



## Lightweight Advances in Flexible Packaging: FPA Member Case Stories

### I. Advances in Flexible Packaging Lightweighting

The following are a few examples of lightweighting that has taken place in flexible packaging. These case studies have been submitted by FPA members. Included are examples of advances in flexible lightweighting and case stories of the lightweighting benefits from flexible packaging replacing rigid packaging.

#### cei (Coating Excellence International), 100% Polypropylene Woven Bag

For purposes of this case study, the weight/thickness referenced here is for large 50 lb. format bags. These bags offer the same high quality, protection and durability as the original poly woven bags, while helping customers meet retailer sustainability goals.

The bags are virtually tear proof, puncture and moisture resistant and provide the ability to be used for long term storage. These bags provide pet food companies with reduced damages to products and packaging during filling, transportation, inventorying and throughout the retail life cycle.



Material	Beginning Year	Current Year
Polypropylene woven	0.387 lb. / bag	0.278 lb. / bag
Polypropylene closing tape	0.00851 lb. / bag	Material was eliminated
Polypropylene tear tape	0.00017 lb. / bag	Material was eliminated
Polypropylene thread	0.0066 lb. / bag	Material was eliminated
Heat seal adhesive		Scant inconsequential amount



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**Curwood, Inc., A Bemis Company, bMET™II film (used for fractional coffee filter packs in the hotel and hospitality sector)**

Coffee is a market at the forefront of sustainability and Curwood wanted to provide roasters with a sustainable package that helps them reduce their carbon footprint while still achieving the productivity, durability, printability, and quality that is necessary to protect coffee’s delicate freshness and flavor.



Before bMET™II 2-ply film was introduced, roasters were forced to use 3-ply film for fractional and filter packages to achieve a glossy appearance and protection against distribution that only these 3-ply films offer.

With bMET™II film, roasters can achieve up to 30% source reduction depending on their objectives. Because of the thinner structure, the number of manufacturing processes is reduced by 1/3, saving energy and using up to 30% less material by eliminating the solvent and related adhesives required for laminating a 3-ply film. The 2-ply structure allows more film to fit on a roll (17% more assuming a 16” OD roll), which translates to less diesel fuel usage and lower transportation costs since more film fits on a truck; less downtime for roll changes; and less transportation and warehouse space being used. There are also cost advantages to having more packages on a roll and less downtime. bMET™II film is also incineration-capable.

The new material lightweights fractional filter packs by up to 30% while delivering equal barrier and presentation. The package demonstrates how roasters can use sustainable material alternatives for even high-end filter and fractional packs without sacrificing the product’s appearance, freshness or protection – a bottom-line consideration in a truly sustainable packaging solution. Even for brands already using a 2-ply film structure, a switch to bMET™II can reduce packaging material weight by 10%. bMET™II film also presents an opportunity for foil replacement, which can result in significant source reduction.

Aesthetically, bMET™II film maintains its glossy appearance throughout distribution, despite repeated handling. The film reduces flex cracks and abrasions to maintain an upscale appearance all the way through product usage.

Material	Beginning Year	Current Year
High-barrier 3-ply metallized structure with a sealant layer has now become a 2-ply high-barrier metallized blown film structure with the barrier and sealant properties built into one layer.	2.5 mils	1.75 mils

### Polymer Packaging, Inc., Frozen Food Package

Polymer Packaging, Inc. reduced the sealant web used for frozen food packaging with a coex 3 layer PE film structure utilizing LLDPE and octene to reduce the sealant structure to a 2.5 mil with better performance, hot tack and process speeds. It reduced the PE content 30%.

Material	Beginning Year	Current Year
48g PET/adh to 3.5 mil mono LLDPE/EVA blend	4 mil	3 mil

## II. Flexible Packaging Replacing Rigid Packaging to Reduce Packaging Weight and Energy Consumption

### Ampac, Flexible Refill Pouches

Flexible refill pouches are a more sustainable alternative and have a higher packaging efficiency, delivering more of the product and less of the packaging to the consumer, when compared to rigid plastic bottles. They reduce overall energy consumption, reduce raw material waste, and provide cost effective distribution and storage. Due to their innovative design and structure, flexible pouches deliver more product with less packaging waste regardless of material and recyclability. Flexible pouches not only contain less packaging material by weight, but when empty, they require fewer pallets and trucks for distribution and storage. This saves energy and cost associated with the transportation and warehousing of packaging materials. In addition, every time a flexible refill pouch is reused, it reduces the volume of waste in our landfills.



