

## **PACKAGING and TRANSPORTATION FORENSICS**

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# **PACKAGING *and* TRANSPORTATION FORENSICS**

*Reducing Risk and Liability*

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**DEStech Publications, Inc.**

## **Packaging and Transportation Forensics**

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# Preface

**T**HE content of this book is intended to provide the reader with a clearer understanding of the importance of regulations and legal requirements that affect the interaction of a package with humans through the course of its design, production, marketing, shipping, sales and use where physical or economic harm may result. This includes the life of a package system in the entire value chain from the materials applied, manufacturing and filling, labeling and all interactions during its useful life. It ends with the final environmental impact at the end of use. At any point during this time a package may cause or be claimed to cause an accident leading to damage and loss.

The authors have served as consulting and testifying experts to represent clients and plaintiffs on behalf of law firms and insurance companies, as well as working with defendants on behalf of manufacturers and their insurers. During this activity, spanning over 30 years of our careers, we have come to an understanding that for various issues, for example, standard of care and personal injury, risk and liability can be significantly reduced. Risk mitigation can be achieved by proper choice of materials, conducting scientific testing to show that the design selected is based on technical and marketing superiority and keeping costs from becoming prohibitive for consumer purchase. Based on our collective experience we have created this book for packaging professionals as well as technical experts whose responsibilities are to evaluate the roles and functions of a package while ensuring risk is not added.

In addition this book may be used by universities and academic institutions as part of the curriculum in elective courses taught to juniors and

seniors in packaging and business programs. In the packaging industry a book of this type has long been needed to provide an understanding of legal issues that may affect a package and its manufacturer or shipper, before or after involvement in a lawsuit. It also offers guidance in the use of proper testing techniques and the design and selection of labeling that can be used in reducing liability and risk.

We would like to thank the faculty, staff and students at both of our universities packaging programs (Michigan State University and Cal Poly State University) as well as the numerous attorneys and industry experts who assisted us in preparation to testify as experts in various lawsuits.

Lastly thanks to our friends and families who helped us during this time!

PAUL SINGH, Ph.D.  
JAY SINGH, Ph.D.

## Introduction

**T**HIS book, *Packaging and Transportation Forensics: Reducing Risk and Liability*, examines recent cases in the areas of patent infringement, trademark duress, shelf-life and seal-integrity issues on food packaging, shipping damage from lack of protective packaging, and personal injury and product liability issues related to packaged products. Some issues are regulated or governed by law, while others are simply decided by juries based on whether a plaintiff or defendant demonstrated that industry practices and standards might have prevented an event. Users of this book could be packaging professionals whose primary aim is to reduce liability and lawsuits by users of packaging that their employers sell; users of this book might also be individuals or experts who want to understand their role in assisting clients facing litigation. *However, this book is not intended to determine who is right or wrong in a given case; that decision lies primarily with the courts in which cases are tried.*

The authors of this book have both worked as experts in the field of packaging, transportation, and material handling. Experts may be either consulting or testifying, and their opinions are used by an attorney to understand a problem in a lawsuit. Experts sometimes testify by filing notarized affidavits or declarations, or they give sworn testimony at a deposition or trial.

Each chapter starts with a general introduction to its topic, describing how it relates to packaging cases, followed by a discussion of specific packaging cases, some of which may seem frivolous and others where an inferior or unsafe design compromises the safety of consum-

ers. Many of these civil cases are settled through mediation or after discovery and an exchange of expert reports. It is therefore difficult to determine whether plaintiff or defendant was at fault without a verdict from a jury or judge.

While various packaging issues are raised in this text, the authors want readers to know that they are not pro or con in a suggested issue when there was no final outcome in a case and both parties accepted some responsibility in reaching an amicable settlement. The book covers the transportation and material-handling industry as it impacts the shipping and handling of products and packages.

The authors' aim is to assist manufacturers, retailers, and consumers to *reduce the risk of liability arising from lawsuits, while manufacturing, transporting and using packages for various products.*

Chapter 2 contains a glossary of terms common to the packaging industry. These terms often play a critical role in a case. The terms may deal with the "prior art" issue in patent-infringement cases by demonstrating that a claim representing a package component or technology was previously developed before the patent's application date. Such issues can either be reexamined by the U.S. Patent and Trademark Office or appear as a contested patent in the federal court where the patent owner is being sued. The terms may also clarify a package's classification, which determines tariffs, duties, or customs imposed on imported articles. These kinds of cases are tried by the Justice Department's International Trade Field Office in New York.

The third chapter focuses on product liability cases in which the authors have been involved, most of which settled before trial. Most of these cases did not concern the Code of Federal Regulations but rather failure to follow consensus standards developed by the industry. This failure often shows a lack of good manufacturing or packaging practices. The chapter looks at these consensus standards and discusses international associations that foster safety and a minimum level of performance in package materials and systems integrity.

