

PRODUCTS LIABILITY

An Interactive Qualifying Project Report

Submitted to the Faculty

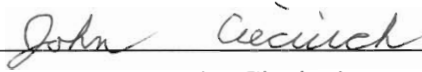
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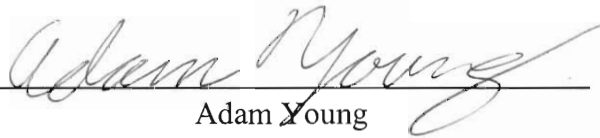
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by



John Ciecuch



Adam Young

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Abstract

This Interactive Qualifying Project focused on the legal aspect of engineering. Two sources were researched and used as a foundation for an understanding of products liability law. Three cases were then investigated and analyzed using the principles previously learned through engineering coursework. This analysis was then considered from a legal perspective to determine which party was at fault in each case. Two of the cases were then presented in a mock trial to a panel of jurors.

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1 AN ENGINEER IN THE COURTROOM

by William J. Lux

This is a book written by an engineer, *for* engineers. It covers in great detail the arduous matter of being a designer of a product which is involved in a court case. The self-proclaimed purpose of the book is to make the engineer more comfortable and more effective in the various stages involved in a legal battle, including such important aspects as depositions and trials. The author has a great deal of experience in this field, which he proceeds to share with the reader, in the form of his opinions and observations, and in the form of anecdotes from his past experiences, all of which can be used by the reader to help educate, inform, and enlighten.

1.1 Chapter 1 - Introduction

The first chapter of the book is aimed at setting up the goals of the book, to establish what it intends to cover and teach the reader, in order to better prepare them for a legal encounter. The author sets the stage with a brief description of his experience, to explain the basis of a lot of his tales of experience, and to introduce the reader to the general notion of legal cases as the result of perceived product failure.

1.2 Chapter 2 - The Nature of Accidents

We begin by defining what the book will spend a great deal of time dealing with, namely the nature of accidents. An accident is defined as: 1) “an occurrence that is unexpected”, and 2) “an occurrence that causes loss or injury, which can be expressed in some form of economic terms.” (Lux, 10) Legal claims against a supposedly defective product generally include a suggestion as for how the design could have been rendered proper or safe, by the inclusion of a given feature or a change in design. It then becomes

the role of the designing engineer to counter these claims by demonstrating why the design is safe, why the machine is designed the way it is, and perhaps why the suggested idea(s) were not incorporated into the product. If the product truly is safe and well-designed, this should prove to be a fairly straightforward task.

A fairly comprehensive listing of various accident examples is then given, through being broken down into 16 different categories: collision, slip and fall, loss of control, hit by falling object, suffocation, electrocution, poisoning, shock and vibration, entanglement, cuts and abrasions, fire, mechanical failure, struck by moving projectile, natural or environmental factors, homicide, and a category of “other”.

Collision- Collisions occur when two or more bodies try to occupy the same position in space at the same time. Four major categories of these are listed, as follows. The first is an accident between two or more moving vehicles, as in a typical auto accident. The legal dispute generally revolves around which vehicle was moving improperly, or was in the wrong place at the wrong time. The second variety is involving a moving object and a stationary one. This can be the case of a moving vehicle striking a fixed object, such as an automobile impacting a building, which generally results in a disagreement based on the right of the fixed object to be in its given location versus the right of the vehicle to be passing through that part of space at that time. We can also have the case of a moving vehicle impacting a stationary one. Fault can be mistakenly placed on the operator of the moving machine, for it is possible that the stationary vehicle should not have been where it was at the time of the accident. Airplane crashes are grouped under this heading, but are complex enough that they are not gone into detail here. The scenario of vehicle-pedestrian accidents are presented in the third variety. This can occur when a car impacts

a pedestrian, which is a quite common mishap, or even when a person hits a moving vehicle. In the second case, disputes frequently revolve around whether the car hit the person, or vice versa, and may be further complicated by questions about whether the operator of the car was able to see and avoid the person or not. Finally, the fourth scenario, that of a person-person collision, is presented. Though generally a smaller and less physically damaging category, these cases are still fairly common, and can include injuries as a result of contact sports, or intentional pushing, etc, which can be covered legally by the definition of assault and battery, turning the injury into a criminal matter.

Slip and Fall- These types of accidents involve only the victim and the surface, location, or conditions in which he or she is involved. There are seven different varieties presented here, each featuring a unique scenario in which the accident can occur. The first is the loss of traction between the foot and the surface, which is a typical slipping accident. Cause of these is insufficient frictional force to maintain the desired position of a foot or hand, generally resulting in a very sudden and unexpected shift of position.

Disagreements can arise of the issue of whether the surface in question was sufficiently “slip resistant”, and whether possible handholds or other methods of support should have been present. A second flavor discussed is that of tripping incidents, whereby a sudden unexpected change in the elevation of a surface blocks the motion of a person’s foot. A scuffing scenario is also presented, where a sudden change in surface material may cause a person’s foot to move in an unexpected manner. The third category presented is that of physical malfunction of the person, such as a sudden bone breakage, or loss of vision (temporary or otherwise), or such things as heart attacks or epileptic seizures. Dizziness is also covered in this category, which can lead to seemingly unprovoked falls or crashes.

Unexpected changes in surface level is the fourth, which can be caused when a person mistakes the number of steps in a flight of stairs, or when the surface conditions themselves change, such as when going from a tile floor to a carpet, causing an obstruction to a smooth walking motion. A loss of step support comprises the fifth condition, an example being the step of a ladder collapsing, or likewise with a step in a staircase. The sixth case is that of loss of balance or support of the body, which can be caused by loss of contact with a handhold or something similar, causing a fall. This can also include the failure of support devices, such as railings. Falls from a ladder or step comprises the seventh and final slipping case, which can be caused by a lack of handholds, insufficient anti-slip devices on the rungs or steps, or even lack of care by the person involved. This serves to illustrate how all the previous types of slipping can meld together into various combinations, which can become quite complex.

Loss of Control- These incidents involve machines over which the operator loses control, through any means, be it loss of steering, braking ability, or any other control system in place. The failure itself can be caused by a control system malfunctioning, the machine failing to respond to the control, or by the operator failing to use the control. A legal dispute may center around whether the control failed, or whether the operator used it correctly. A sub-category of this type of failure is inadvertent motion, which only includes unexpected motion *under power*, and so does not include rolling down a slope.

Hit by Falling Object- This variety is fairly simple, in that it merely involves a person being struck by an object which is essentially free falling due to gravity, the cause for the fall (intentional, unintentional, etc) is not in question. Another type of this is being hit by a rolling object, which includes vehicles rolling down inclines, but only when *not* under

their own power. In this case, legal issues arising over the effectiveness of the vehicles braking systems may arise, such as the apparent failure of a parking brake.

Suffocation- A result of an extended lack of oxygen is the suffocation death of the victim. This may be due to any number of causes, including air passages being obstructed, air being replaced by some other gas (eg- carbon dioxide), and excessive weights being placed on the victim's chest, so as to prevent sufficient breathing. A subset of this is drowning, in which the only effective difference is that it occurs in water, or some other liquid, instead of involving only gases.

Electrocution- Electrocutions are simply caused by human contact with excessive amounts of electricity, whether the result be burns, death, or otherwise.

Poisoning- Poisoning accidents include contact with substances which injure or destroy any part of the body, due to any cause.

