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While there are many advantages of flexible packaging, it is up to the industry to overcome the disadvantages. *The Constant Cycle of Evolution* on the material side is incredibly important and highlighted in this eBook.

Contents

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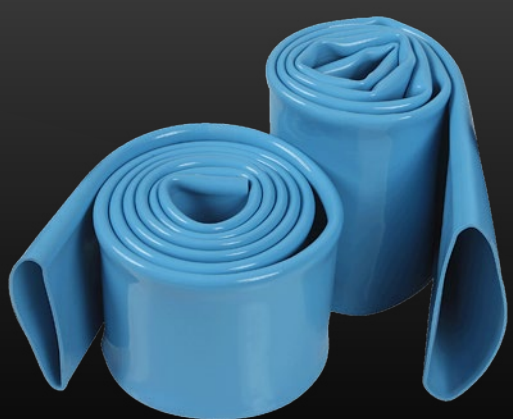

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Obtaining Barriers When Coating and Printing Flexible Materials

By **Tom Kerchiss**, Chairman, RK PrintCoat Instruments Ltd.

Thin flexible substrates of paper, film and foil are often modified, manipulated, coated or combined with other substrates, adhesives or chemical blends to facilitate processing or confer a material or materials with specific properties that may otherwise be absent. Substrates may be valued for the thermal stability, permeability and physical strength and barrier resistance that they provide.

Substrates and consumables must meet regulatory requirements with regard to safety and wellbeing and contain non-migratory components. Printability, convertibility and the ability to accept embellishment or value-added processes is of course a must.

The base material, method of manufacture and additional surface modifications, often made at the time of production, may make the choice of one substrate over another (theoretically) easier to decide upon.

Film manufacturers and formulators produce modified structures from polymers such as polyethylene, polyester and polypropylene. Polyethylene for example, when modified and in the form of polyethylene terephthalate (PET) provides good gas, aroma and moisture resistance making it suitable for carbonated soft drink bottles, snack food wrappers and much more besides.

Flexible packaging is an important packaging medium. With so much purchasing dependent

A precision-engineered coating machine, designed to print, coat and laminate all types of flexible webs such as papers, films and metallic foils on a reel-to-reel basis.

upon the whim of the moment, even the most basic of wraps or packs need to be designed to gain attention during that brief moment of eye contact. Consider confectionary, particularly chocolate, an important sector for flexible packaging.

Oriented polypropylene is highly valued for some applications. It can, for example, provide a white pearlescent sheen to a simple wrap. For confectionery wraps, foil and metalized papers can be used not just for barrier protective purposes but also for the silver/gold and other metallic decorative sheen that they provide.

Package print converters sometimes print reels of pre-metallized materials such as polypropylene (PP) as a single ply on flexographic or gravure presses. But there are alternatives. For instance, it is possible to laminate metallized oriented-polypropylene (OPP) to another film prior to printing. Sometimes metallized polyester is reverse printed prior to laminating. Of course much depends upon circumstances and chosen materials and dictates of the application.

Chocolate and other confectionery items as well as snack foods such as nuts and crisps must be packed in materials that can protect them from oxidation, moisture, light, heat and spoilage that may arise as a result of microbial contamination – bacteria, molds and fungi, etc. In some situations, flexible pouches may be appropriate (a subject along with laminates and inks that this author will cover later in the year).

Chocolate, unlike cocoa, does not possess anti-oxidant properties so it reacts badly when exposed to atmospheric oxygen quickly becoming stale. Items that include chocolate such as chocolate croissants lose flavor, look unappealing and become fit only for throwaway.

Improvements in polymer filmic technology coupled with inorganic and organic surface treatments and coatings make it far easier to source material that meets various objectives such as specific heat-seal thresholds, gloss, clarity, flexibility without cracking and product resistance.

Material selection can be a trade off. For example, some polymeric films have an intrinsic barrier resistance either to moisture or oxygen, but rarely both. For the packaging of certain foods the

composition of the fat content, pH and aroma compounds can have an impact on the sorption characteristics of some of the polymers. Environmental factors such as temperature and relative humidity can compromise permeability and barrier resistance.

Regardless of material or process selection, the converter and others in the supply chain need to weigh up different processing options. It may be that one method of coating is economically more advantageous than another but does not provide the necessary barrier properties that an application requires. A degree of experimentation and trialling may be necessary.

Barrier critical properties that may be required for those engaged in flexible packaging, particularly onto films and papers include, humidity control, safe sealing, airtightness, light protection (UV), oxygen permeability, aroma barrier, heat resistance and water vapor protection. Peel-ability and grease proofing might be a requirement.

There are many coating applicator methods that may be considered. One option is reverse gravure coating. Reverse gravure with its large wet coat range offers key coating benefits such as uniformity and freedom from pinholes. It is worth noting that pinholes will impact the effectiveness of any barrier that has been put in place.

A lot of work is being carried out to make barrier coatings more environmentally acceptable and quite a few coating practitioners are moving to water-based coatings with lower solids. Sometimes modification is needed to process equipment such as dryers.

The search for packaging materials with barrier properties is driven by the diverse requirements

With so much purchasing dependent upon the whim of the moment, even the most basic of wraps or packs need to be designed to gain attention during that brief moment of eye contact.

of the end user. Some barrier properties are easier to obtain than others. Obtaining a good moisture barrier may be relatively easy, obtaining a barrier to gases may be more difficult.

Polyethylene and polypropylene offer little in the way of barrier resistance to oxygen, whereas ethylene vinyl alcohol or EVOH — one of the familiar options for clear high barrier filmic applications — provides barrier protection against oxygen and is an equally effective odor and aroma barrier.

The barrier effectiveness of EVOH however, varies according to thickness and to factors such as temperature and humidity level at the molecular interface, not the ambient humidity of the general environment.