- 840 empty pouches with spout fitments (1 L) can be stored or shipped in the same amount of space that would only accommodate 30 plastic bottles (946 mL) – a 96% reduction in storage or shipping space.\*
- A flexible refill pouch (1 L) can hold 5% more product than a plastic refill bottle (946 mL) with 55% less packaging material weight.
- The packaging efficiency (product to package ratio) of a flexible pouch is nearly DOUBLE that of a plastic container, which means the same amount of product can be delivered with HALF the amount of packaging material - Big savings in shipping costs!
- Two used plastic refill bottles (1.47 L) would occupy the same amount of space in a landfill as 107 used flexible refill pouches with spouts (828 mL).
- A 70% reduction in primary and secondary packaging can be achieved by using a flexible pouch versus a glass jar.

\* Volume in reference to actual product volume, not container capacity.

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### Ampac, Flexible Retort Pouches

Flexible retort pouches reduce the impact of product packaging on the environment by reducing raw material distribution and storage needs, eliminating packaging components (e.g. – labels, caps, lids, etc.) and reducing consumer waste. For consumers, flexible packaging also increases shelf presence, creates more options for “eye-catching” graphics, and can improve the taste and texture of foods due to the reduced heating times required.

- Flexible pouches have 88% less packaging weight than an “old-style” #10 can.
- 354 empty pouches can be stored or shipped in the same amount of space that would only accommodate 12 of the glass jars – a 97% reduction in storage or shipping space.
- Reduced raw material distribution and storage means fewer trucks, less fuel, and less greenhouse gas emissions.

### Ampac, Recloseable Retort Pouch

Ampac has partnered with Tamaya Gourmet to provide a more sustainable alternative for fruits packaged in glass jars. Tamaya Gourmet required 1) an easy-open feature to ensure customers did not have difficulty opening the pouch, 2) recloseability to allow storage of unused produce, 3) good film clarity to highlight the appearance and color of the fruit, and 4) high-quality, modern graphics to convey the premium quality of the product. Ampac provided a recloseable standup retort pouch with rotogravure-printed graphics and incorporated Ampac’s Linear Tear technology for straight and easy tearing of the pouch.



- Only 8 empty fruit jars (32 oz) can be stored or shipped in the same amount of space as 143 empty retort fruit pouches (35 oz), a 96% reduction in storage and shipping volume.
- A retort fruit pouch (35 oz) holds over twice the amount of product with 91% less material weight as compared to a glass jar (32 oz).
- The packaging efficiency, or product-to-package ratio, of the retort fruit pouch (35 oz) is over 14 times higher than the packaging efficiency of the glass jar.
- 918 filled pouches (35 oz) can be transported on a standard 1.2m x 1.1m pallet versus 330 filled glass jars (32 oz), resulting in over three times the volume of product delivered on one pallet.

**Jar vs Pouch Comparison**

Package Format (Product Volume)	Product Weight (grams)	Packaging Weight (grams)	Product to Package Ratio
Rigid Glass Jar (32 oz)	800	250	3:1
Flexible Pouch (14 oz)	400	11.85	34:1
Flexible Pouch (35 oz)	1000	22.68	44:1

The new pouches achieved all of Tamaya's requirements and provided significant savings in shipping and storage weight while also minimizing product breakage. The glass in the current jar format accounted for one third of the packaged product weight. The new retort pouch packaging is less than 3% of the weight of the final packaged product, providing a tremendous improvement in the product-to-package ratio and reducing the cost of shipping. Multiple pouch sizes and SKUs are under development. Retort fruit pouches are a more practical alternative to glass jars because they offer a more sustainable package and a higher packaging efficiency - delivering less excess packaging to the consumer regardless of material recyclability. Pouches reduce overall energy consumption, lessen raw material waste, provide cost effective distribution and decrease environmental pollution. Due to their innovative design and structure, retort fruit pouches improve product-to-package efficiency by more than 90%. Retort fruit pouches also offer added safety to the consumer because they will not shatter or crack if accidentally dropped. In addition, flexible pouches require fewer pallets and trucks for distribution and storage. This saves energy, lowers cost associated with transportation and warehousing and minimizes pollution emissions. Retort fruit pouches reduce the volume of waste in landfills by 94%, which ultimately helps reduce carbon footprint!

