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Coldchain Solutions

Protecting the things people care about.[®]

Propelling the Temperature-Controlled Shipping Industry to Greater Heights (and Lower Temps...)



Introduction

With the advent of the Internet, retailers discovered new markets. Proximity of location became less critical and quick, effective shipping became the key to ecommerce expansion. This growth created demand for new packaging and shipping solutions, particularly for perishable goods.

Perishables that decay or deteriorate when exposed to unstable temperatures present a unique shipping challenge for ecommerce retailers. These include foods such as meat, dairy, fruits, vegetables, and baked goods, but also may include flowers, cosmetics and medications. To meet this challenge, packaging manufacturers strive to develop temperature-controlled packaging solutions that are practical, affordable, effective, and environmentally friendly.

This whitepaper offers couriers, e-commerce retailers, fulfillment and distribution businesses an understanding of prominent shipping challenges and solutions for perishable goods and how different types of cold chain shipping products compare in performance, sustainability, and cost-effective features.



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Considerations and Challenges

The fast-paced nature of ecommerce has considerable influence on shipping and business practices. The necessary quick fulfillment speed coupled with FDA regulations for shipping perishables create a range of challenges in temperature-controlled shipping. These include:

Regulatory Compliance

The [FDA Food Safety Modernization Act \(FSMA\)](#) rule on Sanitary Transportation of Human and Animal Food sets forth regulations about food safety during shipment. The regulations dictate that a shipper of perishable food items must take appropriate measures to ensure temperature control is maintained throughout the shipping process.

The [Federal Food, Drug, and Cosmetic \(FD&C\) Act](#) regulates the sale and distribution of cosmetics, drugs and food to protect consumers from contamination and spoiled products. Items that are delivered spoiled or contaminated could violate this law.

Without proper attention to temperature-controlled shipping, ecommerce retailers who sell perishable items risk violating these regulations and could be subjected to legal action or fines.



Cost

Regulations have led to more intentional approaches toward temperature-controlled shipping and handling, which can make it challenging to identify cost-effective solutions for perishable shipments.

It is not always economically feasible to employ a refrigerated truck for transporting perishable goods. Even goods that travel by refrigerated transit must be protected from temperature fluctuations during warehousing, loading and delivery. Sourcing an affordable temperature-controlled packaging solution is vital to the success of a business that ships perishable goods.

Inventory Management

With the shift towards eCommerce and consequent opportunity to sell at greater and greater volumes, retailers have more concerns regarding space and inventory management.

More products mean more shipping containers. Businesses must also consider how well a shipping solution works in a warehouse environment. This requires intentionality about the amount of space a shipping solution requires for implementation, the way it functions logistically within the fulfillment process, as well as its functionality in transit.



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Product Functionality

Aside from maintaining temperature control, retailers must consider the durability and versatility of their packaging solution. This means considering the solution's ability to protect its contents, avoid leakage, maintain freshness and be scalable enough to meet the needs of different sized and shaped products.

Sustainability

Consumers have become [hyper-aware of the environmental impacts](#) of shipping materials and methods. Ecommerce retailers must consider how their product and packaging choices fare when it comes to recyclability and carbon-footprint. [Sustainability of packaging will affect consumer perception of a brand.](#)

Packaging Options

When evaluating a temperature-controlled shipping solution, businesses should choose a solution that has been tested and proven effective for temperature control during a wide variety of external conditions. Other considerations include cost, scalability, warehousing requirements and sustainability.

EPS Insulation: EPS insulation panels are used as an insulating liner inside a rigid shipping box. EPS is also commonly sold in molded form, often as a standalone box with a lid. The addition of ice packs enhances efficacy. EPS is the most traditional and widely used solution for cold chain packaging, as it is cost-effective and lightweight.



Unfortunately, EPS insulation solutions fall short in sustainability. EPS materials are not recyclable, take decades to degrade in a landfill and are even [banned in some states](#). Not only will EPS materials hurt the environment, they could hurt a brand's reputation with its customers.

Another downside to EPS is size. EPS panels take up a lot of space in a shipping warehouse and molded containers take up even more. They are not easily scaled to fit various types of products and don't break down for transport or storage.

EPS does a moderately good job at insulating products against temperature fluctuations, however advancements in technology have brought forth new materials that surpass it in temperature control and sustainability.

CoolPAC™ vs. EPS Foam: A Temperature Control Challenge



VS



CoolPAC technology has been third-party tested and shown to outperform industry standards and EPS foam in temperature control. Tests included 24 and 36-hour thermal testing of 1 lb. of gourmet chocolate among an ambient temperature of 90 degrees Fahrenheit as well as an ISTA 7E Heat 24-hour test with fluctuating temperatures.

The average 8"x8"x8" CoolPAC box liner, pitted against nominal EPS foam shelled boxes, showed greater cooling retention and a vast difference in radiant heat transfer compared to the EPS foam. CoolPAC technology, when used with reflective bubble box liners, showed only a 6-degree increase in temperature over a 24-hour period of fluctuating heat.