Shock and Vibration- Injuries can be caused by sudden, rapid forces applied to the body, whether they be a single force, in the case of a collision with something, or they may be oscillating, in the case of vibration damage. The category of vibration also encompasses noise damage, resulting in hearing loss.

Entanglement- Entanglement is caused by a part of the body, clothing, or equipment being caught in a piece of moving machinery. Legal disputes can arise over the presence, or lack, of protective devices, such as shields, and design issues involving the machinery itself.

Cuts and Abrasions- Contact with operating (or sometimes non-operating) machinery may result in cuts to the victim. The primary distinction between entanglement and cuts & abrasions is that entanglement injuries are generally on a larger scale, in that they may

involve the complete loss of use of a limb, due to its being pulled into the machine and cut or torn off, whereas cuts more often simply result in more superficial damages, due to very brief contact with the machine.

Fire- Combustion of any kind is classified as fire, which can cause sometimes severe burn injuries to the victim. Smoke inhalation also falls under this category, and property damage is generally also involved. Chemical burns are a subset of fire, which incorporates exposure to acids or other chemicals which are toxic to humans. Explosions also fall under the fire category, as they are examples of a specific type of combustion. They are characterized by a rapid shock due to the almost instantaneous burning of the materials involved, which can be extremely harmful to people or property nearby. Radiation damage is also classified under the broad category of fire, and involves electromagnetic radiation, which does not always show its effects immediately, presenting a difficult legal front. Burns from hot surfaces, such as a stove or exhaust system of an automobile are also included in this heading, as are fluid burns.

Mechanical Failure- Accidents can be caused by the unexpected failure of a component of a machine, resulting in a dangerous and often uncontrollable situation for the operator. An example of this can be the sudden fragmentation of the blade on a power rotary lawn mower.

Struck by Moving Projectile- Injuries resulting from impacts with almost anything flying through the air are included in this. Arrows, bullets, and other devices propelled by explosions comprise a sub-category, which includes intentional shootings, which are not classified as accidents. Wars are another sub-category, but injuries and damage are expected in this situation, and so also do not fit the description of an accident.

Natural or Environmental Factors- This includes things which are generally termed natural disasters, which are events beyond our control, of which we may all be victims. Classes of this are heat, cold, lack of water, animal attacks (which includes attacks by humans), wind damage, and lightning strikes (note- only damage directly resulting from lightning strikes falls under this classification, fires caused by lightning are not included).

Homicide- Homicide is the killing of a person, which is considered to be an accident in the eyes of the law. This includes activities where the death is expected. The sub-categories of suicide and “legal intervention” (capital punishment) are included.

Other Accidents- This is included merely to account for situations which may arise which are not neatly included in the above list, so as to keep from forcing a set description on an incident which is not quite classified as such.

Chapter 3- Why Go To Court?

The issue of why people should go to court at all is presented in this chapter. One common situation that arises is that a victim looks at their own specific case and manages to concoct a perceived defect in a product that could have prevented their injury. For instance, a person injured while driving under the influence of alcohol may claim that, had there been a device on the vehicle to prevent its being started by a person who had been drinking, they would not have been able to operate the vehicle in the first place, and therefore could not have been injured. Scenarios often arise where a product is used for something other than its intended purpose, such as when a hunting rifle is used in a homicide. This can lead to arguments between the designer of the product and the victim, as to its intended uses, and (for example) why there should have been precautions taken in the design process to prevent the incident in question. Over time, a set of legal

requirements have been established for both the designer and the consumer. The requirements for the designers, makers, and sellers are as follows:

- “The product must meet the expectations of the buyer and user.
- The product must not be unreasonably dangerous.
- The product must not be defective.
- The product must warn of hidden or unexpected dangers.
- The product must be manufactured according to specifications.
- The product must not be misrepresented.
- Proper instructions for safe use and operation must accompany the product.” (Lux, 31)

The following conditions apply to the end user of the product:

- “He must use the product according to instructions and warning.
- He must not misuse the product.
- He must maintain, repair, and inspect the product according to instructions.” (Lux, 32)

In terms of the defendants in a law suit, the *status quo* seems to be that 1) “the cost of an accident should be assessed to those most likely to have prevented or avoided the accident. Those, the court seems to believe, are the designer and manufacturer.” and 2) “The cost of the accident should be assessed to those most able to pay those costs.” (Lux, 33)

1.4 Chapter 4 - Avoiding Litigation

The most effective way to avoid litigation is to avoid the accident, and while this may sound trite, it is an important principle to bear in mind during the development of a product. However, in a more detailed sense, the following precautions should be taken:

- “Avoid the accident.
- Protect from the accident.
- Make the accident safe.
- Warn of an impending accident.
- Warn of the possibility of an accident.
- Protect the operator (or other personnel) from the accident if it should happen.” (Lux, 36)

Protecting from an accident can involve putting guards in place over dangerous parts of a machine, in an attempt to keep the user from contacting them in the first place. Making an accident safe generally means using safety devices to eliminate as much hazard as possible in the case of an accident (such as installing seat belts and air bags in cars).

Warning of an impending accident most often takes the form of warning lights and buzzers, in an attempt to alert the user to an impending dangerous condition, giving the user sufficient time to prevent the situation from taking place. Warning of the possibility of an accident is most often done through warning labels and decals in place on the machine, and instructions in the manuals that came with the product. This action is considered sub-par, when compared to the previously mentioned methods, as warning labels and manuals are often times not read (or are read, but not heeded), and a warning

still does nothing to address the danger itself. They may be ineffective in preventing a lawsuit, but they will most definitely be used against the defense if they are *not* included with a product when they should be. Protecting the operator (or other people) if the accident should occur involves implementing devices such as seat belts to minimize the injury to the user should something go wrong, which is very much related to making the accident safe.

The theory of balanced product design is presented, which states that a good design will give balanced attention to each of the following aspects of the product: specifications, performance, life, reliability, serviceability, costs, and safety. Each of these must be considered and incorporated into the design process in order to assure a product that will satisfy the customers needs and expectations.

1.5 Chapter 5 - The Litigation Process

The litigation process is fairly complex when taken in a detailed examination, but the basic stages are as follows:

1. The claim (Summons and Complaint).
2. The response and defense (Answer).
3. The discovery process, which includes:
 - Interrogatories
 - Requests for production
 - Requests for admissions
 - Inspections
 - Depositions

4. The trial.
5. Post-trial activities
6. The settlement

Each aspect will be now be examined in more detail.

The claim- This is the initial action which declares what the plaintiff feels has been done wrong, and who is supposed to be at fault. It may not be very detailed, in order not to “tip the hand” of the plaintiff. The claim must have merit in the eyes of the judge, or the case will not be allowed to continue. It should explain what the accident was, and why the plaintiff feels the defendant is at fault.

The response- The response determines what the next step will be. If, after examining the claim, the defendant feels that the claim is valid and agrees with it, he says “yes”, and the matter will be settled out of court. If, on the other hand, the defendant disagrees with the claim, the process will proceed towards a trial.

The defense- At or after the time of the response, the defendant will list his defenses, explaining why the allegations are denied and why the claims are disputed. This is an important step which will set the stage for the course of action that the defendant will take from this point onwards.