#### **Nordenia USA, Pet Food Packaging - Pro Plan Cat Food**

This packaging replaces blow molded jug with lighter weight flexible package in a cube efficient FlexZiBox®.

The total weight reduction from a jug to a flexible package is 88 grams. This is a 71% weight reduction. This also reduces transportation usage by 195 trucks in 2010 and 92 trucks in 2009. Shipping product rather than shipping packaging to the stores. Reduction to Walmart Scores are as follows: 68% CO<sub>2</sub>; 74.7% Transportation, Sustainable material, Product to Package ratio; 52% Cube Utilization; 72% Recycled Content; Recovery 59.3%.



#### **Polymer Packaging, Inc., Deli Salad Packaging**

This application is for institutional Deli Salads. The current packaging is five pound buckets with lids. The customer was looking to solve several problems with the new structure, including cost of the containers, reducing corrugated costs, saving storage space and increasing shelf life. Consumers/End Users were also looking for packaging that took up less space in their storage units and reduced their total trash output.

By going to the new flexible packaging, Stand Up Pouch, solution our customer is better able to reduce warehouse space for packaging materials, reduce corrugated costs by 30%, and increase the shelf life by 3 weeks. Consumers have found that the new packages take up less storage space, are easier to use and significantly reduce the amount of trash created from empty plastic buckets. Reduction in shipping costs was achieved because 30% more product can be shipped on each pallet.

## Robbie, Fresh N Tasty Bakery Pouch

The Fresh N Tasty Bakery Pouch was designed to hold fresh baked cookies, croissants, breads, donut holes, scones, muffins and other fresh baked goods. Bakery Pouches offer consumers value-added benefits that were not available with rigid containers. A proprietary zipper for easy reclosing and a custom film structure keep baked goods tasting fresher, longer. A handle at the top of the pouch allows consumers to easily carry the product and a large window gives a clear view of the fresh baked goods for easy identification. Printable pouches offer retailers custom graphic designs with dynamic color imagery to help build brand equity, increase consumer appeal, and increase impulse sales.



Based on a preliminary Life Cycle Assessment (LCA) the following data was determined based on the flexible Fresh N Tasty Bakery Pouch versus a rigid clamshell container. The study basis was one truckload of flexible pouches at 780,000 units.

### Manufacturing Process

Our study quantifies the physical raw material usage, in regards to crude oil and the amount of carbon dioxide emissions (CO<sub>2</sub>).

- Packaging by weight (in grams)
  - 41.31 Rigid Clamshell
  - 12.74 Fresh N Tasty Bakery Pouch - flexible package

This calculates to a reduction of 69% of solid waste introduced into landfills.

- Energy Used in the manufacturing process of 780,000 flexible pouches compared to rigid clamshell.
  - 87% less Coal
  - 74% less Natural Gas
  - 64% less Crude oil

Approximately 79% less CO<sub>2</sub> is emitted during manufacturing of the flexible package compared to a rigid clamshell.

### Distribution Process

Pouch dramatically reduces transportation CO<sub>2</sub> emissions as calculated below:

- Savings calculation of CO<sub>2</sub> per truck load
  - 1 pallet Pouches = 65 cases (250 pouches to a case) (16,250 per pallet)
    - » 1 truck load holds 48 pallets or **780,000 pouches**
  - 1 pallet of rigid clamshells = 30 cases (250 clamshells to a case) (7,500 per pallet)
    - » 1 truck load holds 24 pallets or **180,000 clamshells**
    - » It takes **3.3** more trucks to ship the equivalent rigid clamshells to the flexible pouch
    - » Fewer trucks mean a savings of 77% CO<sub>2</sub> and reduces diesel fuel consumption by 77%.