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Natural Fiber Insulation: As sustainability becomes more important to the average consumer, brands have turned to natural resources to insulate their temperature sensitive shipments. One of the more popular sustainable solutions is cotton. Recycled or virgin cotton fiber is inserted into a polyethylene liner and marketed as a green alternative to foam-based insulating panels. Natural fiber insulation companies claim that it can provide a similar temperature control factor as EPS foam, but third-party verified research is lacking.

A natural fiber insulation solution is often touted as a green alternative to EPS foam. But, [cotton is one of the most environmentally damaging crops grown today](#). Consider that it takes more than 5,000 gallons of water to produce two pounds of virgin cotton and successful crops are heavily reliant on insecticides, further polluting groundwater.

Recycled cotton is far eco-friendlier than EPS foam and virgin cotton. The problem with recycled cotton insulation is that the onus on the consumer to dispose of it responsibly is two-fold. For the consumer to successfully recycle cotton insulation, the bulky panels must first be cut open and separated from their polyethylene liners. The liner and cotton are both recyclable, however neither material is accepted in the curbside bin. This means consumers must deconstruct the insulation and then seek out and deliver the separated materials to two different specialty recycling drop off locations (if they can find them).



CoolPAC™ vs. Cotton Insulation: A Sustainability Challenge



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CoolPAC is 100% recyclable, through a partnership with the Trex® Recycling program, CoolPAC film can be [recycled into Trex Decking](#). CoolPAC liners can be dropped off for recycling anywhere that accepts plastic film grocery bags. This includes thousands of grocery stores across the U.S.

CoolPAC technology also allows for more environmentally conscious and sustainable practices, due to its lightweight properties and storage functionality. CoolPAC products take up less space in warehouses and can be customized in size for more intentional space reduction on freight trucks, which reduces transportation costs and carbon emissions.

Advances in Cold Chain Technology: CoolPAC™

The newest advances in temperature-controlled shipping technologies include cold chain packaging products designed to offer the best of all worlds: to insulate, preserve and protect temperature-sensitive shipments by reducing radiant heat transfer and also reducing foam packaging waste, while increasing warehouse storage space.

PAC's CoolPAC solution is a thin, lightweight bubble material that has been third-party tested and shown to protect against radiant heat intrusion better than EPS foam. This unique, flexible material comes in a variety of types and sizes to fit any product, from samples to full pallet wraps. CoolPAC can even be purchased in roll stock, for ultimate flexibility of use, and it is 100 percent recyclable.



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The CoolPAC products offered by PAC Worldwide include a versatile mix of box liners, mailers, self-expanding mailers, pouches, roll stock, and pallet covers.

These products provide:

- Superior protection against radiant heat intrusion
- A peel and seal release liner for easy closure
- Protection against freezing during winter months
- Reduction of warehouse space needed for storage
- Reduction of DIM weight for shipping
- Increased fulfillment speeds with one-piece design
- Material that is 100% recyclable

Additional Considerations:

Cost Factors: When it comes to evaluating the cost of a temperature-controlled shipping product, it is important to consider direct costs as well as indirect costs. The direct cost is the cost paid per package including insulation material and ice or gel packs. Indirect costs include things such as the cost of shipping the packaging, warehouse space to store it, fulfillment speed and superior protection against spoilage. Direct costs are easy to quantify. Indirect costs deserve more careful consideration, as these costs can add up quickly and make a seemingly less expensive solution more costly in the long run.



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CoolPAC™ vs. EPS Foam: A Cost / Space Analysis



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One truckload of (8x8x8in) box liners, which fits 36,450 box liners is equivalent to over *five and a half truckloads* of EPS foam-lined boxes of the same size.

Not only are CoolPAC® insulated box liners low profile and lighter, which greatly reduces overhead and inventory storage capacity for warehouses, but their structure also allows for a reduction in space for inbound freight. This reduces long-run carbon emissions and shipping costs for inbound materials. They greatly reduce DIM weights compared to traditional coolers and insulated boxes and are made with materials that are FDA approved for food contact.

Scalability Factors: Rarely does a one-size-fits-all approach work for businesses in shipping and packaging. When your temperature-controlled shipping solution is scalable, it opens options for different size shipments and leads to expansion that would not seem possible within the bounds of set-size insulated boxes or panels (think of sample sizes all the way up to entire pallets).



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A Partner You Can Trust

PAC would like to extend the promise that we are a packaging partner you can trust. Our packaging specialists are continuously researching industry trends, testing new materials, refining solutions and working with industry partners to bring the most effective and sustainable solutions to our customers.

For over 40 years, PAC has worked to gain the trust of businesses large and small. We use our deep industry knowledge and advanced technology to assist them in finding the right packaging solution for every product.

Please contact us to learn more about our CoolPAC™ solutions and how our team of cold chain shipping experts can help you identify the best options for your shipping needs.

Jenifer Nelson
Associate Director Cold Chain
Jenifer.Nelson@pac.com
916-749-0588

Tammy Skrzekut
Product Manager Cold Chain
Tammy.Skrzekut@pac.com
317-439-8677