Discovery- This stage of the process gives both sides the opportunity to find out relevant information from the opposing side. This often involves (from the defendant’s side) a detailed account of the accident, some information as to what was going on at the time, anything that can be learned about the plaintiff, information on other persons involved, and detailed information about how the plaintiff thinks the product should have been designed, modified, or equipped. The plaintiff will attempt to find out as much as

possible about the design of the product, and why it was designed and built that way.

This process may continue for as long as the information being requested is deemed relevant. The sub-categories of the discovery are presented below:

Interrogatories- Interrogatories are generally the first discovery method used; they are simply a set of questions that each side sends to the other. They will often contain a great many questions, many of which may be very specific. A lot of the same questions will be asked from case to case, focusing on obtaining detailed information on the product in question, and (from the defendant's side) determining as much as possible about the situation in which the accident occurred, and as much information as possible about the victim.

Requests for production- These are requests for physical information, such as blueprints of the machine in question (and all of its parts), photos of the accident scene, medical records of the victim, etc. There is usually a tremendous amount of information exchanged during this phase, much of which may consist of trade secrets of the defendant's firm.

Requests for Admission (RFA)- The objective of these requests is most often to get the defendant to admit to certain key issues for the prosecution's case, such as admitting that the product in question was sold without a certain feature, or that a machine was redesigned to prevent the type of accident which occurred, or that a machine had a previous record of similar incidents, and so on. The defendant may either "admit" or "deny" each point; an admittance means that the point in question is to be taken as fact by both the plaintiff and the defendant, and therefore does not need to be proven in court.

Inspections- A very important aspect of a product liability case will be the physical examination of any machines and locations involved in an accident. Both sides will wish to see for themselves the result of whatever situation came to pass, and will have the opportunity to do so during the inspections stage of the process. An inspection by members of one side of the case may often be made under the supervision of members of the opposing side, so as to ensure that no questionable actions occur (such as perhaps the replacement of a guard which was removed at the time of the accident). It is important to note that information which is gained by one side during an inspection may be subjected to discoveries by the opposing side, but *only* if it is asked for, which is to say that no information is required to be voluntarily disclosed.

Depositions- In this, the final phase of the discovery process, a witness, potential witness, or someone believed to have knowledge of the situation at hand, is asked questions in the presence of attorneys representing both sides, as well as a court reporter. The witness is under oath, and as a result the deposition can be seen as a veritable mock trial. The questions asked, and the answers given, will play a large role in determining the actions taken by both sides, and may even determine whether or not the case will go to trial. Depositions are extremely important, and can be very lengthy, if the witness was closely involved in the accident.

The trial- At the trial, each side is given the opportunity to present its case, its evidence, its witnesses, and its arguments before the judge, and, if applicable, the jury. The procedure involved in a trial is a very time-honored tradition, following many strict, and sometimes obscure rules. A trial will generally consist of the choosing of a jury, if applicable, the opening statements for each side, the presentation of evidence and

witnesses by the plaintiff, the presentation of the case for the defense, final arguments by both sides, the charging of the jury (as to what their task is, the rules they must obey, etc), the jury's deliberation, and the presentation of the verdict.

Post-trial activities- These generally involve appeals of the decision, usually on the part of the losing side, and may include motions for a retrial. Such motions are most often based upon legal technicalities.

Settlement- After the trial is over, and all appeals processes have been completed, the settlement occurs. This will almost always involve a payment from one side to the other, at which point the case is considered resolved. A settlement may also occur at any point during the litigation process, and merely requires that both sides reach an agreement which is mutually acceptable. This can prevent the tremendous cost (in both time and money) of going to trial, and may still leave both sides satisfied.

1.6 Chapter 6 - Engineers and Engineering Information

Engineers are often involved in product liability cases, as they know the design of the product better than anyone else, and are therefore the best qualified to judge its strengths and weaknesses, and why a certain design was adopted instead of another. They generally testify as one of two types of witnesses, fact, or expert. A fact witness testifies as to what he knows as fact, whereas an expert witness is allowed to testify as to his opinion, if said opinion will help the judge or jury understand some technical information, or details that are not common knowledge. The engineer may be called upon to explain parts of the design process of the product, in order to answer questions as to why a certain feature was not implemented, or why a particular material was used, or why a safety feature was considered and discarded, etc. In order to do this effectively,

complete and thorough records of the design process must be kept, in order to be able to show the progression of the product from ideation to production. The engineer must have a good knowledge of the process that was followed before taking part in a deposition or a trial, so as not to accidentally misrepresent the truth, or perhaps to damage his own case by forgetting one detail that could make a significant difference. He must be prepared to answer all manner of questions regarding the product, especially ones relating to its safety in the situation in which the accident occurred, and why certain steps were not taken to prevent the accident, or at least to better guard against it. In order to better insure one's ability to deal with a future legal situation, good records should be kept of all engineering decisions, but if information has been lost, or was never recorded, it is acceptable to report that it is not available, rather than try and recall something which may not be accurate or entirely truthful. As a general rule, things that aided the engineer in the design process should be kept, things that are not really relevant or did not help in the process may be discarded.

1.7 Chapter 7 - How the Engineer Can Help the Attorney

While engineers and attorneys have very different backgrounds, and different ways of looking at a situation, when the two work together and attempt to understand each other, they can form a very effective team. The engineer's training is very technical and scientifically-related, and in an area which the attorney likely does not have much experience. As such, it becomes the responsibility of the good engineer to do his utmost to explain engineering concepts, terms, and ideas to the attorney in as clear a manner as possible, so as to enhance the attorney's ability to argue effectively in court. The ways in

which the engineer can help the attorney have been broken down into a number of categories, as follows:

1. The engineer can explain the design and development process to the attorney, as well as to the judge and jury. He will understand why certain decisions were made, and why other design options were discarded or discounted.
2. The engineer can explain products, systems, parts, and the operation of the machine in question. He has the ability to enlighten the attorney as to how the machine functions, what capabilities it should have, and what it should not be expected to do. “The good engineer is a good explainer.” (Lux, 87)

The engineer can be of assistance in many ways, including explaining the design and development process, explaining the machine itself (in terms of its components and operation), and discussing the manner in which a product is evaluated and tested. He can tell about the successful product and *why* it is successful, as well as products which are not so successful, and the causes of that. If required, the engineer can perform tests on a product to check for failures or to see what might occur in a given situation. He knows the uses and applications of the product, and is able to evaluate its usage in the accident scenario as to whether it was appropriate and within the bounds of what the machine was designed to do. He has an understanding of the relationship between operator and machine, and can offer insight into the interaction between the two, and how that may have influenced the situation at hand. He is able to perform accident reconstructions, to learn more about what may have occurred before, during, and after the accident, and can pass this information along to the attorney, who may be able to use it to uphold or break down the story of a witness. He is qualified to discuss the “state of the art”, in terms of

what is and what is not possible, as well as feasible, from a technological and economic standpoint. The engineer can also discuss engineering literature, and summarize it as appropriate to the given situation, to better support the attorney's case. Material which does *not* support your side's case should also be read, to give some sense of the competition and what the opposing side may bring against you. Assistance may be given to the attorney for conducting depositions and the like of people involved in the case, so as to better be able to determine what should be discovered, and what significance it has. The engineer may help the attorney determine what course of action the opposing side may take, what could happen as a result, and how best to prepare for such an eventuality. The good engineer can translate technical things into language the lay person can understand, and can understand clearly. If this is not done well, his side will lose, as the jury will not understand the argument, and may become offended if they feel the engineer is being elitist. He also has some sense of the statistical probabilities of various aspects of the case, including components of the accident, and even of the case itself. The engineer can explain complex technical processes, and can put them in terms that non-engineers can understand and grasp. Oftentimes a good analogy is invaluable in this regard. Listening and reacting to different aspects of the case, and different testimony is also an invaluable skill of the engineer, as he can offer feedback as a technically proficient person in his area of expertise, and also as a layman when concerning matters not included in his training. The engineer can testify, both in depositions and at trials, and can be an important factor in this regard, as he may be best able to discuss certain matters in court. Written reports can also be the duty of the engineer, to better express his ideas and opinions, however, they must be written in language which is comprehensible

to a lay person. Finally, the engineer may also be able to pose useful questions to the attorney, to aid the deposition and cross-examination process.