Chapter 4 deals with personal injury cases that come up in civil courts resulting from accidents. These range from fatal injuries from handling packages that may be large and heavy and somehow placed into commerce or transportation while being unstable and result in catastrophic accidents. Others relate to faulty dispensing devices that cause harm or hazardous chemicals that, when leaking, harm the environment and humans. This chapter makes no attempt at discerning which party was right or wrong, since these cases reached an amicable settlement



before trial. The cases are presented based on issues described in the complaints filed in the court, the corresponding discovery, and expert opinion that may have been rendered prior to settlement. *It is for the reader to determine how a certain package and its materials and form can reduce the risk of litigation in case of an accident.*

The fifth chapter discusses intellectual property cases relating to the infringement or validity of a patent. It also covers trademark cases involving packaging shapes and profiles that provide branding and design features that prompt retail recognition. In most cases when a plaintiff accuses a defendant of infringing on a patent, the defendant files a case claiming the patent is invalid. If this is made obvious to the court, it forces the court to dismiss the case. While the Patent and Trademark Office tries to ensure that all new patents and trademarks are original, it is the ultimate responsibility of the patent applicant to prove rightful ownership of an original idea, concept, product, or process.

Chapter 6 examines labeling, markings, and warnings placed on a package. All information that is presented on a package, along with colors and logos, helps identify the product in a store where thousands of other products are displayed. Information such as quantity, weight, volume, warnings, and precautionary markings is required on a package to protect the consumers and warn them of potential effects. The seventh chapter focuses on cargo securement and loading and unloading issues of trucks, ships, trains and aircraft. The authors have assisted clients in more than one hundred cases in this area. Agencies such as the Department of Transportation, the International Maritime Organization, and the Federal Aviation Administration govern safe passage of goods through various channels of transportation. This section discusses regulations primarily concerning truck shipments, which are a common source of damage and injury while moving goods in North America. Chapter 8 covers transportation law and regulations for food products and hazardous materials for which packaging, labeling, and transportation are strictly regulated. Chapter 9, "Tamper Evident and Child Resistant Packaging," covers the primary packages used to dispense pharmaceuticals and chemicals subject to the Poison Prevention Packaging Act, which requires specialty closures such as child-resistant and tamper-evident caps on bottles. The efficacy of these systems needs to be tested to show that they meet the desired objectives and functioning criteria.

The tenth chapter covers fork-truck injuries and accidents and corresponding to Occupational Safety and Health Administration regulations

for package handling. Chapter 11, “Laws on Environmental Packaging,” discusses local, state, and federal regulations that cover environmental protection. It also discusses the environmental impact of packaging. Finally, Chapter 12 looks at what is required when giving written testimony in an expert report. We have shared five expert reports from packaging and transportation liability cases. While preparing this book, the authors were engaged in lawsuits that helped shape the examples they cited. In reviewing textbooks on the role of science in litigation, the authors came across a quote stating that an expert does not reach conclusions or provide opinions before analyzing the evidence:

*It is a capital mistake to theorize before you have all the evidence. It biases the judgment!*—Sherlock Homes to Doctor Watson in *A Study in Scarlet*

## Packaging, Transportation, and Material-Handling Terminology

**T**HIS chapter focuses on terms used in the fields of packaging and their association in the transportation and material handling industries. The terms relate to units of measure, forms, and manufacturing. For example, the measurement of 1/1000 of an inch for the thickness of paper, a unit of measure called a caliper, is referred to as *point* for paper-based packaging materials, whereas the same caliper is referred to as *mil* for plastic films. A 3-mil-thick plastic film has the same thickness as a 3-point-thick paper. Terminology plays an important role in intellectual property cases that involve patents and trademarks. Terms can play an important role in decision-based arguments in customs and tariff and classification cases. This chapter first defines two terms used in this book's title.

*Packaging* is the art and science of safely containing, protecting, using, and communicating about a product while protecting the environment [1]. *Forensics* is the application of a broad spectrum of basic sciences and engineering principles to answer questions of interest to a legal system. The authors therefore define *packaging forensics* as the use of this broad spectrum to resolve legal disputes and other issues related to packaging methods and systems.

This chapter presents some critical packaging terms, their definitions, and the sources of the definitions. In providing testimony and expert opinions, an expert relies on the vocabulary used by craftsmen, employees, and professionals in a given industry. The terminology in the packaging industry is an interesting synthesis of art, science, and trade. However packaging terminology and its interpretation can play a critical role in how a product is treated in a court of law.

Besides the well-known Webster and Oxford dictionaries, there are numerous sources of packaging-industry terms. The Packaging Manufacturers and Machinery Institute created a text called *Glossary of Packaging Terms*, which is no longer in print. It has been replaced by the Institute of Packaging Professionals as the *IOPP Glossary of Terms* [2]. Two other credible sources of packaging terminology are the *Encyclopedia of Packaging Technology* [3] and ASTM D996 [4]. Various packaging textbooks and periodicals also cover the terms in the packaging industry through articles and new-product releases.

In this chapter we will focus on lawsuits and challenges that are related to packaging terminology. The three initial examples are cases that tried in the International Trade Court in New York. S. Paul Singh served as the expert witness in all these cases on behalf of the U.S. government. The cases involved an imported article and whether a “packing for conveyance” could be used for its classification, thereby adding to its tariffs.

To understand why terminology is critical for classification of an item, we use the example of an 1893 case in which the U.S. Supreme Court decided on the classification of tomatoes as a vegetable. The tomato, the often red fruit of the plant *Solanum lycopersicum*, is consumed in diverse ways, including raw, and as an ingredient in many dishes, sauces, salads, and drinks. While it is botanically a fruit, it is considered a vegetable for culinary purposes and under U.S. customs regulations based on a court decision in *Nix v. Hedden*, which caused some confusion.