Flexographic and gravure packaging printers and converters have to deal with many ink/substrate-related issues. Filmic substrates such as polyethylene incorporate slip agents. While slip agents do an admirable job of modifying the co-efficient of friction, if they migrate to the surface of the substrate this can result in ink adhesion difficulties and print defects. Some ink may also contain slip additives which, when combined with the filmic slip additives, softens the ink and increases the tendency for blocking to occur.

Corona treatment of the film on press may burn off the excess additive, provide for better wettability and allow the ink a better chance of adhering to the substrate. There are other options though. For instance, printers working in conjunction with the ink supplier may instead opt for an alternative ink system to resolve the problem. One solution, though one that is not always up for consideration, is to switch to a different substrate, perhaps even laminates. ■

ABOUT THE AUTHOR

Tom Kerchiss is the chairman of sample preparation system and print/coat/laminating technology specialist RK PrintCoat Instruments Ltd. The company, which won an Innovator in Pre-Press Award for the FlexiProof 100, supplies printing ink manufacturers, both large and small, as well as printers, converters and other businesses with color communication devices for all of the major print disciplines.

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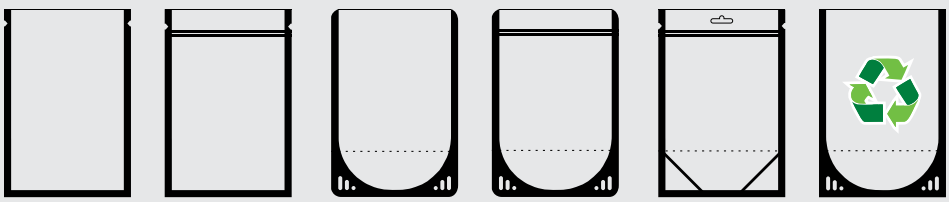

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Flexible Packaging — In a Constant Cycle of Evolution

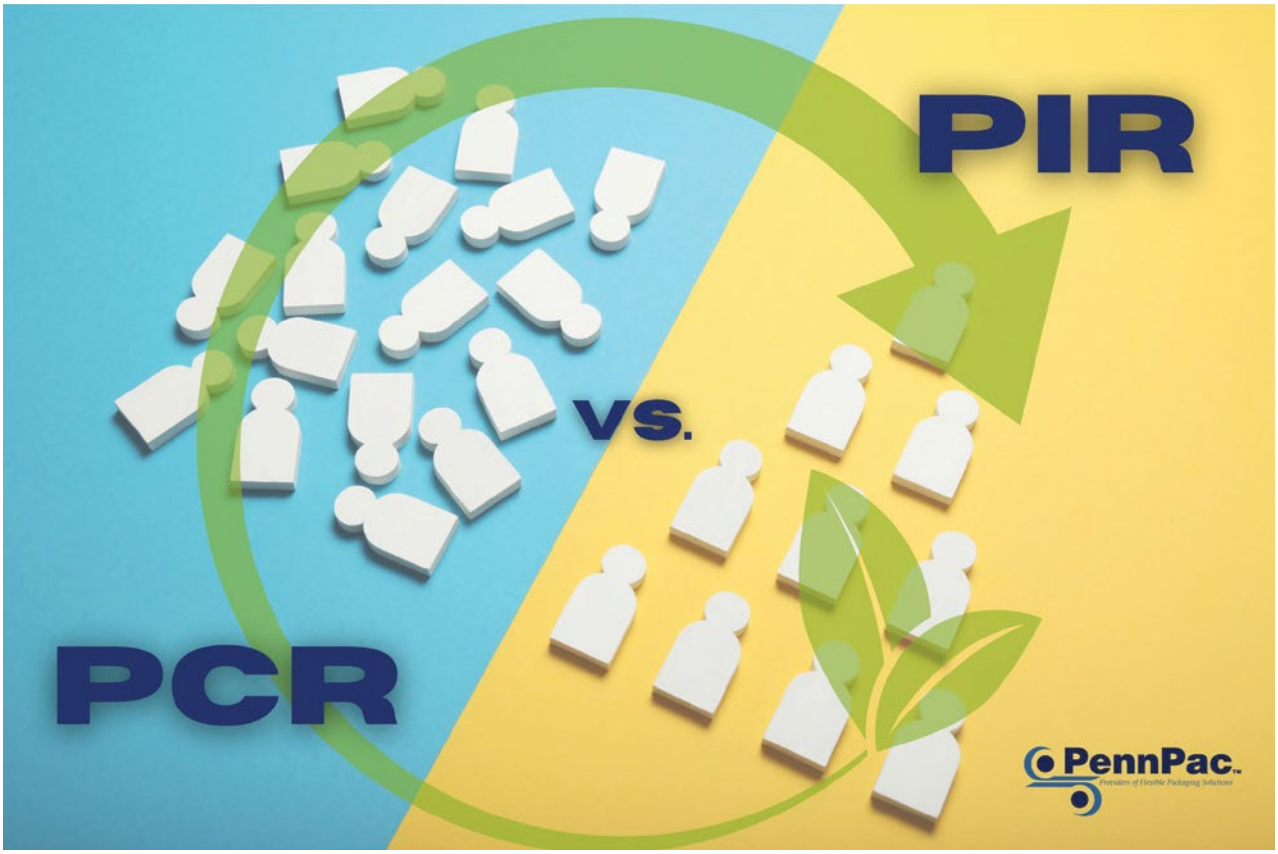
By **Rob Tiller**, Managing Director, PennPac

Just when we think flexible packaging films have reached a milestone of innovation, technology kicks things up another notch. From pharmaceuticals to food, various product lines are protected and preserved with eye-catching packaging, improving shelf presence. At the same time, current packaging plays a crucial role in eco-friendly efforts, including sustainability. The recent breakthroughs in flexible packaging technology offer a blend of versatility and functionality. Persistent evolution of product packaging is revolutionizing environmentalism in ways never imagined. This brief read will explore some of the latest trends and technologies which continue to impact consumer, environmental and industry demands.

