

White Paper **The total cost of shipping - Part 2** 

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For several years, cost and operational efficiencies have been front-of-mind across the life sciences industry. This is the result of many legacy blockbuster drugs coming off-patent and the knock-on effect that has had on the market: loss of profits due to generic drugs and a wave of mergers and acquisitions.

The supply chain is an area where both cost and efficiency savings can be made. However, these can only be achieved alongside maintaining compliance if there is full understanding of all the factors that contribute to the total cost of shipping.

As discussed and analysed in Part 1 of this series, there is a general misconception that there are only two main factors that contribute to the total cost of shipping: cost of packaging and cost of freight. The whitepaper concluded that the cost of shipping temperature-sensitive pharmaceuticals is not just the cost of the packaging plus the freight, but of many other related and often overlooked factors within the overall supply chain. These additional factors were discussed at length in Part 1 and are set out in Figure 1 on the next page.

## Temperature-controlled packaging

The first, and most obvious, cost is that of the temperature-controlled packaging. When analysing movements via airfreight it is likely that either passive or active temperature-control is being used, but do we really know how much it is costing to use these solutions? The shipper will know the obvious cost; the freight charges and the cost of buying or renting the temperature-controlled shipping system, but what about the related costs? There are a range of shipping systems that are generally categorised into three types:

1. Single-use passive shipping systems. Insulated shipping systems using expanded polystyrene or polyurethane with a combination of water-based cooling and sometimes phase-change materials. These are designed either for limited or one-time use. The shipper buys the system from the manufacturer and generally stores it until required.

2. Reusable passive shipping systems. Designed to withstand the rigours of the supply chain and to be used many times over. Manufactured with a strong outer skin to provide physical protection and using high performance insulation combined with phase-change material cooling. These can be purchased but are more frequently rented from the supplier on a short or long-term basis.

3. Active Unit Load Devices (ULD). A system that is designed as aircraft cargo equipment and utilises electrical and mechanical cooling to provide temperature control, powered by a combination of mains and battery supply. These units are rented for each shipment and usually via the shipper's third-party logistics (3PL) partner or from the airline directly.



# Factors contributing to the total cost of shipping

So, what are the other costs involved? These will depend on the type of temperature-controlled shipping system that is used. Figure 1 identifies the various elements that should be considered when calculating the total cost of shipping cargo via airfreight and using temperature control.



Figure 1 – A holistic view

If passive technology is being used, in particular single-use, it is normally the shipper who will store the system prior to use, who will require equipment to condition the components to the correct temperature and who will then need the manpower to assemble and configure the systems before loading the cargo to ship. These are all 'hidden' costs that may not have been considered, but with the development of passive systems that accept multiple pallet loads other processes are introduced with associated costs. For example, large amounts of space, conditioning rooms and operatives may be needed.

Although the theory is obvious, it is not necessarily that easy to quantify, and some of the costs may well be present anyway. Larger pharmaceutical manufacturers are likely to have large warehouses with staff and cold storage facilities which may not be at full capacity, so it could be argued that this cost is already present and therefore negligible. However, this is not the case in all situations and if the shipper has a smaller facility then the requirement for storage, conditioning and resource could be a burden on other operations.



### The theory in practice

The principles of the total cost of shipping have been discussed with various stakeholders during the writing of this paper, providing the opportunity to assess several different situations and different requirements.

These consultations also served to develop the theoretical stance of Part 1 and provide a practical view of the principles of TCoS. Table 1 is a summary of a situation where the shipper, working with its 3PL, wanted to assess the temperature-controlled packaging options and to understand what the subsequent total cost of shipping would be. In this example, the shipper had four US pallets of product. These required two passive shipping systems (either single-use or reusable) and one active RAP. All of the costs detailed in the table are representative and based on this scenario.

	Single-use passive shipper		Reusable Passive shipper		Active shipper	
	Item Cost	Total Cost	Item Cost	Total Cost	Item Cost	Total Cost
Shipping System	£750	£1500	£750	£1,500	£3,950	£3,950
Delivery charge to site	£50	£100	£100	£200	£250	£250
Storage on site	£25	£50	None	£0	None	£0
PCM Management (Conditioning)	£50	£100	None	£0	None	£O
Preparation	£50	£100	None	£0	None	£0
Freight Charges	£2,486	£4,972	£2,437	£4,875	£4,125	£4,125
In-transit management	None	£O	None	£O	£1,237	£1,237
Receipt Management	£50	£100	None	£O	None	£O
Disposal	£150	£300	None	£O	None	£O
Repatriation costs	None	£O	None	£O	£300	£300
Total cost of shipping	£7,222		£6,575		£9,862	

Table 1 – Real-life scenario



### A comparative view of temperature-controlled packaging options

Working in partnership the costs associated with using the different types of shipping system were identified and compared:

• Shipping System (purchase or rental fee). The cost to either purchase or lease the shipping system. For the single-use system this is a purchase price, for the reusable and active systems it is a rental fee.

• **Delivery charge to site.** This relates to transportation of the shipping system to the customer's site. For the single use system this is the cost to transport a bulk shipment of systems to the customer's facility. For the reusable and active systems, this is the transport cost to get a conditioned unit to the customer's facility for loading.