Botanically, a tomato is a fruit: the ovary, together with its seeds, of a flowering plant. However, the tomato has a lower sugar content than other fruits and is therefore not as sweet. Typically served as part of a salad or main course of a meal, rather than at dessert, it is considered a vegetable for most culinary uses. This dispute has led to legal speculation in the United States. In 1887, U.S. tariff laws that imposed a duty on vegetables but not on fruits, caused the tomato’s status to become a matter of legal importance. The Supreme Court settled this controversy on May 10, 1893, by declaring the tomato a vegetable, based on the popular definition that classifies vegetables by use and that they are generally served with dinner and not dessert [5]. The holding of this case applies only to the interpretation of the Tariff Act of March 3, 1883, and the court did not purport to reclassify the tomato for botanical or other purposes.



FIGURE 2.1. Citizen Watch's Eco-Drive watch package [7].

## 2.1 Example 1: Reusable Package (*Citizen Watch Co. v. United States*) [6]

This case involved the tariffs related to a new design to pack and display “eco-drive” watches (Figure 2.1). The package for these watches was developed by Citizen Watch Company and manufactured by suppliers in China and Thailand. The package’s unique shape was cylindrical and made from “eco-friendly” materials.

The plaintiff argued that the packages were only made to distribute the product one time and not designed or intended for storage or display. On the contrary, the defendants claimed that the new package was used to display and market the watch to retailers such as Walmart. An important question raised by the plaintiff’s legal team for the packaging expert was how to determine if this or any other package was reusable and how many uses constitute a reusable package. The underlying question about the packaging terminology was whether the packaging literature distinguished between a single-use and reusable package. The defendants wanted to demonstrate that consumers used this new package to store the watch and that retailers used it to display that product, making it a packing for storage and conveyance and increasing tariffs on this imported merchandise. There are also different expectations for reusable packaging among consumers (reusing a reusable shopping bag, for example) and an automotive company that uses a plastic reusable bin for automotive parts being shipped between suppliers and assembly

plants. The latter often decides this based on business decisions that include improved part quality and reduction in damage. A consumer who reuses a plastic shopping bag might be emotionally attached to helping the environment by reducing waste.

## 2.2 Example 2: Air-Tight Packaging (*Sensient Flavors v. United States*) [8]

In this case, tariffs were imposed on a product packaged in a plastic pouch that was vacuum packed with dehydrated vegetables shipped as premium ingredients to hotels and restaurants. The package was classified as air-tight packaging. With their own expert on food packaging, the plaintiffs argued that the laminated foil and plastic pouch shown in Figure 2.2 is an air-tight package. The defendants showed that oxygen and nitrogen transmission rates demonstrate the permeability of both these gases through the plastic and foil laminate structure. The package was not, therefore, air tight. In fact the term *air-tight packaging* was discussed during ASTM D10 Subcommittee on Packaging meetings, and the task group on terminology agreed with this analysis. The only example of a true air-tight package for purposes of clarification presented to the court was a glass ampoule used to fill pharmaceutical liquids; it was an absolute barrier to liquids and gases, maintained at all times unless the ampoule is broken.

## 2.3 Example 3: Plastic Bottles for Kids' Bubble Bath Shaped as *Sesame Street* Characters (*Minnetonka Brands v. United States*) [9]

The issues in this case revolved around classification for purposes of tariff of blow-molded plastic bottles (Figure 2.3) shaped as *Sesame*



FIGURE 2.2. S. P. Singh.



FIGURE 2.3. Minnetonka Brands' line of Sesame Street soakies.

*Street* characters. The empty bottles were purchased from China and filled with bubble bath liquid by the plaintiffs at their manufacturing plant in Minnesota. The entire product was sold by retailers in the United States. The importer and plaintiffs in this case contended that the product was classified as a toy and not a packing for conveyance of liquid bubble bath.

Toys from China have been exempt from U.S. customs. The court agreed with S. Paul Singh's testimony on behalf of the United States on the definition of terms related to the package and plastic bottle. But the court decided for the plaintiff, stating that during actual use of the bottle to dispense as bubble bath, and when it was empty, a child using the bottle would likely consider it as a toy. Hence the exemption on customs applied.

In a similar matter the court had ruled that key rings that were imported by McDonald's and sold with Happy Meal promotions were in fact to be considered as toys. That is because the user of that article of merchandise does not ever consider putting keys in this product, but merely gets amused by it.

#### **2.4 Example 4: Thermoformed Plastic Clamshell for Grapes (*Tradewind Farms v. United States*) [10]**

This case involving classification concerned a plastic thermoformed



clamshell container with a hinged lid (Figure 2.4). The container was a great success in 1990s for the marketing and sales of fresh berries by Driscoll's, a leading grower and shipper of strawberries, raspberries, and black berries. The unique clamshell packages were designed to handle one pound of strawberries and six ounces of raspberries. However, Costco, a leading retailer, found great benefit in these types of packages. High-quality produce was visible, but the packaging did not allow consumers to handle the fruit in the store. Costco decided to introduce a clamshell for grapes, replacing the bags that were conventionally used to ship grapes, as shown in Figure 2.4.

