

WHITE PAPER



Film and Adhesive Suppliers Respond to Durable Goods Market Pressure

The Drive for Engineering Innovation Intensifies the Need for Nameplate, Label and Decal Development During Initial Product Design

Although consumer spending is down, the demands driving engineering advancements and innovations for durable goods continue to be strong, as does the market pressure to reduce manufacturing cost and time to market.

Continued advancements in materials and their applicability make early supplier involvement more critical than ever. Design teams choosing to do so during the early design phases are finding that they are not only able to reduce product-development costs, but also incorporate newfound innovation into product designs.

Projections for the durable goods marketplace had been strong, with demands for big-ticket items such as major home appliances and outdoor power equipment expected to make solid sales gains through 2009.

In fact, the Washington, DC-based Association of Home Appliance Manufacturers (AHAM) had predicted 2009 would see a 5.3 percent increase in demand of major home appliances to 76.143 million units and a 6.8 percent increase (9.8 million units) for air conditioners. The Outdoor Power Equipment Institute (OPEI) in Alexandria, VA, also expected shipments of riding mowers to jump by 3.5 percent in 2009 to 238,363 units, while walk-behind powered mowers were expected to at least remain steady at approximately 5.4 million units.

Many industry associations are perhaps in proverbial holding patterns and remain hesitant to either retract or re-forecast projections in light of the struggling economy. While the uncertainty of projected purchases of durable goods and other products will remain, OEM-supplier partnering is essential for branding efforts to appeal to an even more frugal and selective customer. By involving a film and adhesive supplier during the initial design, OEMs can target consumers who are cutting back to ensure their products are not scaled out of the equation.



The Role of the Pressure-Sensitive Film and Adhesive Supplier

Cross-functional design teams have been coming together more often to address the array of materials and components that comprise the final product. These teams incorporate the expertise of industrial designers, design engineers, manufacturing engineers, production, marketing, management, and in some cases, human-factor specialists. Further, these specialists are involving their suppliers early on to address design and engineering issues, involving key components such as sensors and controls, motors and compressors, and displays and indicators. The most thorough design teams are also involving suppliers of pressure-sensitive film early on to gain perspectives on nameplate and label placement, size, shape, and regulatory guidelines. These early collaboration efforts have been yielding positive results that have impacted product factors such as functionality, styling, and cost, among others.

Many objectives can be achieved through OEM-supplier partnerships. A pressure-sensitive film and adhesive supplier can ultimately assist OEMs in determining nameplate and label performance and application parameters.

It is during a collective exchange of ideas that will determine if, say, the nameplate, label or decal is expected to convey information, portray brand image, provide tamper evidence, or all of the above.

A supplier can also help an OEM conclude if costly alternative materials can be replaced; ascertain the best combination of materials for durability or resistance to climatic elements, contaminants and/or chemicals; and verify a solution meets industry and regulatory requirements.

In collaboration, OEM cross-functional teams and their suppliers are most often looking at optimizing the application of the three main types of labels used on durable goods:

- Nameplate labels which are critical to branding and identification purposes;
- Warning and instructional labels which convey important consumer information;
- Regulatory/compliance labels which carry required testing and certification details.

The goal is to enhance product performance through the choice of the appropriate adhesive solution. Over time, this has become a more challenging exercise. That's because today, there are numerous types of surface materials - from smooth to textured, and from nonporous metals to low-surface energy plastics - to which durable-goods nameplates and labels must adhere. Early involvement of a pressure-sensitive film partner will ensure specification of the best polymeric facestock material and adhesive so the label performs as designed. This collaboration also allows pressure-sensitive film suppliers to be able to make recommendations regarding special effects that a design engineer might want to incorporate – like a brushed-metal look to reduce the cost and weight associated with real metal, or a glow-in-the-dark polyethylene film for a unique product look.

Pressure-sensitive film and adhesive suppliers regularly help OEMs and converters navigate a rather tough terrain when it comes to material compatibility. With the right adhesives, newer materials such as thermoplastic olefins (TPOs), designed for thermoforming applications, can be used without the additional costs associated with priming, flame and corona pretreatments to overcome low surface energy, which pose adhesion challenges. In addition to choosing the appropriate adhesive, some surfaces may require the use of a heavier adhesive coat weight to provide extra bond strength. Even more aggressive adhesives may be necessary if the surface is textured, or if acrylic paint has been replaced with powder-coated paint to improve durability and scratch-resistance of the painted surface.