A small pouch of silica gel acts as a drying agent to help prevent excessive moisture from damaging product and altering flavor. *Photo courtesy of PennPac.*

Active Packaging — It's Alive!

Since the days of the Industrial Revolution, numerous imaginations achieved what many thought as impossible. As time passed, an economy once based on low-volume agriculture and handmade items became mechanized, leading to today's mass production manufacturing across the globe. As we have seen, large scale manufacturing production comes with its share of loss, or scrap. Helping to reduce such loss is a fascinating technology named Active Packaging (AP). What makes AP so important and impressive? Well, it's a low-risk, effective and active packaging system that improves product shelf life, without sacrificing flavor quality or food safety. Two common examples of AP are the



incorporation of a functional material comingled into the product package itself, or simply placing an active component into a package film lamination structure.

For instance, if you open a bag of your favorite beef jerky, you'll typically find a small pouch of silica gel, or similar desiccant. This acts as a drying agent to help prevent excessive and unwanted moisture from damaging the product and altering the intended flavor. Inversely, this magical little pouch can also add surplus moisture it collects if the product becomes too dry. Along with jerky type pouches, you'll also find this type of system in dried fruit and nuts.

In addition to its use in food packaging, this style of AP is also used in other consumer products including sneakers, electronics and clothing.

For an integrated packaging example, suppose you have a product like a vitamin, which may be sensitive to UV light and/or heat. Engineered UV filter medium can be added to the lamination structure of the package to actively protect the product while it is on the store shelf, or even in the home. This is also the case in rigid packaging like a tray or a capped medication bottle.

Regardless of the type AP used in many of today's grocery stores, general merchandise or healthcare items, you can rest assured that all packaging compositions with such additives (physical or integrated), must adhere to all food, pharmaceutical and consumer product safety standards.

Acknowledging Barriers

While most consumers focus their attention on price, brand and general appearance of the product, we unknowingly bypass the importance of barrier properties packaging films provide. Not only does packaging create an attractive and informative shelf presentation, it also provides the moisture, oxygen, oil, gas and light barriers essential for maintaining freshness. Those steaks, sausages and chicken breasts appear fresh through the heat-sealed and crystal-clear packaging films.

A perishable product's additives or natural formulation may be negatively impacted by many of the forementioned properties, in addition to others such as flavor and odor. What film(s) get used

for which product is simply determined by which specific ratios of water, oxygen, etc. need to remain within. It's all about the migration control of what you can't see!

Let's touch on the basic types of barrier film substrates used in the packaging of many of our favorite products to maintain necessary shelf-life quality. Polyester (PET), Metallized Polypropylene (MPP) Ethylene Vinyl Alcohol (EVOH), Polypropylene (PP), Polyethylene (PE) and Nylon (PA) are the most common materials creating many of the laminate structures used in most food packaging applications.

While each material provides its own array of characteristics, respectively, they are often strategically combined in lamination structures by both packaging engineers and food scientists, with a common goal — to minimize food waste.

Sustainable Mindset — PCR vs. PIR

We hear about protecting our environment almost daily, regardless of region or country. Regulations and global pressures continue to dictate the future of packaging formats. A common driver behind flexible packaging films is the proportions of recycled content. Both consumers and brand owners are influencing packaging engineers and contract packagers to incorporate both Post-Consumer Recycled (PCR) and Post-Industrial Recycled (PIR).

While PCR materials have already been used by consumers for their intended purpose, these materials continue to maintain future purpose, using traditional curbside recycling processes.

PIR materials, on the other hand, have yet to make it into the consumer-use streams. Therefore, they are recovered and reused in a much more efficient and cost-effective manner, ultimately reducing logistics emissions and unnecessary packaging efforts.

Persistent evolution of product packaging is revolutionizing environmentalism in ways never imagined.

While research has shown no single packaging method (glass, plastic, metal, paper, etc.) can be applied to all our various packaged products, we can strive to use each in their most sustainable state. Using compostable and plant-based materials, for example, along with PCR/PIR materials, we can continue building an environmentally conscious future.

The Evolution Continues with Collaboration

In summary, flexible packaging films continue to play an instrumental role across supply chains. While the products inside vary, the technology and innovation advancements remain in forward motion. From protective barrier properties, to functional integrated packaging systems, flexible film technology continues to offer practical solutions that enhance product safety and longevity.

Embracing a global reuse campaign for flexible film packaging provides us an opportunity to work together and drive change. Collaboration from brand owners across private and public sectors, along with an educated and motivated society, will eventually close the loop of reuse. With many years of packaging design to learn and share ideas from, we are well placed to continue the cycle of flexible packaging evolution. ■

ABOUT THE AUTHOR

Rob Tiller surrounds himself with a team of industry experts, together providing PennPac's customers with a friendly and reliable experience. Customers around the country and across many industries – food and beverage, consumer healthcare, industrial, fulfillment, medical and more – trust PennPac's customized solutions for their supply of flexible packaging films.

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Demand Increasing for PCR Plastics

How Recycled PE supports Sustainable Packaging Solutions

By **Alan Schrob**, Director of Mechanical Recycling, NOVA Chemicals

Sustainability is on everyone's mind these days. From reducing plastic pollution to combating climate change, consumer awareness of the environmental impacts of current methods of production and consumption is increasing, influencing people's priorities and purchasing behavior. And who do consumers believe should be shaping the future of sustainability? According to survey data from NielsenIQ's Consumer Packaged Goods (CPG) sustainability report, almost half of consumers hold brands most responsible for sustainable progress.[1]

That means that brand owners are turning to producers and converters to help them make their products and operations more sustainable. With the upcoming UN global plastics treaty and multiple national plastic pacts all focused on building a circular economy, plastic packaging is a major focus of many sustainability efforts.