• Storage on site. This is estimated for the single-use system as it may be stored on site for up to a month before being used. This cost is not applicable to reusable passive or active systems.

• PCM management (conditioning). The cost to condition the cooling medium. This cost is not applicable to reusable passive or active systems as these solutions are normally delivered to the shipper pre-conditioned and ready to use.

• **Preparation (assembly & configuration).** The manpower required to assemble and configure the units. Many single-use passive systems are designed for fast assembly but processes have been developed that require several operatives. This cost is not applicable to reusable passive or active systems. Note – The cost of loading the products has not been included as this is the same for all options.

• Freight charges. This is based on a pallet weight of 100kg and a cost per kilo rate of £2.50. For the single-use passive the chargeable weight is the volumetric weight and for the reusable passive it is the actual weight (the highest in each case). An assumption is made that a pivot rate is applied to the active system of 1,650kg.

• **In-transit management.** The additional charge applied to active systems to ensure performance during shipping. This does not apply to passive systems.

• **Receipt management.** The manpower needed upon arrival at the destination site and upon unloading the product to dismantle a single-use passive system. This cost is not applicable to reusable passive or active systems.

• **Disposal.** The cost associated with the disposal of single-use passive systems. In many countries, it is now the responsibility of the shipper to ensure that proper provisions are in place to dispose of packaging materials according to local waste regulations, otherwise it can be necessary to transport the empty packaging back to the origin location for disposal or reuse.

• **Repatriation.** Repositioning following use. In this case, repatriation is included in the rental cost for the reusable system.

• **Cost of holding stock.** This is not captured in Figure 1 or Table 1, but if the shipper uses a large number of systems, these are likely to be ordered in volume rather than just-in-time, and therefore will represent significant funds tied up long before the shipping system is used.





#### **Complex challenges**

As this dynamic industry evolves there are also a number of complex challenges that have not yet been quantified. Some of these are outlined below.

Regulators are stepping up their scrutiny of the global pharmaceutical supply chain, especially where a product has a temperature label claim. For newer products, the manufacturer may review the marketing authorisation (MA) and, if commercially viable, may well resubmit the MA, stating different requirements for storage and transportation, therefore allowing more flexibility when reviewing and performing supply-chain qualification.

However, for those products that have been on the market for many years, this is unlikely to be financially viable so it is necessary to find the most cost-effective solution to allow for continuation of supply, compliant with global requirements for Good Distribution Practice (GDP). The shipper must therefore understand all of the costs associated with product shipments.

Shippers are also supplying to new markets, the BRIC countries for example (Brazil, Russia, India and China). Not only are these further away and therefore take longer to reach, but there are also new challenges with regards to customs clearance and in-country delivery. Markets such as these still have developing infrastructure and the environmental conditions may be more extreme, both hot and cold. Such issues elevate product risk within the supply chain and, as a result, there may be an additional cost that needs to be evaluated, the cost of compliance. A recent example came to light where a shipping lane was qualified, and as part of the process the shipping system had to be placed in a cold storage facility before the customs release process could be executed. Initially a water based passive shipping system was used, but the shipment was arriving in the destination airport within 60-72 hours of dispatch and, due to the energy still present in the frozen packs, could not be placed in cold storage. Therefore, it had to wait until 120 hours was reached when it could be placed in the cold store for the release process to be executed. This presents further risk and so would require further qualification to ensure a robust process.

Another area of cost that is not always quantified is qualification. GDP regulations expect shippers to assess risk within their supply chain and then perform appropriate qualification to ensure this risk is mitigated. The level of qualification required will depend on many factors, but the type of shipping system employed will certainly be a major element. The level of temperature control that is required for a product may also dictate the airline service that is required.

There are many airlines that now offer a premium pharma service, with the intention of giving the shipper assurance that their product will have a greater level of control and therefore lower level of risk whilst in the airline's custody. Such a service could include storage in a controlled temperature warehouse, minimised time on the tarmac during loading and unloading of the aircraft, reduced risk of offload and a full investigation should something go wrong, amongst others. The shipper will need to decide if this level of service is necessary to ensure compliance and whether the additional cost is justified.



### Conclusion

Many aspects of the supply chain can contribute to overall cost, but some get missed. As the realworld Table 1 shows, although a single-use passive shipping system would appear to be cheapest, in this scenario the cost of using a reusable solution is lower. However, it should be noted that in other scenarios the active system may have come out as the most cost-effective method.

It is not only cost that the shipper needs to consider when choosing the best solution. The impact that each solution may have on existing operations and what safeguards may need to be put into place should the unexpected happen (offloads, customs delays, etc.), also play a measurable part. With environmental concerns now high on the agenda and more countries raising concerns about waste packaging materials, this aspect too must be assessed alongside an already extensive list.

In order to be more cost efficient in response to industry pressures, transparency and analysis of supply chain costs provide opportunity for operational efficiency and cost savings. Understanding all of the costs associated with shipping and choosing the optimum thermal packaging solution can save over 30% per shipment.

If you would like to continue the discussion in person, please feel free to contact a Tower representative on info@towercoldchain.com or visit our website www.towercoldchain.com