A New 4-Step Process for Lowering the Cost and Reducing the Carbon Footprint of Thermoformed Packaging

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When brand owners engage a custom thermoforming organization, they are usually looking for a unique packaging solution— a solution that maximizes package aesthetics, quality, and performance, while minimizing costs. Today, custom thermoforming companies must also have a deep understanding of the essentials of sustainable packaging in order to help customers’ lower overall environmental impacts.

Sustainability expertise must be based on science, evaluation tools, experience, and a corporate commitment to practice sustainable operations. Since 1996 when Dordan Manufacturing first began developing expertise in thermoforming recycled PET (RPET), the company has developed a 4-Step Design for Sustainability Process that helps customers achieve measurable sustainability improvements. This process entails:

- Lower product-to-package ratio
- Materials selection
- Materials reduction
- Sustainability documentation

Two examples will help make clear how Dordan’s Design for Sustainability Process is applied.

**AT&T Go Phone**

AT&T’s Go Phone aims at customers who would rather pay just for what they use and not commit themselves to a long-term contract. The old retail packaging for the Go Phone consisted of an outer RPETG clamshell for rack display, an insert color matched HIPS tray for product presentation, a RPET insert tray lid, and a graphic insert card for consumer information. AT&T/Motorola
came to Dordan through Combined Technologies, Inc. with the goals of reducing the cost of the package and, if possible, improving its sustainability.

Dordan engineers began with the basic design premises of reducing the overall product-to-package ratio. An improved product-to-package ratio offers the potential to lower the carbon footprint of the package by consuming less material. A smaller package also can potentially increase the number of packages per pallet, which means fewer shipments and less overall non-renewable energy consumed and greenhouse gas emitted during shipment.

Using a design that achieved a smaller product-to-package ratio and the same plastic, the Dordan packaging engineers went on to reduce the gauge—thickness—of the clamshell from 0.030” to 0.025” and the inner tray from 0.045” to 0.035”. These gauge reductions further lowered the overall material content of the package. The reduction in gauge was accomplished with no appreciable impact on package performance. In addition to the gauge reductions, Dordan engineers also changed the front of the outer clamshell from convex to flat, thereby eliminating the snap on lid and reducing the overall material consumption further. Figure 1 shows the new Go Phone package—clamshell and tray; figure 2 shows the larger old package—clamshell and tray. Figure 3 shows the larger old package, left, and the slimmer new package right. Clearly the slimmer design will mean more products per pallet and an increased number of units per foot of retail rack space.
Dordan is a member of the Sustainable Packaging Coalition and subscribes to the coalition’s comparative packaging assessment tool COMPASS, which provides environmental profiles of packages based on a life cycles approach. The COMPASS tool gives Dordan packaging engineers the industry life cycle inventory data (LCI) required to scientifically assess the overall environmental impact of a new design. Using the COMPASS tools, it is clear that AT&T/Motorola achieved a package with lower environmental impacts:
The top bar (red) represents the new Go Phone package; the bottom bar (blue) represents the old Go Phone package. The tick marks through some of the bar graphs illustrate the three life cycle phases considered for this environmental assessment: manufacture, conversion and end-of-life.

It is important to note that Dordan's Design for Sustainability Process includes a wide selection of materials for consideration. These materials can be petroleum resins, bioresins, and renewable and manufactured fibers. The COMPASS tools help Dordan engineers evaluate the impact of the choice of various materials on the overall design. It is also important to point out that reducing product-to-package ratio is not always possible. The principles of material selection and material reduction must be used in concert with the other
steps in the four-step process so that all avenues for improvement are explored and maximized.

**TomTom GPS package for the model One LE**

The redesign of a package for the TomTom GPS model One LE provides a case in point for not only reducing material and cost while improving sustainability, but also moving package production from an off shore facility to Dordan Manufacturing in the U.S. and thus saving transportation costs and lowering overall transportation impacts.

The TomTom GPS package presented to Dordan for redesign was a large outer clamshell for retail rack display and two thermoformed full-size insert trays with an upper pocket to display the GPS unit and a lower compartment to hold the accessories. The outer clamshell was made from 0.030” RPETG; it weighed 100.550 grams. The two insert trays were made from 0.030” RPET; they weighed 97.592 grams collectively. Taken together, this package consumed 198.142 grams of plastic.

The Dordan packaging engineers began the design-for-sustainability process by working toward a lower product-to-package ratio. While doing so, it became apparent that the overall plastic content could be significantly reduced by using a 0.015” RPET lid and 0.025” HIPS tray for the GPS unit and incorporating a paperboard carton to house the tray, lid and accessories. The paperboard carton is almost universally recyclable in the North America.

Figure 4 shows the old material intensive clamshell; figure 5 shows the new smaller product tray and lid; figure 6 shows the old clamshell, left, and the
new smaller product tray and lid, right. The tray and lid collectively weigh 23.659 grams, which is an 88% reduction in the weight of plastic consumed for the package.

Figure 4

Figure 5

Figure 6

Data from a COMPASS comparison of the two packages tells a compelling story of the lower carbon footprint of the new versus the old package:
The top bar (red) represents the new Tom Tom package; the bottom bar (blue) represents the old Tom Tom package. It is important to note that the high water, biotic and mineral consumption and the high aquatic toxicity are the result of integrating a paperboard carton into the new Tom Tom package design.

**Investing in sustainability expertise**

The Federal Trade Commission (FTC) has developed a set of guidelines to steer consumer product manufacturers away from making unsubstantiated environmental claims. Commonly used terms, such as environmentally friendly or compostable, should be avoided according to the FTC in favor of statements that can be backed up with data, for example certified compostable to the ASTM 6400 standard for compostable plastics or an environmental improvement of 50 percent in terms of lower greenhouse gas emissions.
In order to give consumer product companies the facts they need to make sound environmental decisions and subsequent claims about their packaging, Dordan Manufacturing believes that it is incumbent on supply chain companies to invest in sustainable programs and sustainable expertise. The supplier's investments in this area must be ongoing and focused not only on the package in the retail setting, but also on what happens afterward — a total lifecycle view of the package from source extraction to end-of-life recovery, reuse, or disposal. Only with this kind of commitment in people and processes can the supply chain partner truly contribute to the overall success of the customer and betterment of the packaging industry.

For more information on Dordan’s 4-Step Design for Sustainability Process, contact the Sustainability Department at cslavin@Dordan.com, call (815) 334-0087, or visit www.Dordan.com.