The container, manufactured in Italy and imported into the United States by the plaintiff, Tradewind Farms, could hold four pounds of table grapes and has vents in the top, bottom, and for airflow. Exhibit 3 shows a sample of the merchandise during my inspection in California in September 2005 at a Tradewind Farms customer's farm. Exhibit 4 shows the samples of the same merchandise container label. Exhibits 5, 6, and 7 show the merchandise containing four pounds of table grapes packaged by a customer of Tradewind Farms and purchased by me at a



(a)



(b)



(c)

FIGURE 2.4.



Costco store in California in September 2005. S. Paul Singh, expert on behalf of the United States, was informed that the plaintiff had claimed that the merchandise at issue met the three-part test under 9817.00.50 of the U.S. Customs publication “The Agricultural Actual Use Provisions” and understood that the three tests are required by the Customs to determine eligibility. In his report, the defendant’s expert showed that the article was a type of packaging that did not meet the classification under 9817.00.50 “Machinery, equipment and implements to be used for agricultural or horticultural purposes.” He testified that the choice of this particular container was initiated by Costco to sell a larger quantity of fruit in its stores. The container was used to package, protect, and display the fruit for consumers to purchase at retail stores, and the merchandise therefore did not qualify as duty-free entry for a horticultural implement under 9817.0050. There was exemption of any import taxes on items under the horticultural implement classification. The plaintiffs argued that a similar item was a clay or plastic pot used to hold trees that are grown on a farm and then shipped to retailers, where consumers purchased them. However it was because of the role of the clamshell container, with its clear and transparent look, labels to enhance marketing of high quality grapes, and the “containment and protection” function required of a package, that the court found in favor of the defendant.

The classification of packages for merchandise plays an important role in today’s retail environment. Packages are also the “products” when we consider a “can of Coca-Cola,” a “bottle of Gatorade,” or a “Lipton’s teabag.” While the packages provide containment, protection, utility, and communication, it becomes clear that the package is the product with which consumers interact. It is important to realize, therefore, that *a package sells the product*.

## 2.5 References

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## Personal Injury

**T**HIS chapter focuses on cases in the area of personal injury. Cases involving personal injury are often on behalf of plaintiffs against manufacturers who develop, market, and sell products with a latent threat or risk of injury. Critical underlying terms specific to personal injury cases and law are discussed at the start of the chapter.

It has been often cited that only 4 to 5 percent of personal injury cases in the United States go to trial. Cases involving packaged products as a cause of personal injury to a consumer or user are a small percent of these cases that reach trial and often involve either catastrophic injury or fatality that is based on negligence of the defendant. Most cases—95 to 96 percent—are settled pretrial. This number is recited by attorneys and experts. These numbers are usually based on statistics reported by the U.S. government based on cases filed versus those that are tried.

While the above numbers are acceptable, as authors, we find the following statistic quite interesting. Many experts believe that 90 percent of the cases that do go to trial end up losing. It is also stated that cases tried in front of a judge rather than a jury do better. It is important to realize that the time it takes to get a decision for a client in a case going to trial can be exhaustive and expensive and at the end a total loss. The steps involved in a personal injury case are the same as in a criminal case, but the resources are those of the law firm representing the plaintiff, and therefore the plaintiff's lawyer can be the one who decides the level of expert testimony, packaging forensics, and opinions that either party may require to demand the damages sought.

The injuries, the accident itself, witnesses, circumstances surrounding the accident are all aspects of the case that need to be investigated. This is a phase of the case that is known as discovery, which can range from several months to a year and includes any analysis and tests that are done by either party. This portion is then followed by the depositions of the experts disclosed by both parties. Based on this testimony, discovery information, and evidence, the parties may seek mediation, which is a legally supervised negotiation to reach settlement.

In the case of *William Neill (deceased) v. Steel Master Transfer in Warren, MI*, an accident occurred during the unloading of a steel conveyor at a Ford Motor Company plant in Michigan. A supervisor was instructing the unloading process with a Ford employee using a fork truck when an improperly packaged and crated top-heavy (high center of gravity) container fell and struck the plaintiff on the skull, killing him instantly (Figure 4.1).

S. Paul Singh, co-author of this book, has been retained on numerous personal injury cases that are the direct result of improper loading and unloading of products off truck trailers, railroad cars, and ships. The proper securement and protection of cargo during shipment is regulated by law and covered by various industry standards. These are covered in Chapter 8 in more detail. Figures 4.2, 4.3, and 4.4 show fallen loads that caused tragic injuries to truck drivers and unloaders.

To analyze and determine the role a company's professionals, repre-



FIGURE 4.1.



*FIGURE 4.2.*



*FIGURE 4.3.*



*FIGURE 4.4.*

sentatives, and experts are to play, it is important to understand the interpretation of three important legal terms that will be used by the court.

#### **4.1 Negligence**

The term *negligence* refers to “failure to exercise the care toward others which a reasonable or prudent person would do in the circumstances, or taking action which such a reasonable person would not.”

In understanding this term’s legal implications, it is important to know that negligence is accidental, as distinguished from intentional torts (assault or trespass, for example) or from crimes. Negligence can result in accidents to both individuals and property.

