

White Paper

Flow Bottle Design and Manufacturing

Pack Flow Concepts LLC

David Brown
9 Surrey Lane
Pittsford, NY 14534
585-267-7829

Gene Eckert
23 Briar Ct.
Hamburg, NJ 07419
201 317 5777
eck327@aol.com

Dr. Stephen Derby
172 Lockrow Rd
Troy, NY 12180
518-279-3419 (office)
518-441-6101 (cell)
sderby1@gmail.com

Dr. John McFadden
35 Creek Rd
Wynantskill, NY 12198
518-429-5746

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Executive Summary

An innovative bottle design has been created to address the changing needs of consumers, manufacturers, transportation firms and the global stream of waste products. This patent pending concept consists of novel reusable outer containers with refill bottles of product that allow for a reduction of overall costs and landfill use. Features within the design allow for easy consumer loading of the refill bottles while constraining the refill bottles so as to dispense the last drop. The marketing displays of these refill bottles at local markets and big box stores are also greatly improved.

The Need To Evolve

The packaging arena is ripe for a transformational paradigm shift. Though package designers have changed colors, graphics and overall external images, the core of the product has not evolved for the handling of liquids. Consumers are calling for Green Packaging and material scientists are trying to get blow molded bottles to decompose in landfills after 3-5 years.

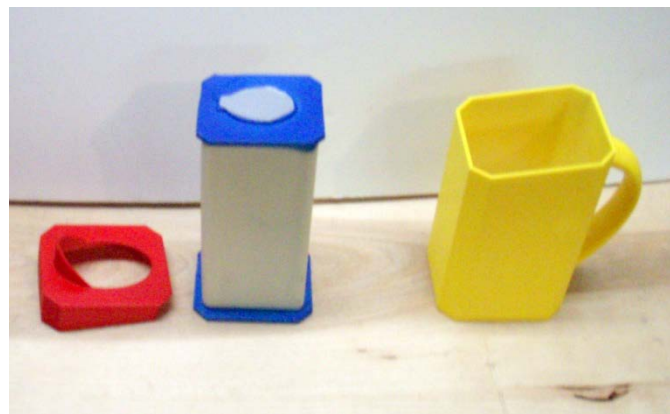
But what about reducing shipping costs of empty blow molded bottles to the manufacturer for filling? Many bottle manufacturers ship empty bottles in bulk and manufacturers are forced to singulated the bottles, placing them upright for filling.

Flow Bottle Concept

The Flow Bottle (Figure 1) has a reusable outer container (this version having a handle), a sliding pour top and a refill bottle. This version of the refill has a silver pull tab for opening. The refill bottle has a top and bottom plate with a lip that creates working interfaces for the outer container and the sliding pour top. The process for reloading the outer container is shown in Figure 2. The top of the outer container would also have slides to align the sliding top (not shown). The bottom plate is slightly larger than the top plate so as to engage with an appropriate sized recessed lip on the bottom of the outer container. This keeps the refill bottle taut so that all of the bottle contents can be emptied.



Figure 1 Flow Bottle – Pouring Version



Sliding Pour Top Refill Outer Container

Versions of the Flow Bottle can be used for:

- Pouring liquids such as drinks
- Pouring viscous fluids such as laundry detergent
- Dispensing viscous fluids such as dish detergent by squeezing
- Dispensing dry products such as cereals or cat litter

