Cold Chain Management

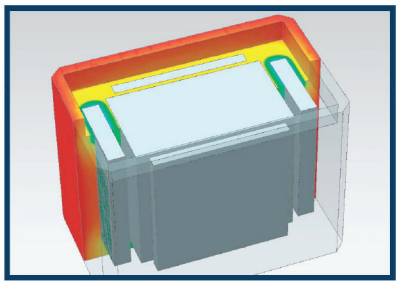
Safe and efficient shipment of temperature-sensitive vaccines worldwide

Bio-pharmaceutical products are highly temperature sensitive. Temperature stability during shipping is critical to preserve product quality and effectiveness. Simulation technology provides efficient thermal validation and certification for cold chain shippers working to distribute essential products, such as vaccines.

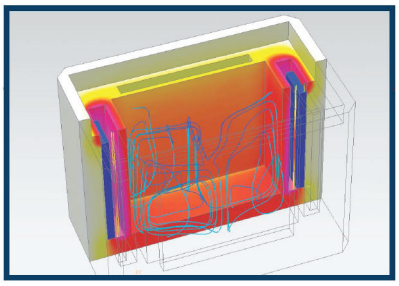
Global health challenges require broad cooperation and innovative solutions to build efficient global distribution channels and transport systems. Software tools offer the flexibility and efficiency needed to respond rapidly and effectively with cold chain packaging designed to spec.

Thermal simulation

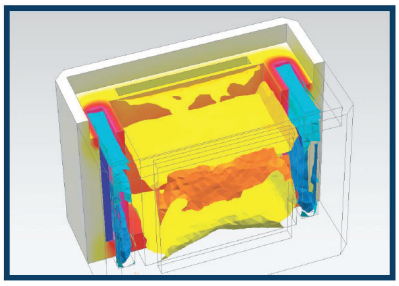
- Efficiently optimize design concepts and revisions
- Evaluate alternative distribution routing profiles
- Qualify designs for specific ambient temperature profiles
- Reduce iterative physical testing
- Assess the impact of temperature excursions during shipment
- Meet or exceed industry quality standards
- Reduce product liability costs



Shipper Temperatures



Air Flow



Air Temperatures

Fully parameterize simulation models for geometry to quickly and efficiently evaluate entire families of shipping containers.

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“Today we are designing and testing temperature-sensitive transport shippers virtually with NX/Simcenter 3D. This has made us faster, more flexible, and more effective at helping our pharmaceutical and biotech customers protect their valuable products throughout the transportation cold chain.”

– Larry Gordon, President
Cold Chain Technologies

Packaging and shipping route challenges require extensive research and thermal testing. Each combination of shipping conditions must be tested and validated to ensure good manufacturing practices (GMP) are being followed and that the essential products being shipped are protected. The time, effort and cost involved has a considerable and direct impact on the efficiency and cost-effectiveness of cold chain transport systems.

Simulation and modeling provides the unique insight needed to design, develop and test cold chain distribution packaging for temperature-sensitive products such as vaccines. Digital thermal models based on environmental conditions help speed up design cycles to discover and release effective packaging products faster. Simulation unlocks better cold chain packaging and routing solutions.

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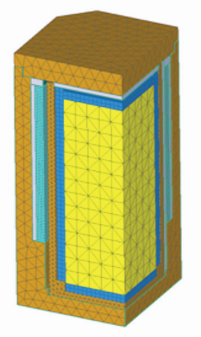
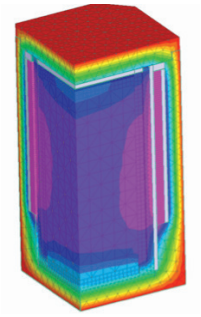
Predictive software

Improve the design of passive and active shipping configurations. Simulating transportation routes using accurate temperature predictions to optimize payload configurations and visualize product temperatures during a transportation cycle, at a fraction of the time and cost of physical testing.

- Model complex physics with precision, including transient phenomenon such as phase change that have a direct impact on product temperature.
- Model buoyancy-driven flow in shipper air gaps using 3D flow technology coupled with thermal simulation.
- Model environmental heating effects such as solar heating in any global location.
- Calculate humidity distribution and condensation on surfaces based on local conditions.
- Model static and dynamic responses with structural analysis tool.
- Simulate ISTA standards, such as drop/impact and random vibration tests.
- Plot product temperature vs. time for any ambient temperature profile, customized to any specific product routing.



Use powerful meshing techniques to quickly and accurately model typical pack outs and components such as phase change materials (PCMs), gel packs, product packages, etc.



Obtain accurate transient thermal responses of shipper pack outs for any time interval.

Efficiently model phase change characteristics of PCMs and automate transient response calculations.

Images courtesy of Cold Chain Technologies

Cold Chain Technologies (CCT) is a global provider of thermal packaging solutions to the pharmaceutical, biotech and health care industries. With engineering services, products and distribution throughout North America and Europe, CCT's team leads the industry in delivering innovative solutions for the control of temperature-sensitive shipments.

CCT's Kool Designs service offering uses Maya HTT's advanced thermal simulation technology to accurately model conduction, convection, phase change, and radiation to accomplish the complex task of predicting thermal performance of transit package designs.

About Maya HTT

- **Industry-leading software developer and provider of engineering services in computer aided engineering (CAE), computer aided design (CAD), computer aided manufacturing (CAM), product lifecycle management (PLM), and datacenter infrastructure management (DCIM)**
- **Extensive experience in design, analysis, systems integration and deployment**
- **Specializing in mechatronics, thermal, fluid and structural analysis, and composites**
- **Technological partner, software editor, and provider of Siemens CAE/CAD/CAM/PLM solutions for more than 30 years**
- **Worldwide customer technical specialist support**

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