



# klöckner pentaplast

## white paper

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### **THE IMPACT OF FULL-BODY SHRINK SLEEVES ON THE NORTH AMERICAN PET RECYCLING INDUSTRY:**

*Benefits, Challenges, and Considerations*

#### **INTRODUCTION**

Brand owners of fast-moving consumer goods (FMCG) and the PET recycling industry have been locked into a tight symbiosis for some time now, and the connections between the two industries will only continue to grow. PET bottle recycling has continued to grow since 2002, to the point that 1,718 MM lbs were collected for recycling in 2012, for a recycling rate of approximately 31%.

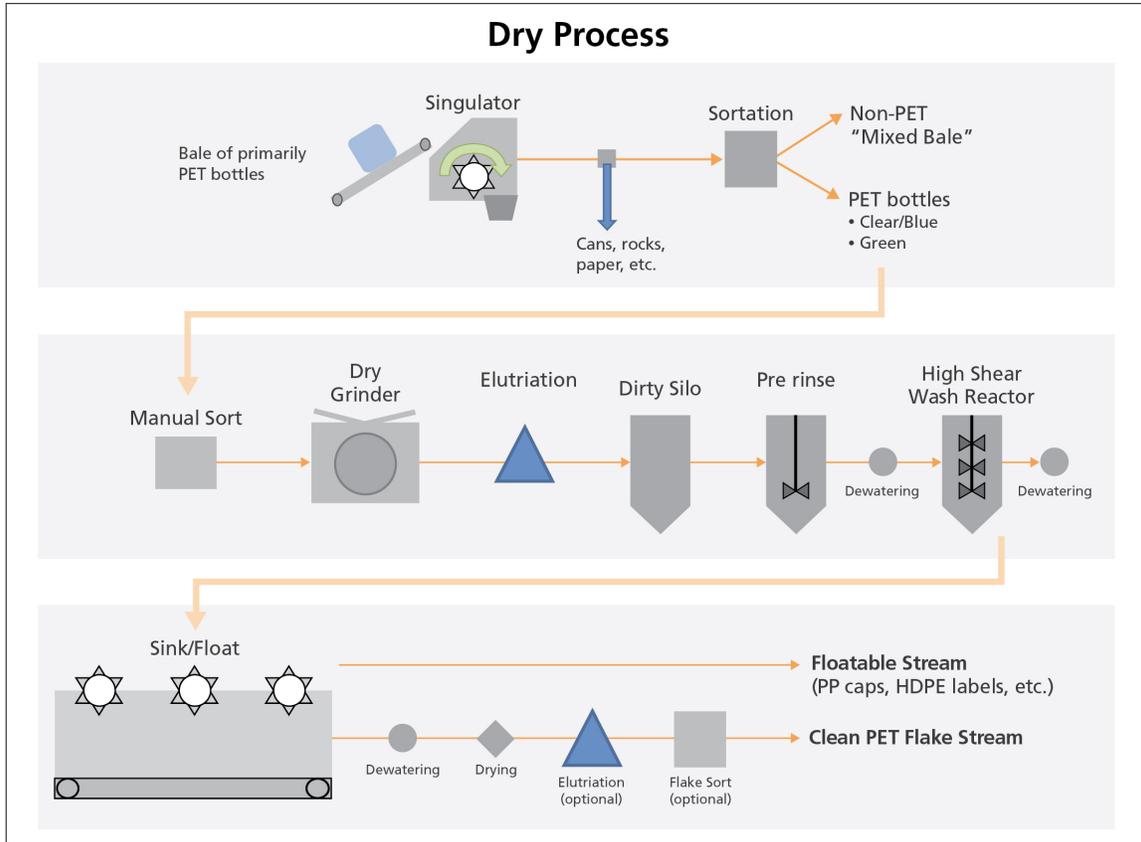
The considerations that drive choices in the two industries are not the same, and can, in fact, be incompatible. The increasing use of full-body shrink sleeves (FBSS) is a case in point. The use of these sleeves provides a variety of benefits to the FMCG brand owners. They are easy to apply; turn the full body of any highly-contoured bottle into a billboard for branding, marketing, and consumer information; and can be printed with eye-catching vibrant graphics, thus increasing shelf impact and, ultimately, sales.

For recyclers, however, FBSS can cause problems. In an industry with very tight margins, some recyclers are encountering difficulties with their existing processes being able to effectively remove FBSS, cutting between 4-7% off their bale yields and significantly reducing profits. In the long term, these issues could affect brand owners' ability to acquire post-consumer PET material for reuse in producing bottles.