Pressure-sensitive labeling can also permit OEMs to add tamper-resistant security features to a product label. Some alternatives include void materials with a special release coating that fractures upon removal to reveal a checkerboard or void pattern, providing evidence of label removal, while rendering the removed label useless elsewhere. Other possibilities include the use of labelstock with special UV additives that leave a traceable "footprint" behind upon removal, destructible label material that when removal is attempted comes apart in pieces, and holographic images for product authenticity.

Regulatory and Safety

Proper labeling can minimize potential product liability issues. Required warning information is rendered useless if the printed image can't be read by the user or if the label material fails to stay on the product. For durable goods applications, labelstock materials and printing inks are carefully chosen based on their durability, graphic quality and long-term adhesion to the intended application surface.

Further, because industry standards continue to evolve, issues involving safety labels can be confusing. Pressure-sensitive film suppliers can help OEMs navigate these requirements.

The American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) both facilitate development of industry standards for durable goods. For warning symbology, equipment manufacturers typically refer to ANSI Z535.4 for equipment sold in the United States and ISO 3864 symbol-only safety labels on equipment produced for export. A harmonized, single-format label may be developed in the future. Additionally, durable goods OEMs also follow product-specific standards that pertain to safe operation of equipment.

OEMs producing electrical-powered equipment must be sure their products carry important regulatory and safety information as specified by organizations such as Underwriters Laboratories (UL), Underwriters Laboratories of Canada (cUL), and the Canadian Standards Association (CSA). Just as electrical components of a consumer product are evaluated by regulatory organizations, the label material must also meet specific performance requirements in order to be included as part of any product that carries regulatory agency recognition. Along with product testing, UL, cUL and CSA use extensive lab tests to determine whether the label meets specific requirements for adhesion, image quality, durability, scratch-resistance, abrasion-resistance and resistance to weathering. These organizations expect both the label and adhesive to withstand various conditions, including UV exposure, temperature extremes and chemical/solvent exposure. Label materials that meet these demanding requirements are granted status as "recognized components."



By working with a supplier who specializes in UL-, cUL-, and CSA-, recognized materials as well as a converter well-versed in utilizing these components to create an approved label, OEMs avoid the hassle of extensive testing required for label certification, a process that can increase costs, take several months, and hinder time to market.

Design Considerations

Pressure-sensitive film provides an optimal balance of aesthetics, durability, and affordability when it comes to meeting the demands of durable goods labeling. Films offer unique, multilayered solutions that allow designers to choose from a wide range of topcoats, films, adhesives and release liners to meet durability and aesthetic requirements. The growing number of application surfaces on the market alone can make it more difficult for design engineers to select the best film and adhesive combinations. Other characteristics such as finish, clarity and cost can also drive labelstock selection.

The best place to start is with the performance requirements of your application. Durable goods products will most likely endure exposure to chemicals, moisture and temperature extremes.

Choosing a film substrate can pose some challenges, and a pressure-sensitive film and adhesive supplier can guide the OEM through the various properties and nuances of polyester (PET), vinyl (PVC), polycarbonate, acrylic and specialty films.

Polyester (PET) is dimensionally stable at high temperatures, and offers durability in the form of excellent initial tear and puncture resistance. Available in gauges of 0.5 to 10 mil, PET is available topcoated or print-treated for enhanced printability. Pressure-sensitive polyester films can be brushed or dyed to create a label that stands out. Metalized PET films are frequently used for product rating plates or serial plates, as metalized films provide attractive, cost-effective alternatives to etched or engraved stainless steel, and variable information can be easily added on-demand in a manufacturing facility.

Because PET can withstand temperature extremes and other environmental conditions, labels will remain legible and intact for the life of the product. These characteristics make it ideal for tracking labels as well as compliance, product identification, safety, hazard and instructional labeling for durable goods.

Polyvinyl Chloride (PVC), commonly called vinyl, with gauges ranging from 3 to 12 mils, is also very durable, offering resistance to UV and other environmental conditions. An extremely malleable film, vinyl can be easily embossed to create a unique texture. It is also easy to print. Extended-life vinyls are commonly used for durable goods requiring outdoor exposure and are ideal for product identification, safety, hazard and instructional labeling.