In a legal case, the plaintiff filing a complaint for negligence must prove:

1. That the party alleged said to be negligent had a duty to the injured party, specifically to the one injured or to the general public,
2. That the defendant’s action (or failure to act) was negligent and not what a reasonably prudent person would have done,
3. That the damages were caused (“proximately caused”) by the negligence. An added factor in the formula for determining negligence is whether the damages were “reasonably foreseeable” at the time of the alleged carelessness.

Along with contracts and business disputes, negligence is one of the greatest sources of litigation in the United States.

#### **4.2 Foreseeable Risk**

*Foreseeable risk* refers to a danger that a reasonable person *should anticipate* as resulting from his or her actions. Foreseeable risk is a common affirmative defense put up as a response by defendants in lawsuits for negligence. For example, an individual unloading a tractor-trailer is severely injured when the stretch wrap used to unitize packages on a pallet fails and the load falls on the individual. While there is potential risk, he had the right to anticipate that the stretch wrap film was properly applied. He did not assume the risk that it would come apart causing injury. Signs that warn, “Use at Your Own Risk” do not prevent lawsuits for risks that are not foreseeable.

#### **4.3 Gross Negligence and Punitive Damages**

*Gross negligence* is carelessness in which reckless disregard for the safety of others is so great as to be a conscious violation of their rights to safety. It is more than simple inadvertence, but it is just shy of being intentionally evil. The cold-chain environment is an important consideration in protecting food packages containing perishables such as milk, eggs, meat, and seafood, helping prevent the growth of organisms that can harm individuals if consumed. If one has contracted to take care of another’s refrigerated food packages for storage in a warehouse, then gross negligence is the failure to actively take the care one would for his or her own food products in the same facility. If a court finds gross negligence, it can award punitive damages on top of general and special damages.

#### **4.4 Example of a Jury Award for Personal Injury Case**

In a 2013 case of a construction site negligence matter in Cook County, Illinois, the plaintiff ironworker suffered quadriplegia after he fell 15 feet onto a concrete floor. The defendant denied liability and maintained that the plaintiff’s injuries were caused by his own negligence, including his failure to use a safety harness.

The plaintiff, a 41-year-old ironworker, was working on a beam during a warehouse addition project. The defendant general contractor al-

lowed shear studs, which are horizontal studs sticking out inches from the top of the flange or walking surface where the ironworkers walk while performing their job duties. This created a trip hazard. The plaintiff fell 15 feet from the beam. His head made contact first with a four foot wall; the rest of his body then landed on a concrete floor.

As a result of the fall, the plaintiff suffered a traumatic brain injury and a broken cervical spine, as well as a complete dislocation of his vertebrae, which resulted in paralysis from the chest down. The plaintiff requires round-the-clock care for the remainder of his life. The plaintiff also suffered neurological problems from the fall, which resulted in a documented drop in his IQ. He suffered numerous complications as a result of his injuries including osteoporosis, muscle atrophy, severe edema, and a split penis due to continual catheterization, a paralyzed bladder, and a neurogenic bowel. The plaintiff underwent several surgical procedures for bedsores, as well as tendon transfer surgery to provide some functionality to his hand.

The plaintiff brought suit against the general contractor, alleging that the contractor was negligent in failing to provide a safe work environment and in failing to comply with safety regulations. The defendant disputed liability and argued that the plaintiff failed to use the safety basket on the date of the incident and therefore caused the injuries through his own disregard for safety. The defendant denied that it violated any safety procedures or protocols and maintained that it was the plaintiff's own negligence that caused his injuries. The defendant also disputed the nature and extent of the plaintiff's alleged damages and injuries.

The plaintiff countered by presenting evidence that it is impossible and even dangerous for ironworkers to work or attempt to work in the safety baskets, which the defendant maintained were present on the job site and the plaintiff chose to not use on the date of the incident. The defendant alleged that the plaintiff had used the safety baskets regularly prior to the incident, and his disregard for safety on the date of the incident was the sole cause for his fall and resulting injuries. The plaintiff presented testimony at trial, including expert testimony, that the use of the safety baskets for ironworkers actually created a more dangerous condition. The plaintiff's expert explained that safety baskets could tip over.

The plaintiff maintained that the safety feature that was plainly lacking at the work site was the lanyard and stanchion method, where each beam is equipped with stanchions at the ends with a safety line through them. A worker clips onto the safety line and then can fall no further than four feet from the beam in the event he is knocked off or loses his



footing. The plaintiff alleged that no such safety measures were in effect at this worksite, despite a safety plan that outlined them specifically for this worksite.

The matter proceeded to trial after settlement negotiations were not fruitful. At the conclusion of the three-and-a-half week trial, the jury deliberated for seven hours over two days and returned its verdict in favor of the plaintiff and against the defendant. The jury determined that the plaintiff was 20 percent liable and the defendant was 80 percent liable for the plaintiff's injuries and damages.