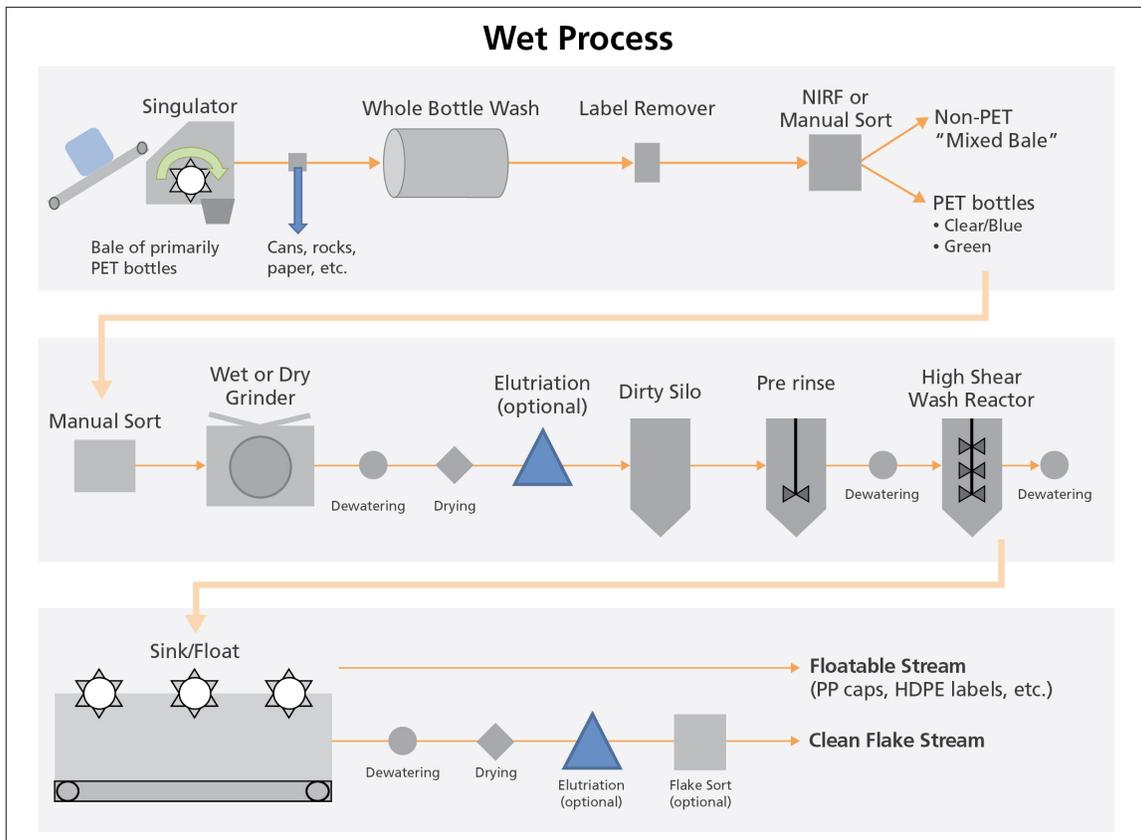
But FBSS present positive financial benefits for brand owners. If the challenges can be adequately dealt with in recycling, FBSS will continue to grow and drive value for both brand owners and recyclers. The purpose of this white paper is to clarify the landscape of options currently available for both parties, and to weigh some of the costs and benefits of each.

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## Dry Process



## Wet Process



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## BENEFITS OF FULL-BODY SHRINK SLEEVES

For FMCG brand owners, the primary benefit of FBSS is increased shelf appeal, which directly translates into increased sales.

- Increases shelf impact of container
  - full-body printable coverage
  - very high, vibrant print quality and graphics
  - allows for eye-catching bottle configurations
- Ideal for promotional marketing campaigns, in particular seasonal promotions, multipacks for bundling products, gift-with-purchase, etc.
- Highly durable – can be used to cover a less expensive or downgauged container
- Allows for the possibilities to enhance barrier characteristics to be included in the label, such as UV and visible light inhibitors
- Optical brighteners are available for improved scanning of tamper-evident features for increased product safety
- Can be designed to be a tamper-evident feature

Although they can present recycling challenges, FBSS also have potential benefits for recyclers as well. The growth of FBSS is driving increased PET container consumption which has and will continue to increase feedstock for the recycler. FBSS do not use glues, in contrast to wraparound, pressure sensitive, and paper labels, resulting in a cleaner product.

