

Advanced Modelling & Simulation - AMS

CASE STUDY :

THERMAL PACKAGING OF MEDICINE AND PHARMACEUTICAL PRODUCTS

Transportation of pharmaceutical products in the best conditions is a crucial activity. The products can be affected by temperature changes and must thus be kept within a certain range during transportation. AMS can help you characterize your thermal packaging using CFD.

MOTIVATIONS

Passive thermal shipping systems are used for global pharma commercial 2-8°C shipments. When arriving at receiving site, in some countries, the payload is stored for a long time in a 2-8°C cold storage during customs clearance. Since the thermal shipping system is not designed for a long term cold storage, this leads to low-temperature excursions that might reach freezing temperature and ultimately end with a product write-off.



FIG. 1 AN INSULATED PHARMACEUTICAL CARDBOARD CONTAINER WITH PCM

Like many Pharma groups, our partner used cardboard boxes with EPS covers equipped with thermal-regulating PCM's (ice packs), as shown in the figure below (1).

PARTNER'S BENEFIT

The incentives are high for adopting CFD simulation of the process to assess the temperature distribution within PCM's containers during long-distance shipping where temperature regulation is critical.

Indeed, the risk of products degradation can be reduced by CFD simulation of the transportation process, which will highlight the most critical configuration in prevention and help adapt the transportation strategy accordingly, without loss of products.

TEST-CASE DESCRIPTION

A real container from our partner Roche Ltd Switzerland is loaded with cold ice cooling-elements subject to a long term 2-8°C storage. The ice cooling elements are expected to heat up and melt down, helping to control the temperature in the chamber of the container. The objective of the analysis is to simulate the evolution of the temperature inside the chamber, including hot and cold spots to ensure that temperature control requirements are fulfilled.

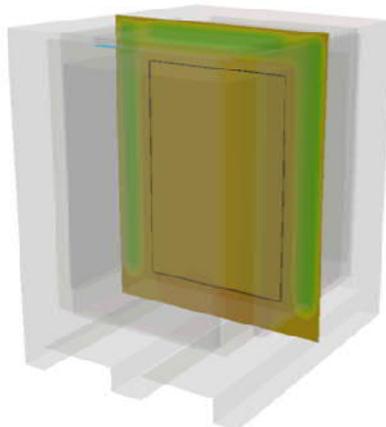


FIG 2. SIMULATED THERMAL FLOW IN A CARDBOARD CONTAINER WITH ICE PACKS

OUR SOLUTION

Pöyry's CFD experts rely on their own tool TransAT, which is based on most accurate and simplified methods to model thermal-flow processes within containers equipped with PCM cooling elements and identify the temperature distribution, including detecting potential risks of hot and cold spots during transportation. More details in the form of a presentation are available upon request.

PÖYRY'S AMS.

Pöyry's Advanced Modelling & Simulation (AMS) group provides consulting services in a broad range of industrial areas. The activities are centered on detailed simulation of fluid flow and heat & mass transfer processes pertinent to energy, industry and infrastructure.

AMS service is enabled by the CFD/CMFD product TransAT.

TRANSAT CFD/CMFD PLATFORM

TransAT is a versatile fluid-flow simulation platform (CFD) using the Immersed Surfaces Technology for multi-dimensional meshing. The platform is best suitable for multiphase flows using tailored predictive techniques and models for complex physics. TransAT can be used in the energy, industry and infrastructure sectors.

TransAT Website: www.transat-cfd.com