1.8 Chapter 8 - The Discovery Process

The discovery process allows the litigation process to really get underway, as it begins to provide each side with the facts they require to begin building their cases. The main components of it are interrogatories, requests for production, and requests for admission. As each part has been described above, in Chapter 5, they need not be re-hashed. However, the salient points of each will be presented.

The goal of the interrogatories and requests for production are, from the standpoint of the plaintiff, to ensure that he can prove his case adequately. To do so, he must prove the following points:

- That he was injured, suffered economic loss, or both.
- That an aspect of the machine in question was the cause.
- That that aspect (be it a part, feature, action, etc) of the machine was the “proximate cause” of the accident, which is to say that the accident would not have occurred had that aspect not been present.
- That the feature of the machine consisted of a defect in the machine, and was present at the time of the accident.
- That the defect existed when the machine left the manufacturer.
- That alternate designs or features existed which would not have caused, or could have prevented, the accident.

- That the alternate designs would not have had a negative impact on the operation of the machine.
- That the costs involved with said alternate designs were not prohibitive.
- That the alternate designs would have made a significant improvement in the overall safety of the product. (Lux, 110)

At the same time, the defense has its own points to prove, namely one or more of the following:

- That the plaintiff's claims are invalid.
- That the injury claimed did not occur.
- That the proximate cause was not as claimed.
- That the fault for the accident lies elsewhere.

It is also important to note that during interrogatories, it is vital to avoid absolute words, such as “never”, “always”, etc. These can be used by the opposing side as a trap, therefore it is important to always qualify such statements, such as “almost never”, or “almost always”, and so on. In addition, it can be important in engineering to avoid the so-called “smoking gun”, which is to say that it can be incriminating in a future lawsuit if one engineer sends another a memo saying something like “We should change part X, someone could get hurt”, especially if the part is not changed. If that memo ever turns up when that part has caused an accident, that can be a very damaging piece of evidence.

Requests for production are generally used when more is to be gained by reading a particular document (for instance, a series of engineering drawings concerning part of a machine) than by asking a myriad of questions. Common items requested for production

are operator's manuals, service manuals, drawings, advertising brochures, etc.

Arguments over items requested are settled by the presiding judge.

Requests for admission are simply aimed at reducing the number of points which must be proven in court, by having both sides agree to accept them as fact. Common requests include admitting that the engineers company was aware of past, similar incidents, that a particular person designed the part of the machine in question, and so forth.

1.9 Chapter 9 - The Deposition

The deposition is an important role in the discovery process. It allows a direct, back-and-forth method of finding information, as opposed to the more formal, and much less flexible/adaptable means of using an interrogatory. The atmosphere of a deposition is generally less formal than that of a courtroom, but the importance is just as great, as testimony given in a deposition can play a very large role in a trial. While depositions can be complex, and are very important, the engineer mainly has several rules which he should obey.

1. Listen to the question. If it is not understood, ask for clarification.
2. Pause before answering. A pause of several seconds will not only give time to think, it will also give the attorneys time to object, if appropriate.
3. Answer only the question asked. Do not volunteer any more information, at all, than was asked for.
4. Answer truthfully, completely, and to the best of your ability. Do not try to bend the truth, or try to make your side look good. Be honest and direct.

5. Do not volunteer any information. Wait until an actual question is posed, and do not try and explain things for the non-engineers in the room.
6. Do not argue or advocate, that is the job of the attorneys.

The reasons for having a deposition in the first place are multiple, and center around obtaining as much information as possible before the commencement of a trial. They may be to help establish facts, and to find the origins of those facts, to explore possible areas of examination which may occur during trial, to look for ways to discredit the witness, to hear testimony before a trial, so it may not be changed later, to preserve said testimony for the trial, in the case of a witness who is unable to appear at trial, and to discover as much as possible about the strategies of the opposing side.

In a deposition, there are three main types of witnesses. The first is the corporate representative, who is sent to speak on behalf of a corporation, and whose testimony is legally binding for that corporation. The second is the fact witness, who is able to present facts that he or she observed about the situation. The third is the expert witness, who, unlike the fact witness, is allowed to express his or her own expert opinions about the matter at hand.

1.10 Chapter 10 - The Trial

The trial is the focal point of the litigation process, and the goal towards which all of the previous work has been directed. The engineer is often instructed to testify at trial, so as to deliver his testimony directly to the jury, or to undergo further questioning by the other side.

Trials consist of eight major parts, namely the selection of the jury, the opening statements, the presentation of the plaintiff's case, the presentation of the defendant's case, the final arguments, the charging of the jury, the deliberation, and the verdict.

The selection of the jury is a fairly straightforward process, simply involving the choosing of either six or twelve people, depending on the case. Opening statements are used to present each side's case to the jury, to set the groundwork for the process which will follow, and to state the claims made by each side, with the plaintiff going first. They can be thought of as an outline of the proceedings which will occur during the trial. Next, the plaintiff will present his case, including the presentation of all witnesses, evidence, and all other information which is being used to argue the case. This generally consists of first relating the story of what happened, from the plaintiff's perspective, and then going into details as to the results of the accident, including medical and economic repercussions. Various witnesses will testify as to what they saw, what they know, and/or what they think, based on what type of witness they are. The plaintiff's position on how the defendant plays into all of this, and how he is responsible, will also be covered in full. After this, the defense will present its case, generally beginning with relating the same story told by the plaintiff, but with different opinions as to what may have caused it, and as to where the fault lies. Testimony will then be given about the design of the machine in question, and it will be shown why the machine is not at fault, and why the changes/additions which were almost certainly suggested by the plaintiff would not have been effective, appropriate, or economically or practically feasible. After all arguments have been made on behalf of the defense, the trial will progress to the final arguments, which give each side the opportunity to summarize their case and give their opinions as to

why they are correct. It should be noted that final arguments do not comprise evidence, they are merely opinions, and must be considered as such. In most cases, the plaintiff will present first, followed by the defense, after which the plaintiff will be given a brief opportunity to offer a rebuttal of the defense's argument. The final arguments will summarize the trial, bringing to light the salient points of the evidence, to help refresh it in the minds of the jury. At this point, the judge will charge the jury with their duty to find the facts in the case, and to determine the proper outcome. The jury will then retire to deliberate for as long as required, and will return to report that they have either reached a verdict, or have become deadlocked, and are unable to reach a verdict (resulting in a mistrial). The verdict will then be read, which may be exclusively for one side or the other, or may be split between the two sides, due, perhaps, to the machine being defective, but not being the cause for the accident. Punitive damages may be awarded, which are given in response to an example of gross negligence on the part of the defendant.