## FILMS USED IN FULL-BODY SHRINK SLEEVES

As a reference, the following table represents the predominant label substrates being used in FBSS. While some of these types can be considered floatable, the aesthetic and physical properties of those films are currently considered inferior to today's brand owner expectation. Here is an outline of their performance characteristics as a label:

Substrate	Print	Mechanical	Label Processing
PETG	Excellent	Excellent	Excellent
PVC	Excellent	Very Good	Excellent
oPS	Excellent	Very Good	Good
PLA	Excellent	Very Good	Fair
Polyolefin*	Good	Good	Fair

\* depending on construction, polyolefins can be floatable

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## **CHALLENGES FOR RECYCLERS**

There are many different and unique PET recycling systems being used today. Not everyone is affected by FBSS to the same degree. It is highly dependent on the 'front end' of the system and the type of material being recycled (curbside, deposit, or expanded bottle bill). The 'front ends' are generally considered wet or dry. The wet systems use a whole-bottle wash step first, then grind the material. These systems are particularly prone to FBSS recycling challenges. The dry systems grind the material without doing any pre-wash or whole bottle wash. Generally, these systems have fewer challenges recycling bottles with FBSS. With approximately 6% of recyclable containers in the US now using FBSS, this results in a loss of bale yield for recyclers.

The largest issue creating the relatively poor bale yields (mid 60% for the curbside collection and mid 70% for deposit material) is non-PET material. Recyclers find HDPE, aluminum, paper, and various organic materials which, in turn, need to be discarded at little, if any, value.

Another issue is ink bleed. In the hot caustic wash, the ink bleeds off the label and contaminates the wash solution, which then needs to be decontaminated by recyclers (increased cost and environmental issues). Additionally, staining of the polyester flake can occur, which downgrades flake quality giving a tinted color to the flake, thereby reducing valuable opportunities for recyclers.

Recyclers also have an issue with contamination caused by glues which hold wraparound and some pressure-sensitive labels on the containers. When glue cannot be removed from the flake, it will change the color value of the flake, the mechanical properties of the resin, and can create black points.

## **ALTERNATIVE LABELING FORMATS**

While other labeling formats exist, it seems that they too present problems which may mitigate their widespread acceptance and growth.

- Wraparound: No shrink properties (no contoured bottles); limited billboard space on container; lower print quality (not as vibrant, more haze, less gloss); and, therefore, less shelf impact.
- Pressure sensitive: No shrink properties (minimally contoured bottles); limited billboard space on container; low to high print quality depending upon inks and number of labels per bottle; multiple applicators required for processing; and, therefore, you can get high quality, but it will be expensive and you still don't achieve a 360 degree billboard.
- Direct print on the bottle: Shrink properties are not an issue; billboard space on container unlimited; fair print quality; however, recyclers would consider these containers problematic because the ink would contaminate their products.

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## **SOLUTIONS TO FULL-BODY SHRINK-SLEEVE ISSUES**

The potential benefits of FBSS for brand owners, and, to lesser extent recyclers, have already led to the development of some options to address the recycling issues. Other FBSS enhancements are coming online or are soon on the way. All of them have plusses and minuses that must be weighed by brand owners and recyclers early in the application selection process.

### **Perforation**

Adding perforations to the labels during the labeling process allows recyclers to more easily remove the label during crushing, baling, mechanical de-labeling, and whole bottle wash. Loose labels can then be separated from recyclable content using existing technologies. While it is unlikely that American consumers will use the perforations to remove the labels on a large scale, this process has been effectively implemented in Japan. Brand owners need to balance how easy the labels can/will come off: too easy and they fall off before they get to the consumer, too hard defeats the purpose.

### **Mechanical Removal**

Another option for some recyclers will be to add an additional step to the recycling process that will physically remove the label from the container. Several suppliers already have such equipment available, but it requires extra cost for the recyclers, and extra space, which may not be available for some recycling businesses.

However, this process has been put in place commercially by at least 5 major PET recyclers (plus at least two others), and initial assessments show that it can produce excellent results and an acceptable return on investment. Even at a cost of \$300-400,000 per machine, the 5 or 6% increase in bale yields that can be achieved can make it possible to have an ROI high enough to justify such investment.

### **De-seaming Adhesive**

A unique coating under development that can be added during production of the shrink-sleeve film that allows the label to unglue during the whole-bottle wash. A hot caustic water solution dissolves the bond holding both edges of the label and allows it to be separated easily from the containers. Removal of labels takes place at the same point that other (wraparound, pressure sensitive, etc.) labels are removed with no additional equipment required by the recyclers. There is a small increased cost to this option for brand owners as it requires an additional coating.

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## TO FLOAT OR NOT TO FLOAT

One further consideration with FBSS is coming into play in the market. Some film manufacturers have developed floatable films that will separate during the sink/float tank process. To date, these floatable films have had measurable performance issues compared to traditional shrink films, including:

- lower print clarity and vibrancy
- inability to shrink to the same levels as traditional films
- registration issues during printing
- durability issues
- to date, these films have been more expensive than traditional films

Some brand owners and industry groups are currently looking at the viability of floatable films and further studying their impact on the entire recycling process.

## CONCLUSION

There is no single option that will work for all scenarios. It's likely that multiple solutions will be implemented with the goal of increasing bale yields for recyclers while providing maximum shelf impact and driving sales for the brand owners. All options still should be completely vetted through multiple recycling processes to ensure these solutions work.

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