## Robbie, Fresh N Tasty Produce Pouch

The Fresh N Tasty Produce Pouch was designed to hold fresh cut fruit and vegetables and to offer consumers value-added benefits that not available with the 2-piece rigid container. Benefits include a bottom gusset that helps keep the fresh cut produce away from the purge for a more appealing appearance and holds the package upright preventing spills. A proprietary zipper placed above the large viewing window, guarantees closure and gives the consumer an easy open/close feature for sealing in freshness during storage. A handle at the top of the pouch allows consumers to easily carry the product.



The pouch has laser micro perforations to control the oxygen transmission rate of the package structure, allowing in only the appropriate amount of oxygen to best maintain the quality of the fresh-cut produce. By effectively slowing the respiration rate, this process improves the consistency of the produce quality throughout its shelf life giving the consumer a better tasting product.

Based on a preliminary Life Cycle Assessment (LCA) the following data was determined based on the flexible Fresh N Tasty Produce Pouch versus a rigid 2-piece Container – Cup & Lid. The study basis was on 2M packages.

### Manufacturing Process

Our study was done to quantify the physical raw material usage, in regards to crude oil and the amount of carbon dioxide emissions (CO<sub>2</sub>).

- Packaging by weight (in grams)
  - 27.02 Rigid 2-Piece Container, Cup & Lid
  - 11.98 Fresh N Tasty Produce Pouch - flexible package

This calculates to a reduction of 56% of solid waste introduced into landfills.

- Energy Used in the manufacturing process of 2M flexible pouches compared to rigid 2-piece container.
  - 86% less Coal
  - 66% less Natural Gas
  - 44% less Crude oil

Approximately 71% less CO<sub>2</sub> is emitted during manufacturing of the flexible package compared to a rigid 2-piece container.

### Distribution Process

Pouch dramatically reduces transportation CO<sub>2</sub> emissions as calculated below:

- Savings calculation of CO<sub>2</sub> per truck load
  - 1 pallet Pouches = 65 cases (250 pouches to a case) (16,250 pouches per pallet)
    - » 1 truck load is 48 pallets or **780,000 pouches**
  - The rigid container is comprised of two pieces – a cup and lid

- » 1 pallet of rigid cups = 25 cases (500 cups to a case) (12,500 cups per pallet)
  - 1 truck load is 24 pallets or **300,000 cups**
  - It takes **2.6** more trucks to ship the equivalent rigid cups to the flexible pouch
- » 1 pallet of lids = 40 cases (500 lids to a case) (20,000 lids per pallet)
  - 1 truck load is 24 pallets or **480,000 lids**
  - It takes **1.6** more trucks to ship the equivalent rigid lids to the flexible pouch
- It takes **4.2** more trucks of cups and lids combined to equal one truck of flexible pouches.
- Fewer trucks mean a savings of 77% CO<sub>2</sub> and reduce diesel fuel consumption by 77%.

### Sealed Air Corporation, Cryovac Food Packaging Systems, Retail Beef Roasts in Cryovac Grip&Tear® Bags

Driver for change to a Cryovac Grip&Tear® bag is the need for minimizing waste at retail while adding convenience to a merchandise-friendly package.

In an alternate setting, retailers receive product in bulk which requires trimming and packaging product at a store level resulting into a labor-intensive process that leads to more retail waste.



In a tray/lid format, you would have more purge, re-work, potential stock outs and leaks in the counter as well as more weight eventually going into landfill.

Food that is wasted before it is consumed requires ten times more energy and materials to produce than the packaging used to protect it.

The Grip&Tear® bag minimizes food waste and is hence a more sustainable packaging format.

Cryovac® barrier bags present an optimal solution to overwrap trays as they allow for a reduction in packaging materials while at the same time offering consumers a more convenient and attractive package.

The extended shelf-life and the leak proof aspect of this package decrease food waste and waste at shelf; the easy-open feature of Grip&Tear® bags is safer and easier for the consumer to handle at home.

In addition to arriving at a solution that reduces materials, it is also less labor intensive at the store level as no trimming or re-wrapping is necessary.



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