As a witness, the engineer will be subjected to two types of examination, direct and cross. Both varieties have the same general rules, the most important of which is to be faithful to the oath taken and to therefore tell the truth and only the truth. Direct examination is conducted by the attorney on the side of the witness, and is therefore more predictable and "friendly", as it is being carried out by a person who is trying to help the witness give the testimony which they have inside them, and is not trying to second-guess or challenge the witness. However, the same guidelines apply to this as to the deposition process, namely that the witness should not volunteer any information, and should answer only the question at hand. After the direct examination, the attorney for the opposing side

will be given the opportunity to cross-examine the witness. This stage of the questioning can become more stressful, as the attorney will do everything possible to lessen the impact of the given testimony by attempting to bring to light any flaws in the testimony, by showing any reasons for bias, etc. The important thing to follow is to always tell the truth, which will assure a cross-examination that is as painless as possible for the witness. No uncertainty should be shown by the witness, all previous answers should be adhered to, and it is also important to maintain a professional attitude, without becoming petty or upset.

A number of guidelines are given for how to respond during such question and answer sessions. To summarize: don't get cute or forget the seriousness of the trial, answer technical questions in terms that lay people can understand, make sure questions are understood, clarify any unusual definitions, be as specific as possible when describing things (avoid loosely defined terms such as "light", try and use numbers when possible), do not sound superior, don't argue, do not ask questions (unless to clarify a question being asked), do not repeat answers, give direct answers, do not give canned answers, do not use absolute terms (eg- never, always, etc), be polite, speak normally, and do not use extreme descriptions unless absolutely necessary.

At the end of the trial, it is likely that the engineer will no longer be directly involved, but it is important to be aware of the verdict, and to perhaps think over the experience in an effort to improve upon it for the next court case which may arise.

1.11 Chapter 11- Questions

The questioning part of the trial is an extremely important phase, as it will give the jury a tremendous amount of information to take in and think about. The attorneys

involved in the case will be very experienced in the manner of questioning witnesses, and have developed a number of different categories of questions which they will ask. The questions will likely conform to one or more of the following types:

- Specific or general.
- Open or closed.
- Leading or non-leading.
- Formal or casual.
- Polite or serious.
- Rhetorical or interrogating.
- Simple or complex.
- Probing or outlining.

The above classifications will encompass nearly any question which may be asked during a trial or deposition. As always, it is important that a truthful answer to any and all questions asked is the only real answer, and that even a slanting of the truth is unacceptable. As a witness, it is the engineers job simply to reveal the truth, not to argue the case. However, as the same question could be asked by more than one person during a trial or deposition, it may be appropriate to focus the answer on a different aspect of the truth. Which is to say that if one attorney has been focusing on the time an accident occurred, it may be acceptable to center the response around the timing of the accident, even if the same question, when asked earlier, involved a response directed more towards the condition of the machine.

1.12 Chapter 12 - Accident Reconstruction

Accident reconstructions can play a vital role in a trial, as they may be the best way to determine what actually occurred during the incident (if there were no witnesses), or it may be used to corroborate or cast doubt upon a witness' testimony. This chapter is not intended to serve as instructions as to *how* to perform an accident reconstruction, but is instead focused on the proper ways of going about a good, accurate reconstruction.

The most important aspect of a quality accident reconstruction is the information-gathering process. Every single piece of available evidence must be gathered, even though some of it may seem to not make any sense or may be suspect. Questionable information may be discarded later, but at the beginning it is vital to find out as much as possible about the accident. This includes possibly getting hold of the actual machine involved, any pictures or videos of the accident scene, and all testimony given by the witnesses. It is also important to know what was going on immediately before the accident occurred, as to what the machine was doing, who was operating it, why they were using it in the manner they were, what the physical surroundings were like, and so on.

A reconstruction is essentially a recreation of the accident as it happened, from start to finish. While a physical "re-enactment" is usually impractical, a careful consideration of all material available and a lot of thought can usually result in a fairly accurate determination of what actually occurred. It must be remembered that testimony from witnesses can be unintentionally incorrect, due to a person's imperfect memory of what occurred, or their unconscious altering of what they saw to what they think happened or should have happened. Therefore it is important to realize that not all

evidence should necessarily be given equal weight. In the case of contradictory testimony, one of two things is usually done: 1) other information will be used to try and fill in gaps and to determine which information is more credible, and 2) possible scenarios will be considered, and possibly some scenarios will be ruled out, but only with very solid evidence against them. By making use of this process, the situation will gradually become clearer as to what could and could not have happened, and possible scenarios will gradually be narrowed down to the correct choice. Each scenario must be evaluated on a number of criteria, including whether it satisfies mechanical, physical, logical, and probability evaluations.

A good, believable accident reconstruction will not contain any contradictions with laws of physics or engineering, will agree with most the information available, will be explainable to the lay persons in the jury, should be as unbiased as possible, should not contain any big surprises, and should be able to stand up to critical examination from the opposing side.

1.13 Chapter 13 - Definitions and Techniques Employed By Attorneys

Attorneys have responsibilities which, like those of engineers, are very complex and important. As a result, as with the engineering profession, they have their own set of terms and techniques. Understandably, the list of terms defined is very extensive, but the most important ones for the engineer will be covered here.

Adverse witness- a witness who has been called by the opposing side, and so who could therefore be considered “hostile” by the attorney in question.

Burden of proof- the responsibility of actively proving the case for the attorney’s side, rather than relying on the opposing side making a mistake.

Expert witness- a witness who is considered proficient enough in his or her field that they are allowed to offer their opinion on a situation, in addition to relating facts.

Fact witness- a witness who is only allowed to offer factual testimony, such as an eyewitness to the accident, and is not allowed to offer their opinion.

Foreseeability- the ability of an engineer to foresee conditions which may occur involving a product, including the ways in which a product may be used (even including ways for which it was not designed). If an issue is considered foreseeable, the engineer is expected to take these conditions into consideration during the design process.

Hidden defects- problems with a product which are not readily apparent, but which may still be considered the responsibility of the engineers and company which produced the product.

Liability- a term which, from a legal standpoint, takes responsibility further than normal. Liability encompasses responsibility for a defect, and the compensation of the victim for that defect, generally through financial awards to the victim. Liability may also be divided between several entities, such as between the company which designed a product and the company which manufactured it.

Negligence- this is defined as “ ‘the failure to use the ordinary amount of care that would be expected from a reasonably prudent person under the same or similar circumstances’ .“ (Lux, 269) Though this may sound like a fairly straightforward definition, this is often a hotly contested issue during product liability trials, and is often to be decided by the jury. As such, there is no clear, concise, all-encompassing definition for this term.

Proximate cause- this is something which directly causes an accident, and without which the accident would not have occurred in the first place.

Punitive damages- these are awarded in special circumstances where the jury feels that the victim has been treated unfairly, or where the defendant is viewed to have simply not cared, and is being “taught a lesson.” Punitive damages are often very large financial awards.

Reasonable care- this is the degree of care which a reasonably prudent person who has been properly trained would use in performing a task. This includes the engineers in their design process.

The techniques used by attorneys do not overly concern the engineer, and so will simply be summarized as using common sense in their questioning and not doing anything foolish.