Consumer pressure and government regulations regarding extended producer responsibility (EPR) and post-consumer recycled (PCR) content mandates are contributing to increasing market demand for recycled plastics. McKinsey estimates that the demand for PCR plastic will triple by 2030 to about 90 million tons.[2]

As one of the most common

As brands consider adopting more sustainable packaging, converters can differentiate themselves with expertise in the post-consumer content arena. *Photo courtesy of NOVA Chemicals.*

and versatile plastics in packaging, polyethylene (PE) represents a significant opportunity for building recycling streams that support a reliable supply of PCR material. Recent innovations in PE resin technology have brought recyclability to a variety of flexible packaging formats with mono-material designs and high-performance qualities.

As brands consider adopting more sustainable packaging, converters can differentiate themselves with expertise in the PCR content arena. Working with experienced PE suppliers and recyclers allows converters to introduce recycled polyethylene (rPE) in their own operations, understand the properties and benefits of rPE, and give their customers a seamless transition to recycled and recyclable packaging.

Understanding rPE

As PCR content usage grows, brand owners still have concerns about how recycled materials will affect their products. In their Packaging Compass study, PMMI and Ameripen found that a third of the nearly 400 CPG companies surveyed were concerned about product protection and product quality when considering sustainable packaging materials.[3]

To address these types of questions, converters and purchasers should ask potential rPE suppliers about the source of the recycled material, what types of foreign materials could be present, such as labels or other polymers and the processes they use to manufacture rPE. The rPE resins behave differently than virgin resins, and those differences in feedstock composition and processing can lead to changes in look, feel and performance.

Converters should also understand how rPE will affect their operations. Different rPE resins can create odors, die lip build up, changes in pressure in processing equipment and other impacts. Experienced suppliers will have the technical knowledge and applications background to manage challenges, ensure operational success and find the right mix of resins to meet converters' needs.

With the upcoming UN global plastics treaty and multiple national plastic pacts all focused on building a circular economy, plastic packaging is a major focus of many sustainability efforts.

The planning and operational adjustments with the rPE manufacturer that are needed to incorporate recycled materials are worth the time and effort. Recycled resins help companies reach decarbonization goals by reducing energy consumption and greenhouse gas emissions. In a lifecycle impact study conducted by the Association of Plastic Recyclers, recycled high-density polyethylene (HDPE) was found to reduce emissions and energy use from production and transportation by over 70 percent.[4]

Meeting Performance Requirements

The latest rPE resins are available in a variety of capabilities, offering design flexibility and meeting the demand for PCR content in a variety of applications. Agricultural films, stretch films and HDPE milk jugs are some of the sources being used to create high quality PCR feedstock for use in multiple flexible packaging applications such as heavy-duty sacks and e-commerce mailers, as well as rigid applications like blow-molded bottles and more.

Recycled resins can even be used in demanding applications such as food packaging. Food-contact resins are highly scrutinized by the US Food and Drug Administration (FDA) with stringent sourcing and processing requirements. Recyclers and resin producers have collaborated to produce mechanically recycled rPE to help brands incorporate recycled content into food packaging products.

Working Together to Design for Recyclability

Considering all of the players involved in the packaging lifecycle – from producers to brands to retailers to recyclers – it is clear that the plastic circular economy cannot be built by any individual organization. To address plastic waste at its source, resin producers, converters and recyclers are working together to design plastic packaging for recyclability from the start while strengthening the supply of PCR materials.

McKinsey's research on product sustainability supports a collaborative approach; they suggest that the most effective way to improve sustainability is to involve the wider value chain. While product development typically accounts for less than 5 percent of a product's total cost, it affects up to 80 percent of the product's resource footprint.[5]

By adopting a collaborative

innovation mindset, brands that engage with suppliers and converters during the research and development phase of using recycled materials can make significant progress toward their environmental targets. The diverse capabilities of rPE are making recyclable designs accessible for more types of packaging than ever before.

The focus on recycling will continue to grow in the years to come. As you begin to include rPE in your packaging or expand your rPE applications, find suppliers who make it a priority to collaborate – who aren't taking a back seat to industry changes, but who are leading the charge to develop sustainable, scalable solutions. The sharing of knowledge and expertise is essential as we work to protect our planet and change the way plastics are produced, recycled and reused. ■

1 https://nielseniq.com/global/en/insights/report/2023/the-cpg-sustainability-report/
2 https://www.mckinsey.com/industries/retail/our-insights/reimagine-reuse-recycle-how-to-reach-sustainable-packaging-targets-in-retail
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ABOUT THE AUTHOR

Alan Schrob's role with NOVA Chemicals is to create and build on existing external relationships to obtain a long-term, secure, high-performing and controllable supply of recycled polyethylene that helps NOVA Chemicals' customers, brand owners and retailers meet sustainability commitments.

