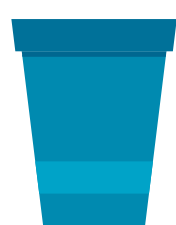


The Evolution of Temperature Control

A visual history of cold chain innovation.

Styrofoam | Mid 1990s – Early 2000s



In the early days of temperature-controlled transport for pharmaceutical products, shippers used expanded polystyrene with water-based gel paks. This packaging would be validated for a specific time period and temperature range. Though inexpensive, Styrofoam packaging — even with passive temperature control inserts — often resulted in temperature excursions during shipping or storage. Logistics providers had to make a lot of assumptions about whether or not a product or sample stayed in temperature range during transport, and manufacturers and trial sponsors experienced delays due to damaged product.

Drivers of innovation in temperature control include:

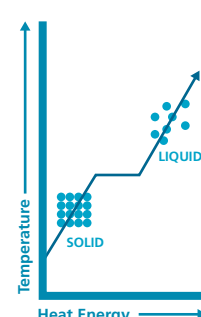
- More stringent regulatory requirements across the globe
- Growing value of drugs like biologics
- Customer demand for new temperature ranges
- Emerging markets with extreme temperatures

Mid 2000s | PCMs

Temperature Trials

In the early days of PCM, World Courier teams placed various packaging configurations on the roof of our London office to test the materials' endurance at absolute external ambient temperatures.

As more precise temperature ranges became the norm, Phase Change Material (PCM) became the preferred packaging for many shippers. Comprised of materials such as salt and paraffin suspended in bricks, PCM gave shippers greater control over temperature ranges during transport. PCM's emergence also meant more emphasis on preconditioning to ensure packaging was ready to ship in-range.



Monitoring | Mid 2000s



Over the last decade, temperature monitoring during transport via high-tech loggers has become more and more prevalent. And while real-time monitoring has a long way to go, shippers are now able to prove packaging performance for customs clearance. In Saudi Arabia, for example, customs officials remove temperature monitors from packaging to check for excursions — and shipments with temperature deviations are not allowed into the country.

Cost Considerations

Packaging evolution has resulted in a value exchange for the logistics market, as shippers are willing to invest more in technology up-front to avoid excursions, trial delays and patient losses down the line.

The New Norm | VIPs

Experts say a shipper's best bet is to invest in packaging that is independent of the supply chain and can keep shipments on-temperature even when storage conditions deviate.

Boxes with Vacuum Insulated Panels (VIP) and PCM inserts are the current gold standard for temperature-controlled transport. And while these packaging innovations may require more up-front preconditioning and planning to mitigate excursions, shippers who use them experience fewer quarantines and shipments clearing quickly to investigator sites.



The Future of Temperature Control



As drug values continue to soar and regulations become more and more stringent, what does the future hold for temperature-controlled transport? Our experts predict a few ongoing innovations:

- Real-time data on temperature will drive even more advances
- Reusable packaging will become more realistic

Learn more about temperature-controlled transport at worldcourier.com

World Courier is a global specialty logistics company that designs world-class logistics and supply chain programs in complete alignment with our customers' business goals. Pharmaceutical companies rely on us because they value the peace of mind that comes with our unsurpassed knowledge, global reach and flawless supply chain execution. Each trusted partnership we form with a customer is deeply rooted in our shared vision of improving global health. With 2,000+ associates in more than 140 offices across the globe, we offer solutions that instill confidence in the on-time, on-temperature delivery of critical products.

When trust is absolutely essential, there's only one choice: World Courier.

worldcourier.com