1.14 Chapter 14 - War Stories

The war stories presented are examples from the author’s experiences in industry. Although the stories recounted are too numerous to list here, the lessons intended to be taught by them are really for the engineer to be cautious in his testimony, to always tell the truth during questioning, to admit when he doesn’t know something, and to simply exercise common sense in testimony.

1.15 Chapter 15 - Tips For The Engineer Involved In Litigation

The book offers final tips to summarize what has been said and to offer a closing remark. Listen carefully to what your attorney has to say, and to do your utmost to work well with him. Make use of all resources available to you. Stay calm, be careful, and

always tell the truth! Mistakes will occasionally be made, but do your best to avoid them, and learn from them so as to not make the same ones in the future.

2 PRODUCTS LIABILITY IN A NUTSHELL

by Jerry J. Phillips

Products liability is an important facet of our legal system today, protecting the consumer from hazardous products which could be unreasonably dangerous. It helps monitor the relationship between the engineer and manufacturer, and the consumer, and endeavors to protect either side from harm.

2.1 Chapter 1 - Definition and Scope

The book begins by laying the groundwork for the discussion which will follow. Several terms need to be defined and clarified before anything may be begun. The first is the actual definition of a product. A product is defined to be a physical item, as well as a service or other intangible which is rendered to a person or entity (such as a corporation). It may even include non-manufactured physical items, such as animals (when then animal is sold and is found to be diseased, for instance). The second term to be defined is that of a defect. A product is defective is there is a problem with it when it leaves the defendant's hands (such as a manufacturing defect), or if it is poorly designed, or has defective warnings or instructions. Defectiveness can also be determined based on customer expectations, in the case of misrepresentation. If a product is not expected to be dangerous, but is nonetheless, it may labeled as defective, especially if the seller has knowledge of its danger. In addition, a method known as risk-benefit balancing may be used to determine whether a product is defective. The aspects considered in this process are as follows:

- “The usefulness and desirability of the product.
- The likelihood and probably seriousness of injury from the product.

- The availability of a substitute product that would meet the same need and not be as unsafe.
- The manufacturer's ability to eliminate the danger, without impairing the usefulness or making the product too expensive.
- The user's ability to avoid the danger.
- The user's anticipated awareness of the danger.
- The feasibility, on the part of the manufacturer, of spreading the risk of loss by pricing or insurance." (Phillips, 18)

This method is used in an effort to break down the aspects of the product, to determine whether its usefulness outweighs its risks. However, some products may be considered "unreasonably dangerous" if "a reasonable person would conclude that the danger-in-fact of the product, whether foreseeable or not, outweighs the utility of the product." (Phillips, 19) Another means of determining the defectiveness of a product is through a state of the art analysis, which states that "the burden of eliminating a danger may be greater than the risk of that danger if the danger is unknown or cannot be eliminated." (Phillips, 21). Through this, a product may be deemed unavoidably unsafe.

An unavoidably unsafe product is something such as a vaccine, where there is some risk involved (such as the Pasteur vaccine for rabies, which is inherently seriously harmful, but is still better than assured death), but where that risk is outweighed by the benefits. However, such products must be accompanied by sufficient warnings and instructions so as not to be *unreasonably* dangerous.

It should be noted that strict liability only applies in the case of a sale, which is the passing of title from the seller of a product to the seller for a price.

2.2 Chapter 2 - The Causes of Action and Damages

Negligence is one of the most common accusations in a products liability case. This can arise in several ways, including inadequate inspection, processing, packaging, warning, design, marketing, or any way in which the defendant fails to uphold a reasonable standard of care. In order to prove this, the plaintiff must show that the accident in question could not have occurred in the absence of the supposed negligence, and it must be shown that it was the defendant's duty to eliminate the danger. The plaintiff must also show that all responsibility for the accident lies on the defendant or defendants.

There are several aspects of this which must be considered in more detail. Statutory violations mean that the violation of a law can be ground for negligence. In the case of reckless misconduct, concealment, and deceit, these actions can lead to awards of punitive damages to the plaintiff. It can also justify the recovery of damages solely for emotional distress, which would otherwise not be recoverable.

An important part of liability law is the concept of strict liability, which involves breaches of warranty. There are a number of implied obligations on the part of the defendant, including the warranty of merchantability, the warranty of fitness for a particular purpose, strict tort products liability, and abnormal danger. The warranty of merchantability states that 1) a warranty that the goods in question should be merchantable is implied in the sale, 2) goods which are to be merchantable must:

- pass without objection in the trade under the contract description
- in the case of fungible goods, are of fair average quality within the description
- are fit for the ordinary purposes for which such goods are used
- run, within the variations permitted by the agreement, of even kind, quality, and quantity within each unit and among all units involved
- are adequately contained, packaged, and labeled as the agreement may require
- conform to the promises or affirmations of fact made on the container or label if any.

(Phillips, 49)

The third component of this warranty is that implied warranties may arise during the course of dealing or usage of trade.

The warranty of fitness for a particular purpose states that strict liability applies in the case of particular purpose warranty. This is of note as strict liability normally does not apply in merchantability or strict tort.

Strict tort products liability is a critical part of the legal issues involved with liability situations. It states the following:

1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is liable for physical harm caused if:

- a) the seller is engaged in the business of selling such a product, and
- b) it is expected to and does reach the consumer without substantial change in the condition in which it was sold.

This applies regardless of the care exercised by the seller in preparation. It also applies if there is no contractual agreement between buyer and seller.

A product which is unreasonably dangerous will find the defendant to be liable even though he may have exercised great care to prevent harm. The standards which define whether or not a product is unreasonably dangerous are as follows:

- the existence of a high degree of risk
- the likelihood that the harm inflicted will be great
- the inability to eliminate the risk through reasonable care
- the extent to which the activity is not a matter of common usage
- the inappropriateness of the activity to the place where it occurs
- the extent to which its value to the community is outweighed by its dangerous attributes.

Misrepresentation of a product is also a serious offense. It is broken down into two components. The first is that of an express warranty by the seller. This states that any statement by the seller which relates to the good establishes an express warranty which must be conformed to by the seller. In addition, any description which is used in the making of a bargain must be accurate at the time of sale, and any model used in the creation of a bargain must be accurate at the time of sale. Note that it is not necessary for the seller to use words such as “warranty” or “guarantee” for the creation of an express warranty, it may occur regardless. The second half of misrepresentation is strict tort, which states that the seller is still liable for harm done by a product sold even if the misrepresentation is not made fraudulently or negligently, and if the consumer has bought the product without any form of contract.

Damages to be awarded are the desired result of any action brought by a plaintiff, and are therefore a vital phase of the process. Generally speaking, the plaintiff is allowed to recover all foreseeable damages, whether in tort or warranty. Emotional distress is one category of damages, which *can* awarded for purely emotional symptoms, with no physical injury, but is more often awarded in conjunction with an injury. Punitive damages are awarded as something of an “above and beyond” award to the plaintiff, intended to send a lesson to the defendant. They are sometimes awarded in cases of gross negligence on the part of the defendant, however, they are fairly rare in the legal system. Joint and several liability arises when there are multiple defendants in a case, and damages to be paid must be distributed between them, to each according to their degree of fault. In the case of joint liability, all damages are to be paid by one defendant, usually as the result of a case where damages are practically indivisible. Several liability is imposed when damages can be divided between multiple defendants, to each in accordance with their degree of fault.

