorative Films

Paint films and decorative films continue to gain rapid recognition in the marketplace. The thermoformed product starts with a sheet that is produced by laminating or co-extruding a paint or decorative film onto a heavier gauge sheet (ABS, TPO, Polycarbonate, etc.). These films are eliminating the need for painting and/or decorating, as well as creating new opportunities to replace more expensive materials or processes.



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Wood grain, stainless steel, aluminum, carbon fiber and even chrome finished laminates are allowing thermoformers to manufacture products that have the features and benefits of plastic, but still maintain the same appearance as the material they are replacing. Laminated wood grain materials are being used where wood appearances are required, from automotive interior trim to hot tub or spa cabinetry. Stainless steel and aluminum laminates are replacing high cost metal products in automotive as well as in the appliance enclosure industry. Chrome laminates are replacing heavier, chromed metal products like vehicle bumpers, grills and emblems.

What we refer to as paint films, are films and resins that have been able to achieve a "Class A" automotive quality finish. Meaning processors can eliminate the need to paint products after they are formed. Most popular in automotive exterior parts in the low to mid volume vehicles, these materials offer huge savings when compared to the costs of other processes that require establishing an entire painting process. As the paint films continue to gain popularity in automotive, these films will also start to find their way into other market places that require similar high quality, paint-like finishes.

Foams

From new thermoplastic foam sheet and pre-shaped rigid foam inserts, to secondary liquid foam, thermoformers and foam suppliers are continually developing innovative ways to incorporate foam based materials with thermoformed parts. Although foams have been used for quite some time in the thermoforming process, new foam materials and new foam innovations and applications are pushing thermoformed product uses to new heights.

New advances in foam sheet materials are allowing thermoformers to expand their capabilities. Foams are

being used for comfort in shoe insoles, for sound absorption in interior vehicle applications, as well as for lighter weight and even moisture resistant reasons (like used in automotive ventilation systems). Products that must be light weight, soft and have little rigidity requirements all lend themselves to thermoforming foam based sheet.

When rigidity is a key factor, twin sheet forming is allowing processors the ability to insert pre-shaped rigid foam in between two formed cavities allowing for a stronger more secure product. Floatation devices, plastic pallets and doors are all being made utilizing this process. In many cases the foam allows the end product to be made with thinner sheet gauges by allowing the foam to act as the major structure and reinforcement, rather than the thickness of the plastic sheet. It can also help reduce the finished products weight when utilizing foams rather than thicker sheets or other fillers.

In single sheet forming and pressure forming, different types of pre-shaped rigid foam inserts are also being used for product reinforcement. Since we are not inserting foam between two sheets but rather just to one side, pressure is being utilized to adhere the pre-shaped rigid foam to the thermoformed part just subsequent to vacuum forming. This technology is allowing manufacturers to eliminate the costly secondary foam operations as well as any type of gluing operation.

Substrate Forming/Vinyl Wrapping

The automotive interior market is by far the biggest consumer of these products, but with the ever changing demands in automotive, a lot of new opportunities are being created with this technology in and out of the automotive world.

Substrate forming or vinyl wrapping consists of heating vinyl and forming it over a pre-glued (heat activated) rigid substrate. Once vacuum formed the hot vinyl sheet activates the glue and adheres to the substrate. The substrate can be made from a variety of different materials and or processes but typically depends on the volume. Lower volume substrates can be a rigid thermoformed part, or even fiberglass, whereas in most automotive applications higher volume substrates are injection molded.

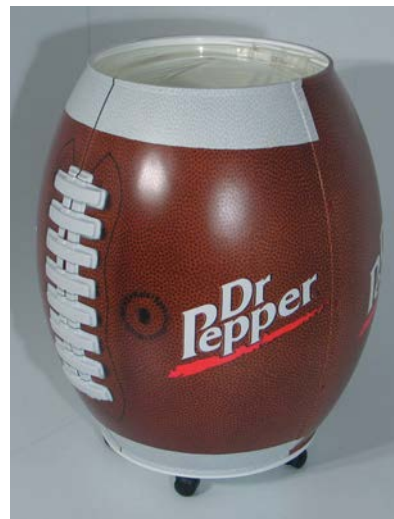
As these applications make their way into the contract manufacturers' facilities we are beginning to see this same technology starting to be applied outside of the automotive interior market. All mass transportation methods can utilize this technology; buses, trucks, RVs and trains, the soft touch leather-like appearances add a higher quality part making final products more attractive and appear higher end looking. In addition to transportation markets, this technology is replacing many other leather wrapping applications, like seat coverings, armrests and even custom carrying cases.

With these opportunities, new manufacturers and new suppliers are working together to develop new methods and improvements to accommodate better processing methods.

Screen Printing/Distortion Printing

Screen printing or distortion printing onto raw sheet stock, then thermoforming it into a 3-D product, has been somewhat of a niche market in thermoforming. New technology is allowing more companies to expand their offerings into this area. Most popular in the display, sign and point-of-purchase industry, screen printing sheet and forming it has traditionally taken an extensive knowledge of both processes to be efficient and profitable. This knowledge was derived from experience and trial and error.