#### **4.5 Partial Fault by Plaintiff and Defendant and Who Is Responsible**

Federal and state courts may vary in how they determine liability to decide the verdict and award. The total damages that may be presented to the plaintiff in an injury case could be determined by any of the following: cost of care for disfigurement; past medical care; the present value of future medical care; lost wages; future lost wages and benefits; loss of a normal life; future loss of a normal life; and pain and suffering in the past and future. A defendant may appeal the verdict, and any award that actually reaches the plaintiff may be delayed.

#### ***McKay v. Furniture Row***

In the matter of *Dan McKay v. Furniture Row*, filed in district court in Adams County, Colorado, I was retained on behalf of the plaintiffs, Dan McKay and Pat McKay, in 2009.

The accident at issue in this case and that caused injury to the plaintiff, Dan McKay, occurred on August 18, 2009, at the Furniture Row stores in Lubbock, Texas. On the day of the accident, McKay was an employee or independent contractor of McKay Trucking, LLC. McKay Trucking was contracted by First Choice Transport to drive the trailer at issue in the accident from Boise City, Oklahoma, to pick up a sealed load that had been driven from Denver, Colorado. The load had been moved from Colorado to Oklahoma by a different driver and tractor unit of First Choice Transport. McKay Trucking had been contracted by First Choice to move the sealed trailer from Boise City, Oklahoma, to Lubbock, Texas, to the Furniture Row store. Since the plaintiff McKay was moving a sealed trailer, he could neither examine the inside of the loaded trailer that he was going to transport nor determine if the load



was adequately secured in accordance with CFR 49 and the Federal Motor Carrier Safety Regulations. In testimony provided by Rick Brockman, warehouse manager of the Pillow Kingdom Distribution Center, a Furniture Row company, he stated that the trailer was loaded by an employee named Carlos Basurto. After loading the trailer, a different employee and truck driver actually moves it from the loading dock, closes the doors, applies the seals, and then parks it before it is picked by First Choice Transport. Therefore it is the driver and employee of Pillow Kingdom who last has the opportunity to view and inspect the rear of the filled trailer and see if the load represents properly packaged goods and if the load is secured in accordance with Federal Motor Carrier Safety Regulations.

McKay, under contract with First Choice Transport, picked up the trailer at issue on October 17, 2009 from Boise City, Oklahoma, and drove the sealed load to the receiving area of Furniture Row, a set of stores that are all under one roof in Lubbock. He stayed in his truck till the morning of October 18, when, on instructions from representatives of Furniture Row, he cut the seal. He then attempted to open the right trailer door prior to backing it into the receiving dock. It is during this



*FIGURE 4.5.*



*FIGURE 4.6.*



*FIGURE 4.7.*

activity that a large, heavy item fell from the top rear portion of the partially open door and struck McKay on the head. The subsequent injuries were catastrophic (Figure 4.5).

Other accidents can cause fatal injuries, like one that occurred at a Northwest Airlines cargo terminal in Detroit, where an individual's foot was scraped by an air pallet (Figure 4.6). Clearly, the handling of loads by forklift trucks and other equipment requires following safety procedures and training for all involved.

Glass crates such as the one in Figure 4.7 are always top heavy, and they can only be shipped vertical. Glass as a product is very strong in compression but very weak when shipped flat or in bending mode. So most packaging of flat glass is done at the end of a glass manufacturing line in wood crates that are placed flat and automatically loaded. These crates are then erected and will always be moved vertically. Figure 4.7 shows a glass crate that rolled off a flatbed trailer and landed on the ground upside down, causing damage and injury. It is therefore very important that wood crates that package and transport glass be made from quality materials and in accordance with industry specifications. Appropriate training should be provided to individuals who interact with these crates using material handling equipment because they are very heavy and fragile.

Associations like ASTM and ISTA also provide standards for testing of such loads for truck and rail shipments.

## **8.5 Reducing Damage during Transportation using Load Securement Methods**

Shippers and carriers can use a range of methodologies to secure loads inside containers, boxcars, and trailers. The FMCSR requires that the load be safely secured during transportation. It is therefore the responsibility of the carrier to ensure that the loads to be transported in their vehicles are properly secured so they do not pose a hazard to other vehicles and people using the same transport highway, railroad, or sea. The same obligation shifts to the manufacturer and shipper of the freight that prepares the packaging, loads the products on a trailer or container, and applies a seal to the trailer before the carrier receives authorization to move the filled trailer. Major retailers apply seals to vehicles such as truck trailers and intermodal containers to prevent pilferage and theft during transportation and therefore bear responsibility to secure the entire load for transportation.

In 2006 at ISTA's annual conference, Dow Chemical Company presented data on load securement from a study done by Carolina Supply Chain Services (Brooks and Rawlins, 2006). The study presented load unitization methods and securement of loads inside trailers for the grocery and food distribution industries. With respect to dunnage used for blocking and bracing loads inside trailers to prevent shifting of loads, the study found that nearly 48 percent of shipments had no stabilization device within the trailers. It also reported that an additional 7 percent of such devices failed when used. Load stabilization devices in unitized or palletized loads include steel or plastic banding, corner posts, tie-sheets, plastic film stretch or shrink wrap that is properly wound around the load on a pallet or slip sheet, glues and adhesives, and netting and web products. The selection of a specific type or a combination of load stabilization methods can be determined by conducting preshipment tests using ISTA and ASTM methods. Figure 8.18 shows the various types of dunnage and load securement methods used by the industry based on the study (REF). Approximately 44 percent of shipments in the food distribution use airbags, whereas another 8 percent use load bars or straps. Straps and load bars require trailers to be properly equipped with posts attached on the side walls. Figure 8.19 shows the breakdown of load stabilization methods by the type of trailer (dry