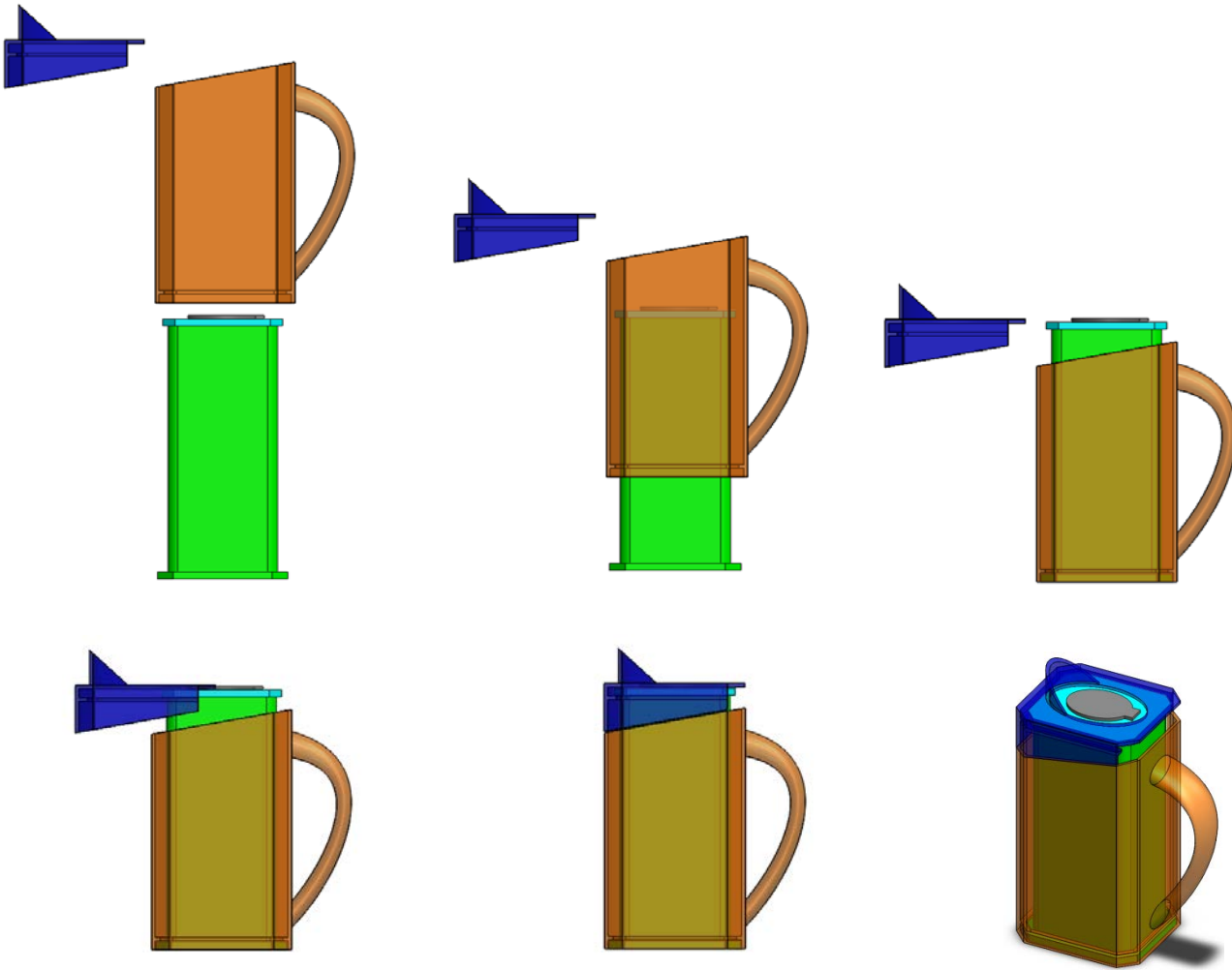


Figure 2 Reloading the Outer Container

The outer container may have unlimited shapes, but could be:

- Rectangular or cylindrical with a handle
- Rectangular or cylindrical without a handle
- Hourglass shaped for gripping and/or squeezing purposes
- Tapered for gripping and/or squeezing purposes

The shape of the outer container does not determine the shape of the refill bottle, nor the shape of the refill bottle the shape of the outer container. The outer container could resemble a current or past blow molded container so as to align with brand recognition (Figure 3). The outer container could contain a window to show how much product is left in the refill bottle, assuming that the refill bottle is translucent.

The sliding top will likely have a seal or O ring to affix the sliding top to the top plate of the refill bottle. This is to limit leakage into the outer container. The sliding top can have:

- Pouring spout
- Pouring spout with reclosable lid
- Nozzle spout
- Nozzle spout with resealable cap
- Multiple locking positions with respect to the outer container

The refill bottle may also have:

- A reclosable lid (Figure 4)
- A recess to allow for liquids near the spout to return to the refill bottle
- An internal taper to facilitate the internal liquids to flow through the bottle opening

The recessed lip at the bottom of the outer container may also have a seal or squishy material to allow for refill bottles to seat properly if the refill bottle is shorter than nominal.

