

Executive Summary

ISTA Lane data represents the first comprehensive database of ambient temperatures experienced by packages in expedited parcel shipping. The project scope was to develop suitable laboratory testing profiles. The basis for suitability in this case was the execution of a pre-approved collection protocol with a rigorous analysis of the data. The result is confidence-based testing profiles collected from the field that reflect expected extremes in both warm and cold weather.

The large database of individual lane information for seasonal extremes also represents empirical definition of the seasonal extremes of temperature likely to be experienced in shipping to specific locations. They present "boundary conditions" for the overall thermal envelope for cold chain shipping in the studied region.

An effective cold chain strategy requires that information about shipping conditions be matched with the known performance of insulated shipping containers ("ISC's). Prior to this, this "matching" has been hampered by the lack of a systematic and quantitative approach. First, data on lane thermal conditions were spotty. Second, intelligence on lane thermal conditions has been difficult to apply to known performance characteristics of ISC's.

The purpose of this paper is to present a detailed method to leverage the ISTA lane data for specific ISCs over specific shipping lanes.

A key element introduced in this paper is called a Slope Response. A Slope Response is the function that defines a relationship between the mean lane temperature and the product temperature within the ISC at specified durations during transit.

Output of the Slope Response function will provide a sensitivity analysis that yields insight into interactions of ISC specifications, the routing, and service level. Every ISC can be characterized by using the ISTA data package with the Slope Response tool.

A software tool that is part of the ISTA Lane data package takes input data in the form of origination and destination zip codes. It uses that input to select the closest geographic equivalent lane data set, and then reports the expected extreme mean temperature for that lane.

This approach to cold chain strategy provides a practical method to field data in making informed choices of packaging and shipping methods to optimize shipping efficiency and to assure safe transit of thermally sensitive materials.

A complete discussion of the use and application of the Slope Response function is contained in the Appendices.