

A Message from Packnet Ltd. Founder & CEO, Mike Nyberg

Sensitive But Secure Examining the Importance of Packaging in the Distribution Environment

Distribution packaging provides the first and most important line of defense against the hazards of the distribution environment. A well designed distribution package can make an immediate and significant contribution to a company's bottom line by reducing or eliminating product damage and decreasing transportation costs. A properly designed package will also enhance company image.

The packaging design mission is to achieve optimum cost by balancing the sensitivity of the product with the protection provided by the packaging to match the hazards existing in the distribution environment.

The science of distribution packaging is more sophisticated and complex than most people expect. There are dozens of methods, techniques and systems for improving distribution packaging and reducing total cost.

Let's take a look at the distribution environment and examine the hazards cargo will encounter.

Consider the Airplane

Shipping product via airfreight presents a variety of challenges. There is no faster way to get your shipment from point A to point B, but the additional cost and potential for damage create a problem.

Start with the handling. A shipment that travels via airfreight will be handled many times by numerous people with a variety of handling equipment and a diversity of care levels. Each stage of the journey creates its own tribulations.

Shock and vibration are concerns within an aircraft's cargo hold. Turbulence can cause packaged product to experience severe shocks when sudden drops occur. High frequency vibrations are transmitted from the aircraft engine to products and can cause internal component damage in electrical components.

Next, consider the cost. Airfreight is the most expensive mode of transport and is based on either the weight or cubic volume of your product and package. Minimizing both of these characteristics can save thousands of dollars per year.

Finally, consider the destination. There may be size restrictions because of the aircraft size that transports to that location, pilferage of your product, storage of your package outside at the terminal or customs, and corrosion issues due to humidity from temperature changes.

Consider the Cargo Ship

Imagine rolling, pitching, heaving, surging, yawing, and swaying all at the same time. These are the six different directions a ship at sea may move simultaneously.

Packaging for ocean shipment requires the use of specialized techniques that go beyond other forms of transport packaging. Much annual cargo loss can be prevented or minimized. Recognizing the proper preparation, packing, marking, and blocking and bracing can have a great influence on successful delivery of goods.

Where cargo is stowed on the ship will dictate most of the type of shock or vibration it will experience during ocean transport. For most cargo ships, the bow area receives the highest shock from the ship tilting from the waves and returning with a slam. A container located on the middle deck of a ship may travel in a 70-foot arc with each complete roll; as often as seven to 10 times each minute. A container located in the stern of the ship may experience continuous vibration from the engine and propeller excitations.

Corrosion causes billions of dollars a year in product loss. There are specific preservation techniques that protect cargo from the harsh and random environments products will encounter when exporting by ocean freight.

Consider the Train

Shipping product via rail dates back to the 1800's and is our oldest form of land-mechanized transportation.

The unique characteristics of rail transport can accentuate the shock and vibration your cargo will encounter from the combination of vertical, lateral and longitudinal forces.

Railcar coupling shocks are considered separate from other transport shocks because they can impose severe loads on cargo. These coupling shocks are a result of impacts between cars during train makeup in switching yards. A minimal impact speed of approximately 2 mph is generally required for actuation of the automatic couplers, while 4 mph is considered undesirable because of potential damage to cargo. In a study of 4,647 observations of coupling impacts, more than 50% of impacts were measured greater than 5 mph.

The type of boxcar your cargo will be transported in will also create distinctive hazards during transport. Studies show lateral low frequency, 2-4 Hz, rolling motion in boxcars. This motion is more severe or pronounced in boxcars equipped with standard draft gears. This type of boxcar is predominantly equipped with roller side bearings and allows a greater freedom of movement.

Other concerns during rail transport include crossing of an intersecting track, weight of cars, load configuration, number of active cars, car center of gravity, and track orientation.

Consider the 18-Wheeler

Shipping by truck is the backbone of the distribution environment. Whether product travels exclusively by truck or it's only one of the modes of transport during its journey, a package will experience many variables, most of them beyond your control.

Truck shipment exposes product to significant material handling risks. Manual or mechanical handling occurs at the loading, unloading and transfer points. Designing the proper outer container, internal cushioning, warnings, impact indicators, and unitization can minimize the effects of the handling cycle.

There is generally very little control over the operation of commercial vehicles and the resulting vibrations, shock and impact transmitted to cargo. Some of the factors that can endanger product include trailer suspension, tire condition, driver experience, gross load of trailer, location of cargo within the trailer, road conditions, and traffic hazards.

Other perils may include the orientation of the package, climactic variations and the static compressive load experience. For example, static compressive load can result in extremely high

dynamic loads on the bottom containers, even for the low stacking heights in vehicles. A level of one G acceleration will add the equivalent of a static load twice that existing on the bottom container.

Considering and acting on all these factors affects whether a product will successfully be delivered damage-free when traveling through the distribution environment. Balancing the protection level and the cost is where the true savings can be found.