Specialty films, like polycarbonate and acrylic, also provide enhanced levels of performance to meet specific labeling needs.

Available in gauges ranging from 3 to 15 mils, polycarbonate is a durable, dimensionally stable film that is typically offered with a clear velvet embossed surface, providing excellent scratch resistance. Applications include graphic overlays on membrane switches, as well as backlit signage where one side of the sign is exposed to UV light and the other is exposed to elevated heat due to the interior lighting. It is also ideal for applications that require repeated actuations or constant usage.

Instrument panels and dial gauges often use thicker sheets of polycarbonate. In these cases, the graphics are often subsurface printed and a transfer tape is then used to mount the graphic to the application surface.

Clear and white acrylic materials are available in 1.5 mil and 2 mil versions. Acrylic offers UV resistance, as well as excellent outdoor durability. It features good tensile strength, and is often relatively rigid. Both clear and white can be used for outdoor applications.

Overlaminates, clear protective films used to safeguard printed graphics, also play a role in the overall durability and appearance of durable goods labels. Clear polyester, vinyl, polypropylene and polyethylene overlaminates can provide a gloss, matte or textured finish and protection of printed graphics against UV and chemical exposure.

Choosing the right film substrate involves understanding application requirements, and a supplier can assist OEMs in finding the appropriate products or developing a custom product to meet labeling challenges.

Adhesive selection is equally critical in the selection process. For durable goods labeling, permanent, high-performance acrylic pressure-sensitive adhesives are typically employed because of inherent resistance to chemicals, solvents and high-temperatures.

Adhesive selection is determined by the type of surface to which it is being applied and the required performance characteristics of the finished label. The physical characteristics most commonly used to measure adhesive performance are shear, tack and peel.

Shear is the property that measures the internal strength of an adhesive. Adhesives chosen for durable applications must have a sheer property low enough to allow the adhesive flow required for proper adhesion but not so low that the adhesive may ooze or cause the label to slide or move from its intended position.

Tack measures the ability of an adhesive to form an instantaneous bond. High-speed labeling applications, for example, require excellent initial tack. Without that strong, immediate bond, labels can misapply. In other instances, you want low tack adhesive, especially if reapplying or repositioning labels is necessary.

Finally, peel, is a measurement of ultimate adhesion to an application surface.

Putting it all Together

Utilizing the supplier's applications experience and product knowledge will lead to finding solid OEM labeling solutions. For example, a maker of commercial-grade pressure-washers was trying to determine why labels were coming off and not resisting the pressurized blasts of water and cleaning liquids during use. The pressure-sensitive film and adhesive supplier not only helped the OEM choose a different, more durable label facestock material, but it also advised that in order for the label to



remain intact, the strength of the adhesive bond needed to exceed the force of the pressurized water and cleaning chemicals. Consequently, the manufacturer was also able to avoid potential after-sale liability issues instigated by warning and safety labels falling off.

Conclusion

Never has there been a time of greater global competitiveness. Today's durable goods OEMs can utilize pressure-sensitive label and adhesive materials to provide design alternatives, enhance product performance and improve product safety. Working with a knowledgeable material supplier starting early in the design process can improve speed to market while lowering total product cost.



About the Author

Brian Ayers is a Business Development Manager for FLEXcon's Product Identification Business Team. Brian began his career at FLEXcon in May 1999 running a coater in one of FLEXcon's manufacturing facilities. From there, he worked in a variety of capacities, gaining a vast knowledge of FLEXcon's capabilities and expertise and leading him to his current role. Brian holds a degree in Business Administration from Becker College.

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About FLEXcon

FLEXcon is an ISO 9001:2008 worldwide manufacturer of pressure-sensitive films and adhesives for applications including indoor and outdoor advertising, bonding/mounting, and product identification, safety, hazard, bar-coded, and primary labels. The company's Value-Better-Supreme (VBS) product offering is the most extensive standard product offering in the pressure-sensitive film industry. FLEXcon is also a leader in developing custom solutions to meet unique converting or application needs. FLEXcon's mission is to provide its customers the highest quality products with exceptional service. The company is headquartered in Spencer, Massachusetts, and has operations throughout North America and Europe, with distribution worldwide. For more information on FLEXcon, visit www.FLEXcon.com.



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