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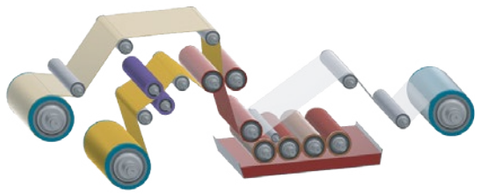

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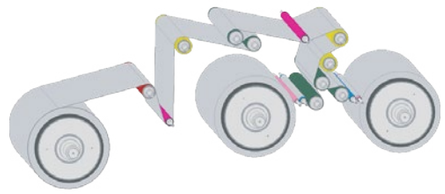

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- Transfer
- Load Cell

Roller Covering Applications
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- Drive
- Load Cell
- Transfer
- Wrinkle Elimination

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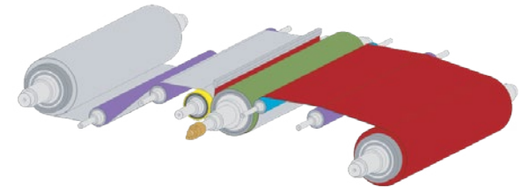

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Innovating Safety

Child-Resistant Stand-Up Pouches that Meet Sustainability Goals

By **Treijon Johnson**, Director of Sustainability, Accredo Packaging and **Sarah Stieby**, Marketing Manager, Fresh-Lock

In the past, brands sometimes had to choose between child-resistant packaging features and sustainability. Pouches, especially, were difficult to engineer with child resistance in mind, so they typically originally lacked child safety feature capabilities. Therefore, many rigid package types employed multi-material structures to meet tamper-resistance and safety goals.

New technology has changed this paradigm, enabling both child resistance and sustainability by improving the end-of-life solutions for these packages. With new mono-material flexible pouch options featuring child-resistant reclosability, we can now help ensure that products that children should not handle without adult supervision are secure while offering a better path toward sustainability.

This collaboration marks a first in flexible packaging solutions with this level of post-consumer recycled content available for consumer goods, including the food industry. *Photos courtesy of Accredo Packaging and Fresh Lock.*

A groundbreaking collaboration has recently resulted in a stand-up pouch that combines proven Child-Guard® slider technology with high-performance packaging films utilizing recycled content. The result is a stand-up pouch made with 50 percent post-consumer food-grade recycled content. This is a significant milestone, as it's the first time a flexible packaging solution with this level of post-consumer recycled (PCR) content has been available for consumer goods, including the food industry.

While the spotlight shines on child resistance, it's important to note that this innovation did not come at the expense of environmental considerations. Child-resistant technology was implemented within a sustainability framework, ensuring that the packaging materials are engineered to be recyclable wherever possible*, which contributes to a smaller environmental footprint. This dual focus is a testament to the company's commitment to helping safeguard consumers and protect the planet.

A key component of the mono-material stand-up pouch's

The Child-Guard® polyethylene slide closure incorporates PCR material for sustainability and necessitates a precise sequence of actions to unlock. The entire pouch is made with 50 percent post-consumer food-grade recycled content.

revolutionary nature is the polyethylene slide closure, which incorporates PCR material for sustainability and necessitates a precise sequence of actions to unlock. Sliders combined with attractive film properties can provide an aesthetic edge on the shelf — just what companies want to attract customers.

The slider is designed with adult reasoning skills and dexterity in mind, making it intuitive to use, yet complex enough to deter children. This closure seamlessly integrates into the pouch's design, maintaining product integrity and consumer convenience.

Film selection ensures the entire pouch is robust enough to withstand tampering attempts while preserving the product, providing brands with a reliable and user-friendly solution. Further, the pouch contains 50 percent food contact pre-recycled materials, making the overall pouch structure distinctive in its high level of sustainable materials.

Collaboration fueled the introduction of this package, which boasts a closure made from at least 25 percent PCR combined with a trusted RP PCR film, which also utilizes PCR content. The entire package is now a mono-material solution that offers a significant step towards circularity.

The advancement in sustainable, child-resistant stand-up pouches represents a pivotal shift in flexible packaging, where safety and circularity are integrated into the design from the ground up. It is a testament to the packaging industry's ability to innovate in response to critical needs, offering solutions that help protect the most vulnerable.

As we move forward, the focus on child resistance, supported by sustainable practices, will undoubtedly shape the future of packaging, helping make products safer and more secure. ■

* Recyclable only in the communities that have appropriate recycling facilities.

ABOUT THE AUTHOR

Treijon Johnson is Director of Sustainability at Accredo Packaging. In this role he leverages a rich background in packaging and is responsible for refining Accredo's robust sustainability strategies to build upon the company's existing successes.

Sarah Steiby is the Marketing Manager at Fresh Lock. With 25 years of diverse branding and marketing experience, Sarah creates ideal consumer experiences and connects people to brands they love.

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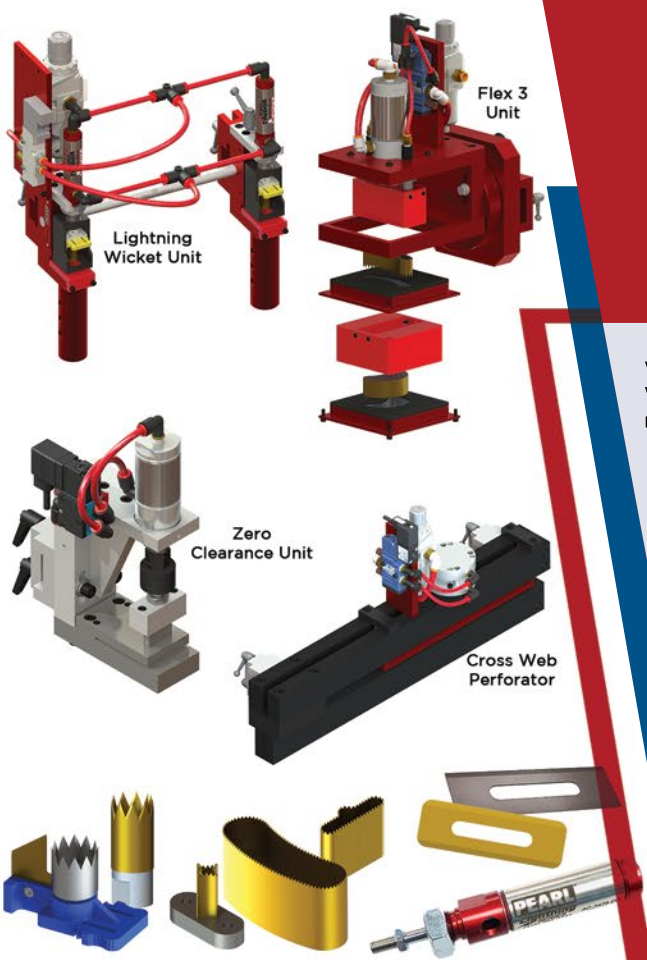

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The Path to Sustainable Growth

How to grow your packaging production sustainably: the advantages for you and your customers working for you.