### Total Dunnage Use

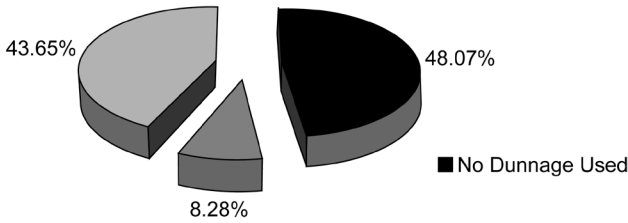


FIGURE 8.18. Dunnage used in truck shipments.

van, refrigerated, and frozen). Shippers prefer air bags over load bars for dry van trailers; in refrigerated and frozen trailers, load bars are preferred to prevent the loads from being pushed to side walls, thus interfering with the air circulation needed between the perimeter of the trailer and the load.

In terms of overall unit load stabilization, the same study (Brooks and Rawlins, 2006) stated that nearly 14.20 percent of unit loads were not wrapped to the pallets (Figure 8.20). In addition, 8.94 percent of unit loads that *had* stretch wrap applied experienced wrap issues that would cause instability and result in damage to shipping units. Almost 39 percent of palletized loads did not optimize the pallet footprint. Recent studies by Singh *et al.* (2011) on corrugated box performance have shown that overhang and poor pallet optimization can result in loss of strength in boxes creating damage and instability. In addition to using stretch wrap around the boxes or items to be unitized on a pallet, it is

### Load Securement Methods as a Function of Trailer Type

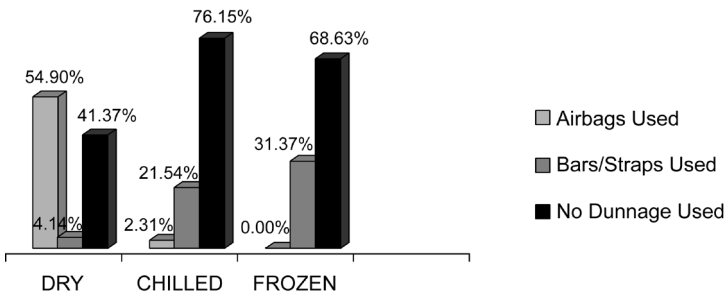
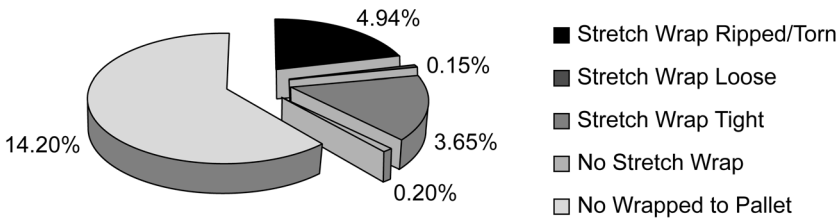


FIGURE 8.19. Load securement methods.

## Total Stretch Wrap Issues



**FIGURE 8.20.** Issues with loads using stretch wrap as a unitization method.

important that the stretch wrap film be wrapped and tied to the pallet base. Damage in shifting loads during severe accelerations or decelerations can cause the entire load to slide off a pallet surface. Plastic pallet surfaces are generally more slippery (due to a lower coefficient of friction) than wood pallets. However plastic pallet manufacturers can use imprinted and indentation patterns on pallet top decks to create friction between items and pallets. It is therefore important to tie the stretch film to the pallet base and wrap the film, along with the pallet base and the lower items or packages. It also known that machine stretch wrap technology provides more consistent loads and can keep the film under tension over a longer period of time during transit.

Load securement inside a trailer, container, or boxcar can be achieved by different means and depends on the mixture of products to be loaded, the weight and volume of various packaged items, frictional properties of load with the vehicle floor, secondary devices such as plastic film stretch or shrink wraps, nylon or plastic straps, plastic or metal bands, steel chains, load bars, airbags, nets, honeycomb, rubber mats, wood blocking, and bracing and dunnage. Various manufacturers of cargo securement devices offer solutions based on the freight, and its weight and volume. It is also important to optimize the pallet footprint. Overhanging boxes or freight do not properly transfer the load to the pallet for even support and create an easier potential for tip over. Figure 8.21 shows the results from the same study.

Other types of load securement methods previously discussed are shown in Figures 8.22 to 8.26. In addition to pallets and fork trucks, unitized loads may also be subjected to lateral forces during clamping and use of slip sheets (Dyvig, 2012). Load securement methods inside trailers, containers, and boxcars include load bars, stretch wrap, straps, airbags, and friction rubber mats (Tan, 2012).