2.3 Chapter 3 - The Parties

The two parties involved in a legal action are the plaintiff and the defendant. The plaintiff may be anyone who feels they have been harmed by the defendant, and decides to take legal recourse. A plaintiff may be the buyer of a product, a user, a consumer, or even a bystander who is injured in an accident. The plaintiff must be directly involved in the accident, and if more than one type of injury is claimed (eg- physical and emotional), then both must occur at about the same time and place as the accident.

The defendants may include a fairly large number of classes of people. For sales of new products, the manufacturers, as well as middlemen and retailers, may be

defendants in a case. Of the manufacturers, the party responsible for final assembly may be sued as well as any manufacturer of any component parts. They may be sued if the part is defective. However, even if the part meets specifications, the manufacturer may be found at fault if there is a foreseeable risk involved with installing the component into the final product, as the manufacturer is responsible for its product before and after assembly. The manufacturer is responsible for the entire product which bears their name, even though they may not have made the part which failed. Middlemen and retailers may be held responsible for defects in products if said defect could have been discovered under routine inspection. The so-called “sealed container doctrine” absolves retailers of implied strict liability for latent defects not discoverable by reasonable inspection, regardless of whether the product is actually sold in a sealed container. This does not, however, allow for misrepresentation on the part of the retailer, and does not apply if there is an attempt at a repair or re-build, in which case the retailer would be considered the new manufacturer. A middleman may also be found guilty on some level if he or she receives a commission from the sale of a defective product.

Sellers of used products cannot be held responsible for a product after it has left the chain of distribution, assuming it is not a case of misrepresentation or a design defect. A seller cannot be held liable if he is “not equipped to pass on the quality of the goods and had no direct impact on or continuing the relationship with the manufacturer,” (Phillips, 92) as in the case of an auctioneer. The only case in which this does not hold true is in the case of a regular used product seller, as they are still considered part of the chain of distribution, and therefore are not liable.

Defendant successor corporations of products sellers are a somewhat unique category which arises most often when a corporation buys another business. This can become problematic when a product sold by the purchased business before the purchase occurred is involved in an accident. There are two major rules involved in this. The first is the Turner rule, dealing with how a buyer of a business can be liable for the defective products of the previous owner. The rule requires: “1) continuity of management, personnel, physical location, assets and general business of the predecessor; 2) dissolution of the predecessor as soon as legally and practically possible; 3) assumption by the successor of all liabilities of the predecessor necessary for the continuation of normal business operations; and 4) a holding out of itself to the public by the successor as the effective continuation of the predecessor.” (Phillips, 94) The second piece of guidance in this area is the Ray theory, which comes into play when the successor takes control of all or substantially all of the manufacturing assets of the predecessor. “It is based on policies stemming from virtual destruction of remedies against the predecessor through the acquisition, the ability of the successor to spread the risk, and the fairness of requiring it to do so as a burden reasonably attached to the benefit of acquiring the good will of the predecessor.” (Phillips, 94)

In the case of lessors, bailors, and licensors of products, they are held liable for injuries which occur to a customer while using their defective products. This requires that the defect develop during the rental period. Long term leases are considered equivalent to purchases of products for the sake of liability. Note that financing lessors who provide the money to lease a product cannot be held liable under strict liability.

When employees are injured in the workplace, employers can sometimes be held responsible, but this statute varies between states, with seemingly no overall consensus. Some cases where an employer can be found liable are when the employer is aware of a potential hazard with a machine but does nothing to remedy it.

Providers of services may also be held strictly liable under product liability law. Three main sub-categories exist in this case. The first is that of representational conduct, which incorporates several types of people, including product certifiers, trade associations, trademark licensors and franchisers, as well as advertisers. These fall under the scope of product misrepresentation. The second sub-category is that of professional services. The providers of professional services are not responsible under strict liability, while the providers of non-professional services are. In addition, product related services are covered by strict liability. In the third sub-category, that of pure service transactions, where no product is involved, the law states that strict product liability does not apply.

Real estate suppliers may also be found liable in product liability cases. Like the providers of services, this is broken up into a number of varieties. The first is that of builders-vendors, who are strictly liable for defective construction in dwellings that they build, regardless of the magnitude of the structure in question. This liability is based on the assumption that the contractor should have superior knowledge and skill regarding the construction of the building, as the purchaser expects that the contractor is qualified to perform the work that he represents himself as being capable of. Lessors of buildings are required to keep them in the same condition as they were in at the beginning of the term of the lease. In the case of occupiers of premises, the landlord is strictly liable for injuries caused by a latent defect, if it was present at the time of the let, and if it is

discoverable by reasonable inspection. However, the landlord is not strictly liable if an occupant's actions are considered abnormally dangerous.

Contribution and indemnity are covered, to touch on the result of a legal action. Someone found intentionally liable is not entitled to contribution. The doctrine of indemnity states that "one 'passively' or 'secondarily' at fault was permitted to recover over in full against one found 'actively' or 'primarily' at fault." (Phillips, 115) Some courts, on the other hand, have done away with the indemnity doctrine in favor of a system which assigns proportionate recovery based on relative degrees of fault.

2.4 Chapter 4 - Factors Affecting Choice of Remedies, Jurisdiction, and Procedure

Reliance is required to be proven for a plaintiff to successfully accuse a defendant of misrepresentation which resulted in injury. It must be shown that there was a breach of an express warranty, which requires proof that the consumer relied on the assurances of the advertisements when buying a product. If there is inadequate warning of something in the case, it must be proven that that was relied upon, or misrepresentation cannot be claimed.

Disclaimers and limitations of remedies are used in situations where a product is not able to meet a certain desired standard, and therefore must be so stated to avoid misrepresentation. Note that contractual restrictions cannot be used to avoid strict liability in situations of negligence or warranty. Contractual restrictions are only valid against liability when product liability is not applicable in the first place. There are several general requirements for disclaimers.

- it will be invalidated if it is inconspicuous or unclear. Small print on the back of a form is not a valid disclaimer. It must be written in “ ‘clear and unequivocal terms’ “ (Phillips, 129) and be written such that its intent is clear.
- it must be delivered in a timely manner, by the time the agreement has been concluded, to become part of the contract.
- it must fulfill its essential purpose, which is most often violated by the seller fails to fix a defect in a reasonable amount of time.
- it must not be unconscionable, and must not leave the buyer with no other options. If it does not meet this requirement, it can be denied, or accepted without the unconscionable clause.

It is stated that disclaimers of fraud or deceit are unenforceable. In addition, complete disclaimers of liability are usually found to be invalid where personal injury is involved. This is due to the fact that, should injury occur, there is at least a minimal amount of remedy generally written into any sales contract. Disclaimers are also usually invalidated if their purpose is the relief of obligation imposed by a statute.

The scope and effect of a disclaimer only apply to parties who are directly or indirectly part of an agreement.

Solely economic loss may not be recovered for, as a result of a defective product. This is because the manufacturer “ ‘would be liable for damages of an unknown and unlimited scope’ “ (Phillips, 140), which is perhaps intended, at least in part, for a suit being filed for the economic failure of a product (it does not sell well), and the manufacturer being accused of causing the failure. This applies in the case of negligence

or strict liability. Solely economic loss is not insurable under product liability because proof of an occurrence is necessary. Solely economic loss is defined as “loss in value, loss of use, cost of replacement, lost profits, and damage to a business’ reputation, where no sudden, physical accident is involved.” (Phillips, 142) However, this having been said, there are occasional cases where an exception is made, but this is done on a case-by-case basis.