COP26, NetZero, the UN SDGs – sustainability is one of the most critical issues of our time, and even in an era in which a global pandemic has dominated news headlines and legislative agendas, sustainability has remained near the very top of the agenda in business, politics, and the media. The challenges of managing finite resources, reducing waste and curbing greenhouse gas emissions have become a much higher priority in recent years and there is broad consensus that the pace of change needs to accelerate. Concerns about climate change and pollution – particularly ocean plastics – are driving a high degree of urgency about moving to a more sustainable way of living and making better choices in how we produce and consume.

Recent consumer surveys, such as a 2019 global survey of 6,000 participants by Accenture, show a heightened sense of awareness of environmental issues and – crucially – that this is playing an increasingly important role in informing buying decisions.

A 'Must Have' — Not a 'Nice To Have'

For modern businesses – in whatever industry or sector – environmental sustainability goes hand-in-hand with business sustainability as more and more customers factor environmental considerations into their purchas-

ing decisions, and rapidly changing legislation forces continuous adaptation. Taking an environmentally sustainable approach is no longer an optional or extra for the ethical business. It is an imperative to long-term business survival and success.

For packaging producers, the issue of environmental responsibility is particularly acute as packaging plays such a visible and fundamental role in all our lives. Because of its prominence, and due to its sheer volume, it has become a target for environmental campaigners, legislators, and consumers. Packaging companies, and the brands they serve, need to do everything they can to demonstrate tangible progress towards the development of products and processes which minimize environmental harm.

A Circular Economy in Packaging

The Ellen MacArthur Foundation defines a circular economy as "a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution." The end goal is an economy in which products at the end of their functional lives are fed back to replenish the system, rather than being discarded and replaced with new products created from limited primary resources.

Adopting the practices of the circular economy in your business – besides the obvious environmental benefits – can simultaneously boost business growth and enhance public perception.

Part of the strategy for arriving at this circular economy is the well-known mantra of the three Rs: Reduce, Reuse, Recycle, and while this is an excellent place to start, there are two more 'Rs' that are no less important: 'Renew' and 'Redesign'. Taken together, these 5 Rs provide an excellent framework for building a sustainability-focused business that will create value in the eyes of its customers.

Reduce

Your packaging can do more, with less

"Reduce" is all about minimizing the amount of packaging, and eventually waste, created. Reducing packaging, in terms of structure, size, and weight – also known as 'lightweighting' – brings important environmental and business benefits. Not only does it save on materials, material costs, and the environmental impact of production and transportation processes, it can also make products easier to recycle. As a result, there is significant demand from converters to continue lightweighting their products through enabling technologies, in order to improve environmental credentials, extend shelf life and reduce waste. Additionally, color management tools, such as ECG printing, reduce waste and press downtime, enabling full digital color management from design to press, enhancing productivity at each step of the workflow. Therefore, contributing to a reduction in packaging, by consciously choosing a supplier that contributes to waste reduction and landfill diversion, is essential for converters to remain ahead of the curve in meeting customer demands.

Reuse

Get Ahead of the Curve: Lead The Charge to Reduce Single Use Plastic

In recent years, we've seen a spotlight on the dangers of a 'throw-away' culture, and the use of materials such as single-use plastics, with a significant increase in research, documentaries, and media coverage highlighting the dangers. As disposable plastic generally doesn't biodegrade, it ends up contaminating the environment, resulting in polluted oceans and overflowing landfills. With heightened awareness of the ongoing plastic crisis and regulations with regard to single-use plastics changing globally, brands are under increasing pressure to conform to sustainability demands. High-profile brands, particularly in the food and retail industry, have switched to reusable materials when it comes to cutlery, straws and plates for example, and have set a precedent for other brands to follow suit.

Conventional plastic's lack of biodegradability is a well-known environmental challenge – but when it comes to the increasingly popular reusable, or multi-use packaging, this environmental weakness can become a strength. Packaging that can be washed and reused multiple times by the consumer, rather than being immediately disposed of, can provide significant environmental benefits over the long term. Its creation presents a very different set of inks and coatings challenges because printed articles need to be much more durable than traditional types of packaging.

With this being such a topical issue, the importance for brand owners to conform to the demands set out by consumers and the media are higher than ever. Converters must therefore ensure they have the materials and

resources ready to cater to this demand – investing in inks and coatings solutions that are robust enough to survive multiple washes over longer periods of time.

Recycle

No More Cradle to Grave. Make The Switch to Cradle-to-Cradle Alternatives to Feed the Circular Economy

Recycling is a key component of any conversation about sustainability in packaging. The use of more easily recyclable materials leads to lower levels of waste at the end of a product's life – making an important contribution to the circular economy. In response to pressure from brands and consumers – as well as legislation – the market will inevitably continue to move towards a more circular approach that allows valuable resources to be recycled and prevents packaging from ending up in landfill or, even worse, waterways and oceans.

