

# Temperature sensitive pharmaceutical transportation – a changing picture

By Tony Wright

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As any manufacturer, producer or logistics expert will tell you, the global supply chain for temperature sensitive commodities is becoming increasingly complex, with a continual flow of guidelines and regulations designed to address consumer and

environmental concerns. For the pharmaceutical and biotech sector, the increasing value of individual products in terms of development and replacement cost, as well as their intrinsic value, is also placing a further element of potential 'risk' that all participants within the supply chain must adequately deal with. In addition, the continuing threat posed by counterfeiting is causing manufacturers to constantly review the distribution-to-market process of their products.

Organisations such as the US Food & Drug Administration (FDA) and the EU see the importance of good practices in the area of manufacture, handling, storing and distribution, as being vital to the efficacy of products (as do manufacturers). Furthermore, the World Health Organization (WHO) has also published a working document on Good Distribution Practices (GDP) that sets clear objectives for 'manufacturers, brokers, suppliers, distributors, traders, wholesalers, transport companies, forwarding agents etc'.

Their document also recognises that the supply chain is no longer simply a case of transporting a shipment from manufacturer to end-user, but a complex chain involving several differing methods, process and participants, with resultant increases in a risk of failure. It recommends that in order to maintain the original quality of the product, "every activity in the distribution of pharmaceutical products should be carried out according to the principles of Good Manufacturing Practice (GMP), Good Storage Practice (GSP) and GDP".

There are of course many other 'guidelines' and 'recommendations' for the safe transportation of temperature sensitive commodities, but what is becoming increasingly clear is that consumer safety (particularly as seen by the WHO, FDA, & EU) is

placing clear responsibility on producers and manufacturers for effective management of their cold chain.

## ***Growth & the globalisation of manufacturing***

A recent assessment of the global pharmaceutical market by Ernst & Young forecast that it will grow to US\$897bn by 2011, equivalent to a CAGR of 6.9%. Furthermore, strong growth in the 10 European markets that joined the European Union in 2004 will help boost European sales over the next five years.

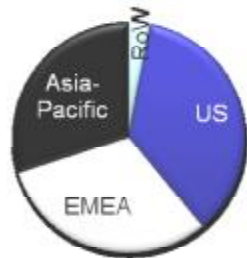
The market also remains polarised between 'big' and 'small' organisations with the top 10 companies accounting for almost 75% of total global sales. Figures for 2006/7 show Pfizer with US\$44bn worth of business, followed by Sanofi-Aventis, GlaxoSmithKline, AstraZeneca and Johnson & Johnson, respectively in the top 5. Furthermore, mergers, acquisitions & partnerships have been a clear strategic growth tactic within this sector and are likely to remain so. The opportunity for larger companies to capitalise on the R & D efforts of smaller, niche and increasingly biotech companies, is likely to be a continuing feature of the growth of 'large pharma'.

Growth of this nature as well as other market factors means the pharmaceutical industry faces continued pressure upon its cost structure – perhaps not surprising given the huge investment in the development of new products and the need to maximise the return on that investment before patent expiry. Outsourcing production to contract manufacturers is a significant part of many major pharmaceutical organisations strategy and a recent survey showed that in 40% of cases, this was because of a desire to focus on core (and more cost-effective) activities such as R & D and sales.

The most 'popular' regions for outsourcing include India (where there are more FDA approved sites than any country outside the USA), China and increasingly, Eastern Europe. The chart in figure 1 below highlights a significant shift in production over the last few years and shows the considerable share of the production market that Asia-Pacific now has.

Figure 1

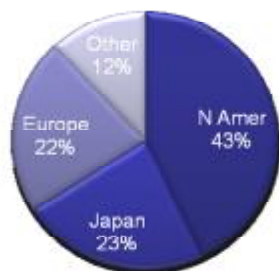
**Pharma/Life Science Production Site Distribution**



Compare this to the chart in figure 2 below, which shows the global regions of sale for pharmaceutical products, and the logistical challenges of efficient distribution to distant markets, whilst maintaining product integrity and efficacy become much more apparent.

Figure 2

**Pharmaceutical Sales**



Transportation and distribution of temperature sensitive products – and across an increasingly wide thermal span – will therefore need to remain at the very top of the agenda, particularly since it is forecast that by 2011, the market for contract manufacturing will have grown to US\$45bn.

## ***Air Cargo***

For pharmaceutical products distributed by air, there is still too much mystique about how the air cargo world operates, particularly its complex process and procedures & which need to be demystified, especially given the pressure upon manufacturers to be using a qualified shipping solution. The evidence for this comes from the recent work by the International Air Transport Association (IATA) when it formed an industry-wide committee to devise a new set of regulations specific to the pharmaceutical sector.