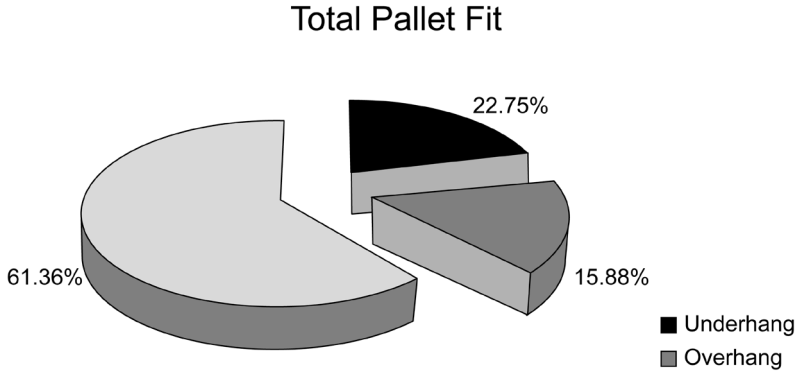


FIGURE 8.21. Pallet surface utilization.

Proper use of plastic film stretch wrap is an effective unitization method. As mentioned earlier it is important for a shipper to understand the weight sizes and types of mixed loads to use appropriate amount of wrap with necessary tension and additives if long term and outside exposure is expected. Various types of plastics provide different mechanical properties and appropriate plastic stretch wrap materials can be selected based on the expected shipping and storage environment. Figures 8.27 and 8.28 show good application of stretch wrap to unitize and secure multiple boxes of varying size and weight on wooden pallets.



FIGURE 8.22.



*FIGURE 8.23.*

In the last decade a new method has been introduced to provide some better features in securing odd shaped boxes and bags onto pallets. This method is called stretch hood, where a large bag of plastic film is stretched and formed around a palletized load of products such as shown in Figure 8.29 for cement bags. It provides a more secure form of unitization compared to using traditional wrap-around stretch film method (Brooks and Rawlings, 2006).



*FIGURE 8.24.*

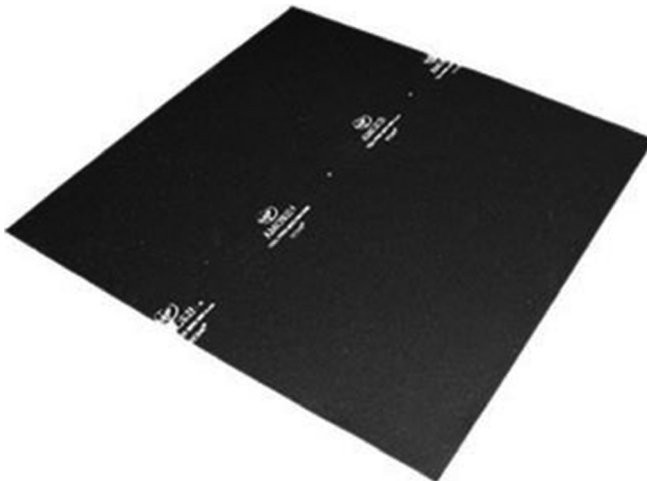




**FIGURE 8.25.**

### **Role of Pallets in Safe Transit and Handling**

Pallets play a major role as a material handling equipment to move products and packages faster and efficiently for both shipping and storage. Over 500 million pallets are annually procured and utilized, among two billion pallets of different sizes, materials, and strength requirements to handle various loads. The Grocery Manufacturer Association



**FIGURE 8.26.**



*FIGURE 8.27.*

in the 1970s standardized pallets for the US retail industry to 40 by 48 inches. These pallets, mostly made of wood, were mainly of a stringer design and therefore were not truly four-way entry. However in the early 2000s leading retailers in the United States started to opt for block style pallets that were truly four-way entry. In 2011, Modern Material Handling conducted a major survey with its subscribers and obtained over 650 qualified responses that addressed most of the recent trends [13]. Results showed that over 90 percent of respondents used wood as



*FIGURE 8.28.*



**FIGURE 8.29.**

a pallet material. Other materials included plastic, wood composite, paper or corrugated cardboard, and metal (aluminum and steel). The three most important factors in making a decision for a pallet were found to be price, strength, and durability. An important observation in the survey (Trebilcock, 2012) is that there were a vast number of reused wooden and plastic pallets in the industry. However in the past decade the price of good quality reusable pallets has gone up. Reusable pallets need to be inspected and rated for their strength before being used for a given application. They may also require additional treatments for specific applications in the food or pharmaceutical industry. A poor-quality reusable wooden or plastic pallet can be a source of damage and potential for injury when stacking loads or other empty pallets.

Figures 8.30 and 8.31 show reusable wooden pallets with a lot of damage incurred from previous shipments. It is clear that they range in size and quality. Good reusable pallet providers and leasing companies have practices that involve inspection, repair, and refurbishing of used pallets before they are put back in service. These pictures show poor used wooden pallets that will most likely produce damage or injury if used to ship or handle loads.

Figure 8.32 shows extreme variations in size, quality, strength and durability of pallets received at an LTL terminal after shipments were delivered. Figure 8.33 shows an example of a poor strength reused wood pallet that failed in an LTL shipment due to weak deckboards.



*FIGURE 8.30.*

## **8.6 Regulations and Procedures for Shipping Hazardous Materials**

The regulations and procedures for shipping hazardous materials apply to all individuals involved with the transportation and shipping of hazardous materials. This includes all those individuals who arrange for transport or may engage in loading activities involving hazardous



*FIGURE 8.31.*

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