An alternate design has the refill bottle entering the outer container from the top and a sliding bottom would lock the refill bottle into place. A fourth piece, the top for pouring or squeezing would need to be then rotated or slid into place.

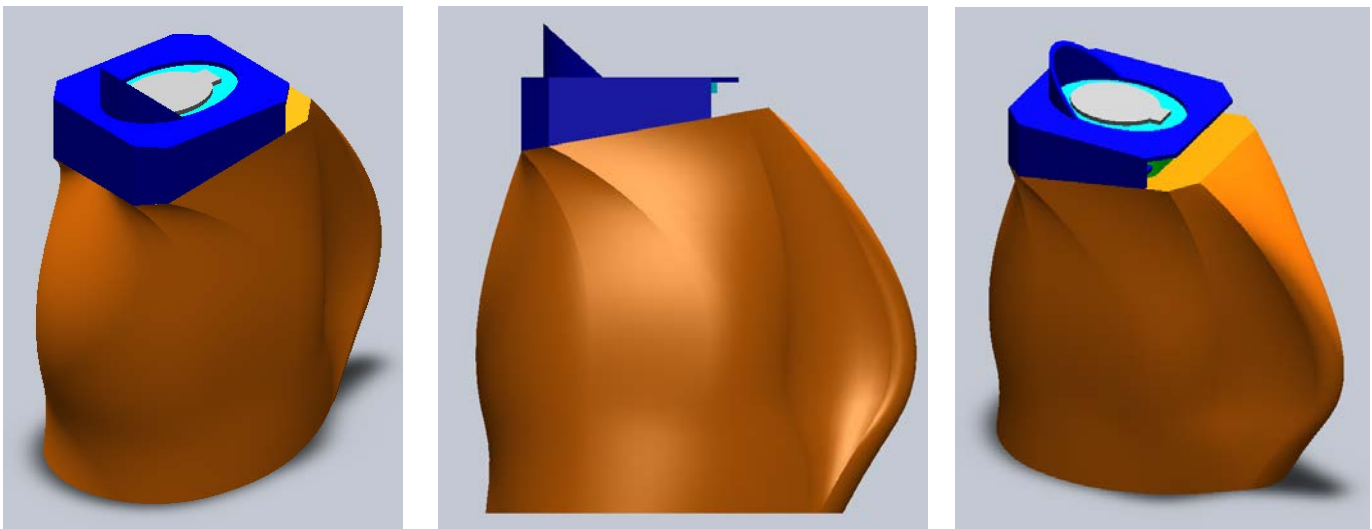


Figure 3 Outer Container For Laundry Detergents

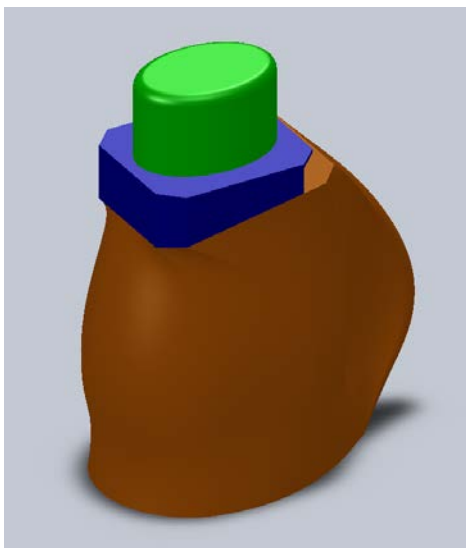
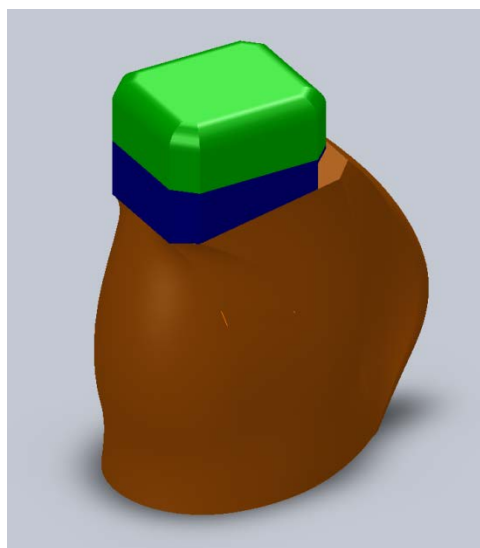


Figure 4 Measuring Cap – Small



Large

Benefits and Cost Savings

There are many benefits and costs savings with the Flow Bottle concept.