The industry, under the guidance of organizations such as CEFLEX (Circular Economy for Flexible Packaging), APR (The Association of Plastic Recyclers), RecyClass and SPC (the Sustainable Packaging Coalition), is seeing a tremendous amount of work happening across the value chain to re-design packaging structures to make them recycle-ready. One of the most notable outcomes of these recyclability initiatives has been a drive towards mono-polyolefin structures and a reduction in the use of complex multi-material structures.

If the Inks Aren't Deinkable, The Package Can't be Fully Circular

When it comes to the recyclability of both plastic and paper-based packaging, deinkability is crucial.

There are a range of inks and coatings available that wash off without creating color bleeding in standard mechanical recycling processes, allowing for higher quantity and quality recycling, without downcycling.

For example, recycle-friendly washable ink technology can be removed without staining the flake or wash water from post-consumer printed PET packaging during the hot caustic wash step of the recycling process. Designed specifically for printing on crystallisable PET shrink sleeves, these inks allow for the increased recovery of high-quality, clean, recycled PET resin flakes.

Another common customer demand is systems for caustic-resistant ink – for retention on BOPP labels and sleeves meant for PET bottles, for example. Caustic-resistant primers, coatings and inks can be used for this purpose. They can offer high resistance properties for mono-web labels, as well as improving recycling performance.

Barriers and Packaging Materials Must Also be Considered

Sometimes packaging materials superficially appear to be recyclable, but due to the presence of hidden layers, one example being film barrier layers in paper or board structures, they are in fact, not, and are ultimately sent to landfill. Functional barrier coatings are therefore also very important for recycling.

Real Alternatives. Real Solutions.

The right barrier coatings, inks and adhesives, can together enable a monomaterial package with oxygen barrier properties matching those of a multimaterial structure, while preserving all other application properties.

Ultimately, with recycling being such a hot topic, it is crucial for converters to understand the processes and what is required from a packaging point of view. By working with suppliers that offer enabling technology to minimize non-recyclable packaging and

waste, brands can meet customer demands for more sustainable solutions, and enhance their overall perception in the market.

Renew

Switch to Bio-Renewable Inks, Coatings and Adhesives That, Instead of Being at Odds with the Natural World Around Us, are Increasingly in Harmony With It

Beyond Reduce, Reuse and Recycle – think 'Renew' and consider the bio-renewable alternatives to fossil fuel-derived packaging products.

The appeal to consumers can be improved – as they become increasingly concerned by climate change and continue changing their habits to conserve the planet – by developing and promoting eco-friendly products that are made from renewable resources.

Start Slashing Co2 Emissions Today

Replacing fossil fuel-derived packaging with bio-renewable alternatives can translate into immediate CO2 emissions reductions for your business.

Increasing the use of bio-renewable resources in your business activities is also key to boosting sustainability and supporting circularity. Technology in this area has advanced considerably in recent years, with a rapidly growing range of options of responsibly sourced bio-renewable inks and coatings. These can allow substantial reductions in CO2 emissions by upwards of 1kg per for every kilogram of ink used, for example, or over 33% relative to conventional alternatives. And with ongoing developments, these figures are continuing to increase.

Redesign

Think Creatively, Think Differently to Get Your Packaging Working More Sustainably

To make packaging more reusable; to reduce packaging waste and weight; and to make it more renewable and recyclable, often requires a fundamental rethink of packaging design.

Redesign to Make Packaging More Reusable

As the linear economy declines, packaging redesign is critical, with an emphasis on packaging lifecycles that do not end up in landfill or incineration, but instead re-enter the circular economy.

Choosing a packaging design that predominantly or entirely includes conventional nonbiodegradable plastic, enables consumers to wash and use it multiple times in the future. Ultimately, this benefits the environment more than if they had used single-use packaging that is set for the landfill after the first and only use.

Redesign Packaging to Reduce Waste And Weight

Protective barriers can ensure better quality and shelf life of products, thereby helping to reduce waste.

Barrier selection in packaging redesign is a crucially important aspect of reducing packaging weight to help it contribute to carbon reduction – also known as lightweighting.

Water-based coatings that can be applied by flexo or gravure applications can create a barrier against moisture, oxygen, CO2, UV light, odor and migration, keeping products protected and simplifying structures without adding extra weight through traditional plastic films.

Additionally, solvent-based lamination adhesives can deliver oxygen barrier properties to high performance structures such as retort and sterilization, reducing the volume and cost of the film used, enabling the production of thinner and lighter laminated packaging films, as well as preventing food deterioration. In addition to using fewer raw materials, these innovative packaging solutions are also potentially easier and less energy-intensive to recycle.

The need for barrier technology will only increase going forward, as the market attempts to develop mono-material structures. Protective coatings that reduce the need for laminates and extruded plastic films and which therefore allow for the downgauging and simplification of label structures, among other solutions, will be necessary.

Redesign Packaging to Use More Renewable Material

The exploration of alternative technologies is another key area of redesign. Across all inks and coating types – whether water-based, solvent or energy curable – there are more and more options for making each of them more sustainable.

Instead of using full petrochemical-based inks, packaging companies are using more renewable inks, based on bio-renewable raw materials.

Using water-based inks with more biorenewable content, setting up solvent capture systems for solvent inks, or using low energy curing UV ink alternatives, are all ways that your business could lower its carbon footprint

for its printing processes and packaging applications.

Redesign Packaging to Make it More Recyclable

Switching from plastic packaging to paper-based alternatives is a growing trend in the market – yet this requires different ink, coating and adhesive selections in order to achieve good performance, so this must be considered.

A particular aspect to keep in mind is that in the switch from plastic to paper, moisture, grease and oxygen barrier properties must be maintained.

Polyolefin structures, which can be recycled, generally have lower barrier properties compared to the current PET structures, so will need enhancing going forward.

Barrier coating and adhesive products can be key enablers, and Direct Food Contact (DFC) barrier varnishes can act as plastic replacements in redesigned plastic packaging using paper-based alternatives.

