

Innovating to minimize packaging impact and doing as much as with as little as possible benefits the environment, business success and branding efforts.

doing more with less

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IMPACT POINTS

- There has been a significant increase in the number of starch-based plastics available for packaging applications.
- Innovative printing processes have allowed traditional effects to be achieved without the use of traditional materials.
- After material reductions have been achieved, sustainability turns to Cradle to Cradle, a methodology that encourages that packaging enhances the environment and human health.

While recently leading a workshop on sustainable cosmetics packaging in Paris, the question again arose, “What is the most sustainable material that we can use?” Those who have worked in sustainability for some time will always give the safe answer of “it depends,” as in “it depends on what you are trying to do with your packaging and what sustainability attributes you are trying to meet.” Different materials will be the best choice depending on whether you are trying to have the packaging recycled, composted or kept for a second use—or to ensure the minimum of damage to the product it contains so that you don’t have to send a second one.

The second answer to this question of the most sustainable material is “less.” Whatever you are using, try to use less of it—whether it’s virgin paper or plastic, ink or coatings. A good example of this was the recent launch of the Clever Little Bag, the new shoebox concept from athletic wear brand Puma. After months of design work and assessment of the entire production, use and disposal cycle of the iconic red Puma shoe box, including a full life cycle analysis of the possible options, it was found that the best solution was a radically reduced box that used a recycled nonwoven bag on the outside and a mere skeleton of recycled cardboard to create structure within. This “less” approach saves Puma 65% of the cardboard used in the previous version, as



The use of a recycled nonwoven bag and a mere skeleton of recycled cardboard to create structure allowed Puma to save 65% of the cardboard used in the previous version, as well as 275 tons of plastic bags and 500,000 liters of diesel from lowered transport needs. It also allows for 60% savings in water, energy and diesel consumption on the manufacturing level.

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Achieving “Less”

“Less” is possible in material choice through the use of recycled materials (less virgin plastic). Despite the sluggish economy, 2009 [the last full-year report available as of print time for this feature] was a banner year for the use of post consumer recycled PET in food and beverage bottles, with the highest ever volume recycled, at 203 million pounds (28% of all consumer used bottles). Non-food packaging bottles also had their best year ever, with 65 million pounds.¹ Less can also be achieved through the use of renewable resources in place of oil-based plastics, and there has been a significant increase in the number of starch-based plastics available for packaging applications. Examples range from the large volume addition of starch to commodity plastics, such as PP (Cereplast, eco Plastic by Plantic and Teralloy from Teknor Apex), to biodegradable or compostable resins using starch-based raw materials, such as Mater-Bi from Novamont, Biotec Bioplast 105, Solanyl BP from Rodenburg Biopolymers B.V.

There are even water-soluble solutions from companies such as Plantic that offer a very quick and easy way of disposing of the material—dissolve it in your sink. Starch has the advantage of being low cost (bringing down the cost of biopolymers

from their sometimes unaffordable prices), stable in price compared to the seesawing of commodity prices these past few years and, oftentimes, a waste material from other processes such as food production. Expect to see more starch being introduced as a raw material as its use moves from food to beauty packaging.

Using less has also been a mantra of some of the innovative packaging solutions seen of late, and EcoCradle, a foamlike

cushioning material from Ecovative Design, has been a favorite. An effective replacement for expanding polystyrene custom molded foams, Ecocradle is produced from regionally available agricultural by-products that are high in lignin (cotton burrs, rice hulls and buckwheat hulls, for example), which are used to grow fungal mycelium—the roots of mushrooms. Producing the material is an extremely low energy process because



COURTESY OF MATERIAL CONNEXION, INC.

EcoCradle, a foamlike cushioning material from Ecovative Design, is an effective replacement for expanding polystyrene custom molded foams. Effectively the roots of mushrooms, the entire growing/creation process uses approximately 10 times less energy per unit of material than the manufacturing of synthetic foams, and the product is 100% biodegradable and compostable.

it is grown in the dark, with no watering and no petrochemical input. The organisms grow in seven days, forming miles of tiny white fibers that envelop and digest the seed husks, and bind them to form the final product. The entire process uses approximately 10 times less energy per unit of material than the manufacturing of synthetic foams, and the product is 100% biodegradable and compostable.

Inks and Coatings

In the inks and coatings, innovative printing processes that avoid the use of foils (and thus enable complete recycling of the paperboard by simply de-inking) have shown that metals can be removed from packaging decoration without sacrificing metallic effects. One such process has been achieved by Henkel with its Mirafoil product. This liquid coating consists of tiny aluminum platelets applied by flexographic printing, followed by a UV curing step. An additional colored ink layer is added to create any metallic color, and the coating can be applied to precise areas of the packaging. The ink is volatile organic compound (VOC)-free, and can be printed

onto any smooth, coated paper surface, including recycled paper, and also onto a variety of polymers.

Reducing energy during the print curing process has been achieved by Roland DG of the Netherlands with its UV-LEC 330/300 process, a low-heat LED UV ink-jet printing process that adds texture and relief to prints using less energy. A variety of materials—paper, synthetic and real leather, textiles, foils, BOPP (biaxially oriented polypropylene), PE, PC and PET films with a thickness of up to 0.039 inches (1 mm)—can be used as printing substrates. The equipment used in this technique can also cut complex graphics after printing with an integrated cutting plotter, and the printed films can be stretched over corners and edges without burr formation or tearing. In addition, matte or glossy transparent coatings can be applied. The multilayering of inks added during this process allows for the creation of an embossed surface effect, much like Braille.

For those who want to go one step further than vegetable or soy with their ink choices, Thai company Panorama SOY Ink Co., Ltd. is offering post consumer recycled vegetable oil inks. They consist of 45% post consumer vegetable oil, 21% pigment and 34% rosin; are VOC-free; and have good rub-resistance, high gloss and good color strength. They dry



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Henkel's Mirafoil, a liquid coating consisting of tiny aluminum platelets, is an example of ink and coating alternatives for achieving metallic effects without the use of foil, allowing recycling of the paperboard by de-inking.

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and set faster and have better dot sharpness compared to regular inks, and can be used for printing on paper and plastic.

The ability to thermoform compound curved geometries from paper-based sheets also allows you to do more in terms of shapes and effects, and the Swedish company Billerud has created a product called FibreForm that can do just this. Using FSC-certified wood fibers in a sheet that has good stretchability on thermoforming machines, it is suitable for food contact and can be printed and coated for decorative effect.

The Next Step

Recent innovations in materials for packaging continue to allow more to be done with less through lower impact solutions that simply use less. But what happens then? When you have used as little as you can, for example in Poland Spring's water bottles that use the minimum amount of plastic possible, there is nowhere left to go (assuming you are already using recycled content).

At that point, sustainability turns to the Cradle to Cradle, a methodology that encourages you to do more good rather than less bad by ensuring that the packaging you produce enhances the environment and human health rather than doing a minimum amount of damage.

So improve and innovate as best you can to minimize your impact and do as much as you can with as little as possible. But after that, take a look at how you might redesign using Cradle to Cradle, and consider how you can do much, much more with more to make a positive rather than negative impact on our planet. ■ GCI

Reference

1. www.napcor.com/pdf/2009_Report.pdf (Accessed Dec 16, 2010)

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