1] The refill bottle is anticipated to be made from biodegradable materials. Plus the fact that the refill uses less material than blow molded bottles, the Flow Bottle concept becomes a Green Product.

2] The refill bottles can be shipped to the manufacturer in a compact format, thus shipping costs are reduced.

3] The bottom plate of the refill bottle can be engaged in a recyclable/biodegradable tray. This tray will facilitate:

- Shipping – by aligning groups of refill bottles as members of pallet layers
- Sortation by product manufacturer – no more empty bottle sortation machines
- Filling – trays are used to constrain refill bottles for filling and sealing
- Shelf presentation – grocery store shelves can hold trays of refill bottles
- End of Aisle/Big box store – pallets of trays of bottles can be displayed

4] The top plate of the refill bottle can be used to attach a handle or handles for consumers to lift tray of multiple refill bottles. Handles can later be removed by consumer as each individual refill bottle is used.

How Is It Made

The refill bottle (Figure 5) has a top plate with opening, a bottom plate for affixing to the tray, and a bag or pouch as the product holder.



Figure 5 Refill Bottle

There are several options on how to make the refill bottle.

1] Create a cylindrical bottom bag on a mandrel. Affix bottom plate with hot melt glue. Connect the top plate by heat sealing bag opening to lip on underside of top plate.

2] Create a cylindrical tube and heat seal bottom and top plate to lips on both top and bottom plate.

3] Create a gusseted pouch and heat seal pouch opening to lip on underside of top plate. Affix bottom plate with hot melt glue. Figure 6 shows 3 options of how the pouch can be aligned with the top plate. The third option keeps the pouches attached at their sides to provide more structural integrity. The pouch sides have perforated cuts so as to facilitate tearing one pouch from the neighbor.

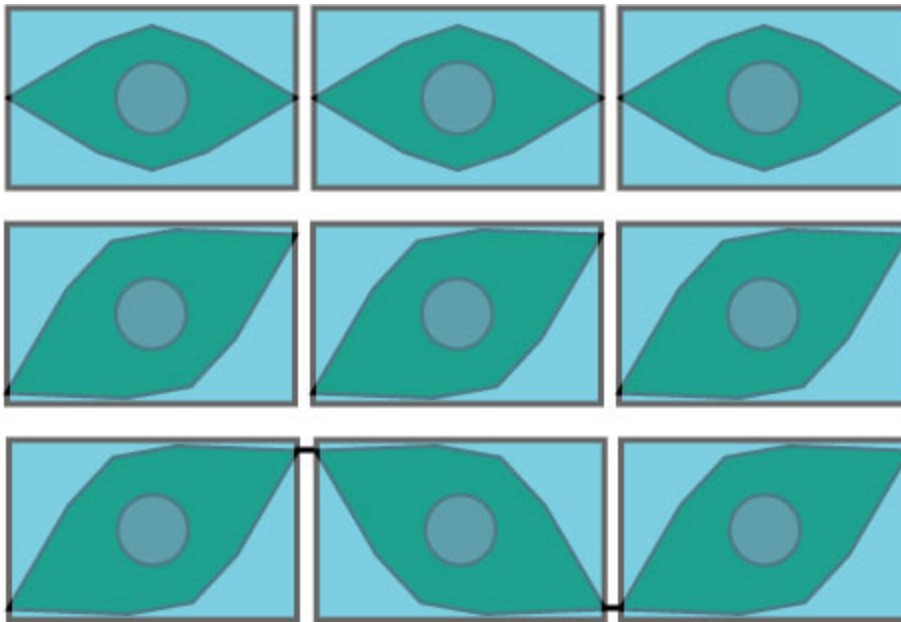


Figure 6 Pouches Aligned With Top Plate – Options 1 Top 2 Middle and 3 Bottom

Packaging Strategies

To understand some of the packaging benefits of the Flow Bottle, one must first understand how blow molded bottles are shipped today. Figure 7 shows the 2 options, stacked in layers on pallets or in random containers mounted on pallets (which require costly machinery to sort and orient for filling).