Today, new companies or inexperienced thermoformers can easily and quickly take on these projects thanks to new proprietary software and processing developments. Thermoformers are now able to create these products by utilizing virtually the same standard job procedures they traditionally use. Once the part is designed and molds



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have been made, the thermoformer only has to run a few sheets with grids on them and record their machine settings (so they can run production using these same settings). The now formed blank sheets can be digitized and processed thru custom software which will determine the proper distortion printing parameters.

Once printed, manufacturers can set up the machine as they did for the sample run and create a quality part on the first shot, therefore eliminating the learning curves as well as the entire trial and error process typically associated with the graphic printing. This new software basically turns a difficult, time consuming distortion thermoformed project, into a straightforward affordable vacuum formed part.

Larger Parts

Large part thermoforming is nothing new but manufacturers and OEMs are gaining confidence and are proceeding to replace many large products that have previously been made in more expensive, slower and more labor intensive processes.

In the past, low volume requirements have made it too costly to thermoform some large products. Today some OEMs and end users are finding ways to increase volumes not only through increasing sales but by standardizing some of these larger products. By standardizing, manufacturers can justify the costs associated with large part thermoforming and maintain much more consistency and repeatability.

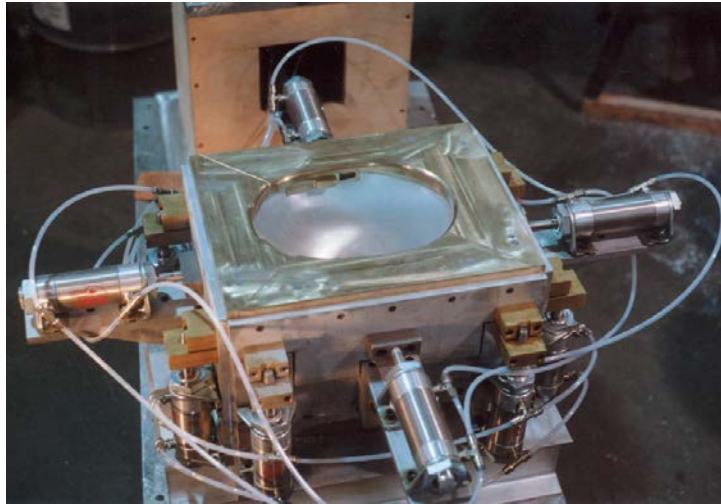
Large fiberglass products are steadily being converted over to thermoforming; from boat hulls, to large bus,

truck, tractor and RV parts. Water drainage systems, holding tanks and other products related to new construction business are also gaining popularity and are being produced in larger volumes. With more and more companies investing in large machinery capable of forming these products, new applications and new markets will continue to develop even further.

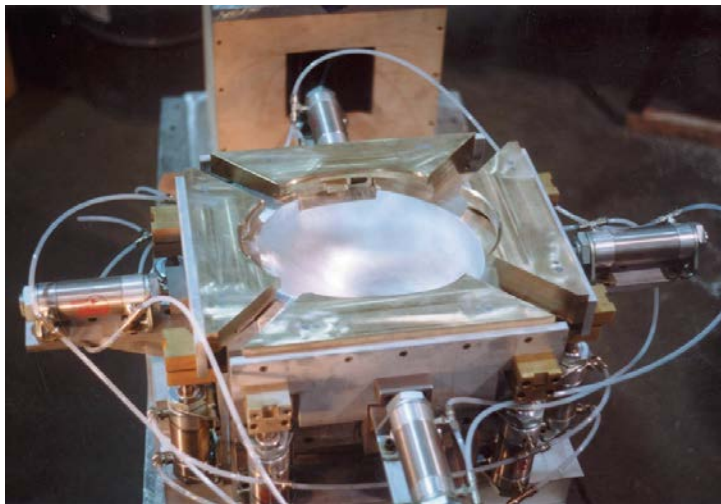
Pressure Forming & Twin Sheet Forming

Pressure Forming and Twin Sheet Forming continue to gain popularity and are becoming much more recognized. Consumers are demanding better aesthetics and more design features in their products that the traditional thermoforming process cannot offer. Many thermoforming manufacturers are quickly adapting to have true pressure and twin sheet capabilities by either purchasing new machinery along with its new technology or by establishing relationships with other companies who already have these capabilities.

As this technology matures throughout the industry, manufacturers are becoming more aware of what these two processes can add to their current product offerings. Even companies who have had these capabilities are learning more from their machine and mold manufacturers on how far these processes can be taken. As new applications develop, new technology will continue to develop with it. Never before have we seen such creativity in mold designs.



"Pressure formed aluminum mold in forming position"



"Pressure formed aluminum mold in de-molding position"

Molds with moving pieces, undercuts, flippers and hinges are becoming somewhat common, rather than specialty projects. Today's pressure forming market has room to grow, and mold design and capabilities will continue pushing out better products more efficiently.

These applications and new markets are all being driven by the improvements our industry is making in materials and machinery. They stem from a combination of straight creativity, finding solutions to product sophistications and the customer demanding more for less. From reducing costs and adding strength and longevity, to increased functionality, today's thermoformers will continue to develop new applications for replacing wood, metal, fiberglass, glass or just replacing other plastic processes. Today's thermoformers are proving the processes wide range and flexibility.

Consumer confidence is increasing and the new advances being made are opening more doors to today's thermoformers and their customers.

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