Sun Chemical Solutions

Ensure a Sustainable Future for Your Business

Over the decades, Sun Chemical has invested in its R&D to improve the efficiency and sustainability of its inks, coatings and adhesives. With the expertise that we've developed through that process, we offer not just a range of highly efficient products to help your business to improve its environmental credentials – but through our 5 Rs approach, we also offer expert advice and consultation to ensure you derive full benefit from our solutions and get the best possible results.

Whatever your business's specific environmental challenges, Sun Chemical has the product range and the expertise to help you to meet those challenges head on and to take advantage of the business growth opportunities this sustainable approach provides.

Reduce

Sun Chemical has two breakthrough oxygen barrier technologies which aid lightweighting while ensuring high standards of food preservation and extended shelf life.

SunBar is a water-based coating that can be applied by flexo or gravure applications that delivers oxygen barrier properties of less than 1 cc/m^2/24 hours from a 0.3µ thick coating. Creating barriers against moisture, oxygen, CO2, UV light, odor and migration, SunBar coatings provide cost-effective, durable and compostable films by creating a pinhole-free, and flexible gas barrier layer that can be easily overprinted with our compostable inks and laminated to a variety of secondary films.

Paslim is a solvent-based lamination adhesive suitable for high performance structures such as retort and sterilization, which also delivers oxygen barrier properties that potentially allow three ply structures to be down gauged to two ply structures delivering both cost and environmental benefits. Enabling the production of dramatically thinner and lighter laminated packaging films, as well as preventing food deterioration, Paslim reduces the volume and the cost of film.

Reuse

Sun Chemical's SunCure® coatings are made with high levels of biorenewable carbon containing raw materials that can be incorporated into post-consumer recycled materials. The coatings have received excellent feedback following commercial trials. The launch marks a breakthrough for Sun Chemical's energy-curing line, as it is the first of many such products to be rolled out featuring significant levels of biosourced and recycled material.

Additionally, waste material from spirulina algae production at Earthrise Nutritionals, DIC / Sun Chemical's food supplements business, is being processed and reused to develop new natural colorants for fully renewable ink

formulations and our technical development of high-resistance inks and coatings continues toward products that can withstand multiple wash cycles to enable reusable printed containers and packaging.

Recycle

Sun Chemical is actively exploring a range of solutions to enhance recyclability, including repulpability and compostability of a range of packaging structures.

Sun Chemical's SunSpectro® SolvaWash GR and FL washable/deinkable gravure and flexo-printable solvent-based inks have been designed initially for reverse printing of crystallizable PET shrink sleeves to allow higher quality and yield of recycled PET from bottle recycling streams.

SunSpec™ SunStar PE extrusion replacement coatings for paperboard in hot and cold cup applications impart repulpability and compostability to paper cups and straws, offer excellent liquid barrier and heat-seal properties. They are highly cost competitive with polyethylene-containing structures and processes.

Renew

Sun Chemical is actively developing its solutions to include higher bio renewable content, including more sustainable solvent-based solutions. In 2002, Sun Chemical made a decision to reformulate its sheetfed offset inks to use renewable raw materials to the highest possible proportion.

w offers an effective solution as a water-based range of renewable inks. The range is uniquely formulated with significantly higher levels of bio-renewable resin content (65%), compared with previous market offerings, while still exhibiting equal or superior print performance. The formulations meet the current technical and cost criteria of acrylic based inks, while the overall bio-renewable content of the inks is approximately 55-60%. This unique technology enables the inks, which are widely used for food packaging, to meet demand from customers and brand owners for more sustainable products. If this technology were globally adopted by all brands, carbon dioxide emissions would be reduced by an estimated 700,000 tons.

Sun Chemical's flagship low migration food packaging offset ink set, SunPak FSP, is based on renewable biobased materials and has achieved a new standard in eco-friendliness through a combination of compliance and sustainability. Not only is the ink set compliant with all existing food packaging legislation worldwide, but it has also been independently tested by Beta Analytic, the world leader in carbon-14 measurements, to prove the high level of environmental sustainability.

Redesign

As the market considers transitions from plastic to paper or shifts from multimaterial to monomaterial structures and from laminations to monowebs, Sun Chemical has developed solutions that fundamentally redesign inks, leading to increased recyclability.

Sun Chemical has launched a flexo/gravure printable barrier coating (SunBar™ Aerobloc) for polyolefin films and a solvent-free adhesive with intrinsic barrier properties (SunBar® Paslim SF) – both also mentioned above in 'Reduce'.

Additionally, in line with the trend to replace plastic with fiber-based alternatives, Sun Chemical has developed DFC inks for use with its compostable DFC barrier varnishes. These DFC inks – Sun Chemical's water-based SunVisto™ AquaSafe inks, which have been successfully used on paper drinking straws – can be printed flexo on paper or corrugated board. Significantly, the combination of DFC and compostable inks and barrier coatings means that you can safely print on the inside of food packaging without the need for a plastic film to protect the food.

A partner who transforms with you.

Today's environment requires more than change. It demands transformation—and a partner who's willing to transform with you. Sun Chemical, a member of the DIC Group, is a leading producer of packaging and graphic solutions, color and display technologies, functional products, electronic materials, and products for the automotive and healthcare industries. Together with DIC, Sun Chemical is continuously working to promote and develop sustainable solutions to exceed customer expectations and better the world around us. With combined annual sales of more than $8.5 billion and 22,000+ employees worldwide, the DIC Group companies support a diverse collection of global customers. Sun Chemical tailors solutions to unique customer needs and brings new ideas and the latest technology to market. As you move forward into a world of stiffer competition, faster turnarounds, more complex demands and sustainable products, count on Sun Chemical to be your partner. ■

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