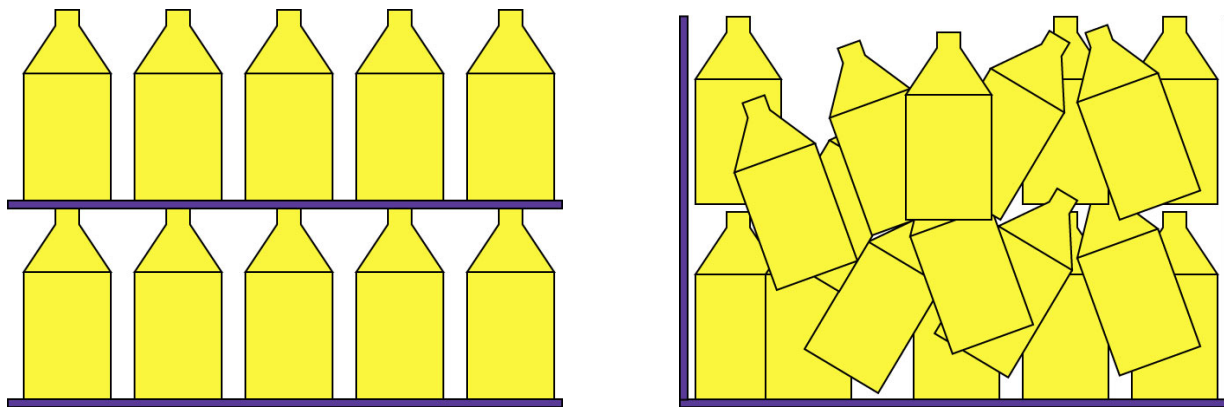


Figure 7 Pallet of Stacked Empty Bottles

Container of Random Bottles

The transportation cost of the empty bottles is determined by the required volume not the weight, so there is a great cost per pound. The machinery to sort and orient bottles uses multiples of hard tooling fixtures for each model of bottle, and the size, cost and volume of these fixtures is not desired by consumer product goods companies.

The Flow Bottle refills are shipped in the collapsed state, first in their tray (Figure 8a) and then stacked on the pallet (Figure 8b). Then the collapsed trays of refills are fed (Figures 9a and b) into the automation, lifted to full height and then indexed under the filling station (Figures 10a) and filled (Figure 10b). Note that the handles at the top plate of the refills is not shown in the following figures for clarity purposes. After filling the tray of refills, the top opening is covered with a pull tab seal (Figure 11).

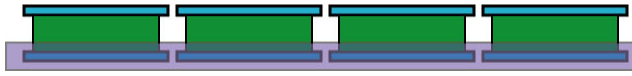
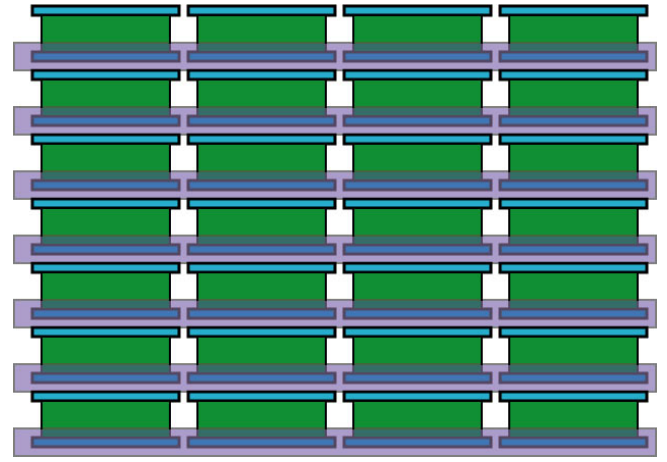


Figure 8 a) Single Tray of Collapsed Refills



b) Stack of Trays on Pallet

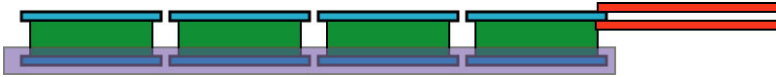
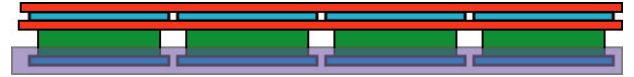