Manufacturers showed considerable misunderstanding about how airlines operate, particularly in areas such as outsourced ground handling and the potential for increased risk. For airlines, there were some clear & wrong assumptions about the temperature sensitivity of specific products that needed to be addressed.

Through its Pharmaceutical Cold Chain Interest Group (PCCIG) the Parenteral Drug Association (PDA), has taken the initiative to create a document known as TR39 which sets out to clarify the responsibilities of supply chain participants and this document is rapidly gaining ground as a leading source of reference. The vision of the PCCIG chairman, Prof. Rafik Bishara PhD, is to harmonize the many global, country and state specific guidelines for distribution, into a single reference.

For the air transportation of pharmaceuticals, what emerges is a common goal – to create a more coordinated approach & simplifying the complexity of the air cargo cold chain whilst also meeting regulatory & product efficacy requirements. Furthermore, the work undertaken for IATA on chapter 17 has undoubtedly opened the opportunity for greater dialogue between airlines, manufacturers and service providers. It must be grasped for the future benefit of all.

## ***Shipment Value & Risk***

One of the key drivers for the use of air cargo over other modes is naturally the weight to value ratio of shipped goods.

For the pharmaceutical and biotech sector where product research and clinical trial phases take an average 7-8 years to complete, the development cost of these products is extremely high. In addition, a natural desire for production cost savings, together with the recent spate of merger and acquisitions within the pharmaceutical industry,

can lead to larger shipment sizes and it is not unusual for a single LD3 aircraft container's contents to be valued well in excess of \$8m

But with these products, risk is not just about the costs of research and production. Many pharmaceutical & biotech products have a correlated sensitivity to temperature and high value which differs with individual commodities. Protein based products, for example have a high temperature sensitivity and significant value.

The risk of failure must therefore be mitigated by a logistic process that takes both elements into account and this can sometimes be exacerbated by the location of manufacturing sites as has been described earlier.

Risk assessment as part of a Quality Management System, should therefore not only include all the usual elements of the cold chain (manufacture, production, environmental thermal mapping, packaging, handling and transport etc.), but also incorporate an appraisal of the security processes being used by each and every participant in the logistic chain.

### ***Changes in European surface distribution & mitigating the effects of counterfeiting***

The European market for pharmaceutical products is expected to grow by 6%-7% over the next five years, but with the European Commission reporting that 2.7m items of counterfeit drugs were seized in 2007, producers have been keen to reduce any risk within their surface distribution practices.

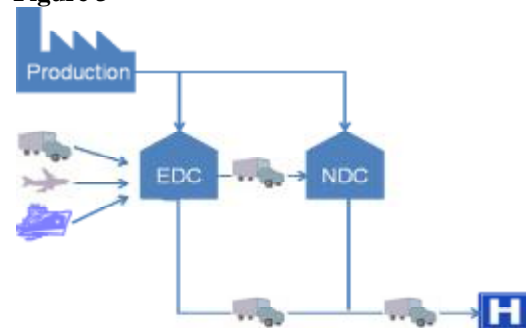
The most significant step for manufacturers is to establish end-to-end control of their distribution process and whilst technology such as RFID is a valuable tool, so is the reduction in physical handling processes. Clearly the more lengthy and participative the supply chain, the more

Following a successful trial by Pfizer in the UK in 2007, a system known as 'Direct-to-Pharmacy' (DTP) has gained more participants across Europe and is impacting upon the traditional roles of both European, Regional & National Distribution Centres (EDC, RDC & NDC).

opportunity there is for counterfeiting of products to take place and potentially inflict business losses.

Figure 3 below depicts what may be the first stages in a continuing process of change, where large EDC's in popular locations such as the Netherlands, coordinate products both from local and distant production sources and have the potential to deliver direct to hospitals and pharmacies across Europe.

**Figure 3**



Using 'last-mile' specialist distributors who may also operate the distribution centres under contract, it is claimed possible to remove the role of the wholesaler and using DTP, deliver direct to pharmacies and hospitals within the same logistical provider. The advantages of reduced exposure and increased security are obvious.

Not surprisingly however, the 650 or so wholesaler companies across Europe have challenged the efficiency claims of such a move, particularly on the grounds that these streamlined systems will not be able to provide the level of patient access to local stockholding of drugs. However, given the background of increased counterfeit risk, it is difficult to see anything but a continuing growth towards streamlined distribution of this nature and specialist companies already operating in this sector are well placed to maximise this opportunity.

### ***Conclusion***

For some logistics providers, meeting the needs of the pharmaceutical business may seem a daunting challenge- but this need not be so. Through incorporating high quality & independent expertise into their marketing, sales and operational procedures **and at an early stage**, those with a strong focus on quality and performance have an opportunity to serve a growing industry sector and create profitable long-term partnerships.