Figure 9 a) Tray of Refills Aligned to Lift Device



b) Tray of Refills Fed Into Lift Device

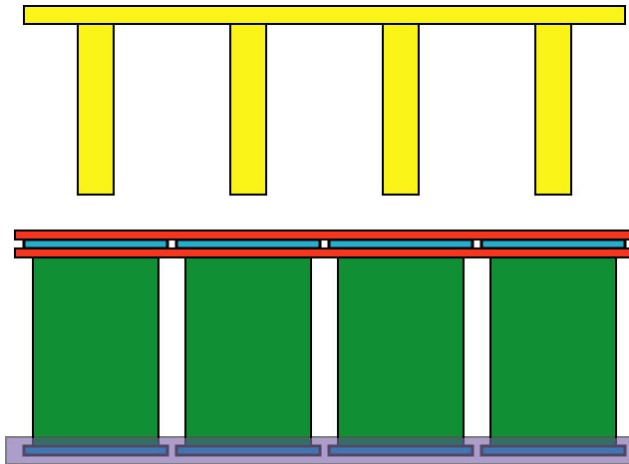
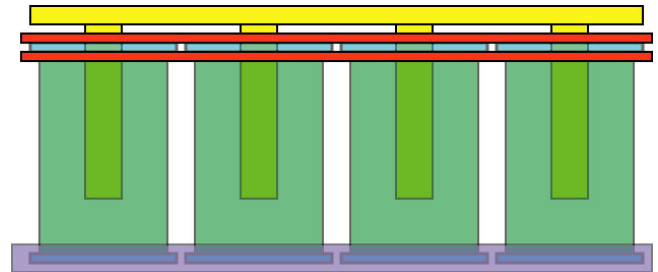


Figure 10 a) Refills Are Lifted And Indexed Under Filling Station



b) Filling Heads Lower For Filling

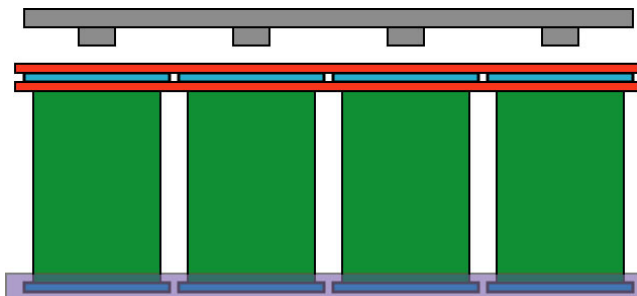


Figure 11 Tray of Refills are Sealed with Pull Tabs

Now the Flow Bottle refills are at full height so the shipping pallets look like Figure 12.

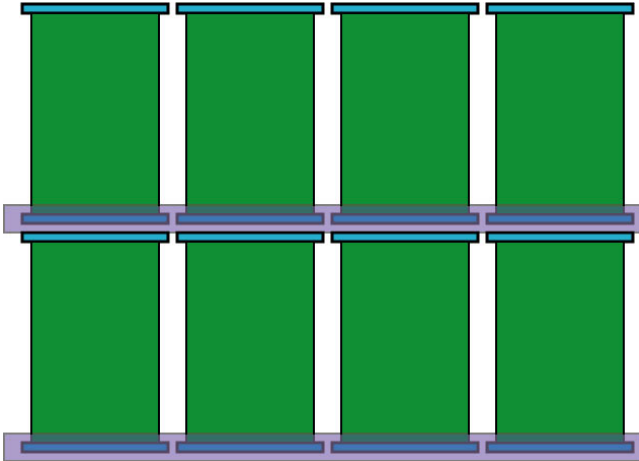


Figure 12 Full Height Refills Shipped in Trays for Store Display and Customer Use

The packing of refills in tray into cases or onto pallets is volumetrically more efficient than that of shipping bottles of current designs. Today's bottles are mostly about brand recognition rather than box-like for maximum shipping effectiveness.

The trays of refills can be loaded onto standard shelves at grocery stores or they could be hung on custom racks or placed onto sloping shelves similar to what is used for milk containers. For big box stores, the display can simply be the pallet of refills in trays so customers pick them up by the handle and go.

Conclusions

The Flow Bottle concept addresses many of the needs of today's consumers and today's manufacturers. From Green Packaging concerns to reduced shipping costs, there are many benefits to this new design. After initial machine development to manufacture and fill the refill bottles, there are cost savings to be achieved.