A notice of breach is sometimes required, which states that “Where a tender has been accepted... the buyer must within a reasonable time after he discovers or should have discovered any breach notify the seller of breach or be barred from any remedy.” (Phillips, 150) This is intended to give a potential defendant time to prepare their case against the plaintiff if a legal action is being considered by the victim.

Wrongful death may occur as a result of a breach of warranty or negligence, and therefore can be argued in court, as a breach of warranty or negligence may be considered a wrongful act. This is owing to the fact that culpability exists “ ‘in the consciousness and understanding of all right-thinking persons’ “. (Phillips, 154)

There are a number of procedural considerations which come into play in these cases. The first category of such considerations is that of jurisdiction. Within this, the first aspect which must be considered is that of statutory causes of action. If an express warranty is breached by the defendant, the consumer protection statute gives the plaintiff the right to treble damages as well as compensation for attorney’s fees. There also exists a private right of action, established by Congress, for damages caused by a knowing violation of a consumer product safety rule, which is provided in addition to other remedies, and not in their stead. Minimum contacts for the defendant states that a

defendant cannot be found liable for a defect which occurs outside of his forum state. If the retailer does not avail itself “ ‘of the privilege of conducting business in the forum state’ “, and does not endeavor “ ‘to serve directly or indirectly’ “ (Phillips, 158) in the forum state, then he is cannot be held liable. However, in the case of businesses attempting to make a profit from a national market, state lines will not limit the range of their liability. Class actions and multi-district litigations are broken up into four types: “1) where there is a risk of inconsistent of varying adjudications; 2) where adjudication of some claims will as a practical matter be dispositive of the claims of others not a party to the litigation; 3) where the defendant has acted or refused to act on grounds generally applicable to a class, making final injunctive or declaratory relief appropriate; and 4) where questions of fact or law common to the members of the class predominate over questions affecting only individual members.” (Phillips 161) In the first three types of classes, all members are bound by the judgment handed down, but the fourth is optional, in that any member can request to be excluded from it.

Inconsistent verdicts and erroneous instructions are a fact of life in a legal system run by humans and involving cases which can become extremely complex. Decisions on these vary between individual courts, but some state the a defective product does not necessarily breach warranty, and vice versa. On the other hand, some disagree, saying “if any counts in a declaration are good, a verdict for entire damages shall be applied to such good counts.” (Phillips, 166)

Res judicata states that “Issue preclusion, or collateral estoppel, precludes relitigation of an issue that has been finally determined in prior litigation between the same parties or their privies- or relitigation of an issue by one party when that issue had

been finally determined against that party in previous litigation, when mutuality of parties is not required.” (Phillips, 166) This law is in place to prevent an issue being involved in a suit more than once, as in the situation of a suit over a perceived future hazard, and then another suit being filed if the future hazard does indeed present itself.

Choice of law decrees that if federal law decides that it its own rule is procedural, federal law is applied over the forum state’s law. In the case of a change of venue, the transferor court sets the conflict rules for the transferee court. In addition, a state must have a significant number of contacts involved in the case in order to apply its own law.

Statutory compliance means that a product is not inherently defective in the eyes of the law, and is considered to be some measure of proof of exercising of due care.

Contract specifications defense is an area which deals with liability in a case where a product is designed a sold in accordance with a contract. In the case of non-government contracts, the manufacturer is not liable, as long as specifications are conformed to. This is true unless the products “are so defective and dangerous that a reasonably competent contractor ‘would realize that there was a grave chance that his product would be dangerously unsafe’ “. (Phillips, 173) Government specifications work differently, as a manufacturer is not liable for a defective product when designed and built according to contract specifications. However, for this to be true, four requirements must be met: “1) the approval of the design by the United States must involve a ‘discretionary function’,” “2) the United States must have ‘approved reasonably precise specifications’; 3) the product must have ‘conformed to those specifications’; and 4) the supplier must have ‘warned the United States about the dangers in the use of the equipment that were known to the supplier but not to the United States.’ “ (Phillips, 174)

Statutes of limitations serve to limit the time span over which a case can be active. The applicable statutes consist of a warranty statute, a personal injury statute, or perhaps both. A statute of repose is a limitation whose period runs between two fixed dates, regardless of the scenario. The date of accrual of a case is the date at which the statute of limitations takes effect. This date may be either the date of the injury, the date when the plaintiff should have known about the claim, or the date when the plaintiff, in the course of reasonable care, should have known about the claim. Tolling exceptions are situations in which the statutory period is stayed. This may be brought about by an event which prevents the period “from beginning or continuing to run as it would otherwise do in the absence of the event’s occurrence.” (Phillips, 182)

Statutory retrenchments are aimed at cutting back on a perceived excess of product liability cases, and excessive awards. To this end, these retrenchments implement “limitations on the amount of chargeable contingent fees; elimination of the collateral source rule; provision for periodic payment of judgments; elimination of strict liability, and the adoption of a product state-of-the-art defense; elimination or restriction of recover for punitive damages; the elimination or restriction of joint liability for co-tortfeasors; adoption of statutes of repose’ and placing a limit on the recoverable amount of general damages or damages for pain and suffering, mental distress, and the like.” (Phillips, 186)

2.5 Chapter 5 - Production and Design Defects

The first type of defect discussed is the production defect. These result in a product not meeting the manufacturer’s specifications, and containing a flaw. No manufacturing process is perfect, and so the manufacturer will set the percentage of

products that may contain manufacturing defects while still producing a sufficient percentage of defect-free products. These defects are also generally random, due to coincidental imperfections in the manufacturing process.

The second main type of defect is the design variety. The Theory of Liability is a somewhat broad term encompassing the various aspects of liability. To begin, the idea of what constitutes liability must be considered. Most courts use some form of a risk-utility analysis to determine the liability in a case. In this method, the liability of the manufacturer depends on a departure from proper standards of care. The main focus is on whether the manufacturer was negligent, but some courts would make it seem as though the most important aspect was the product itself. Despite this, a jury will take into account the judgment or “conduct” of the manufacturer. In strict liability cases, the actions of the rest of the industry do not play a part, so a product which may be of above-average overall quality will see no benefit from this in court. Instead, the safety of the given design, the chance of the situation becoming dangerous, the feasibility of other possible designs, and the adverse consequences to the consumer of other designs are all very important. One important criteria of a products defectiveness under strict liability is whether it would perform under normal conditions as an ordinary consumer would expect. In addition, the product may be deemed defective if the plaintiff is able to prove that the design was a proximate cause of his injury, and if the defendant is unable to show that the benefits of the design in question outweigh the dangers inherent to it. Note that a product which fills a required or critical need and can only be designed in one way is viewed differently.

Polycentricity is a term used to describe some design decisions, as they are “many-centered problems.” They serve to illustrate how a given design may be safe under most conditions, but may become hazardous under lower percentage conditions. There are trade-offs made in any design as to safety, weight, complexity, and cost, to name a few, though it is the decision of the manufacturer as to whether these trade-offs are acceptable for their purposes, if the trade-offs were to be made known to the public, but still be accepted by the public. These trade-offs make the process of determining a product’s liability a more complex and arduous task. In one case, it was thought that the jury should be instructed to consider the probability and seriousness of potential injury, as well as the ability of the manufacturer to design a safer product without jeopardizing any of the functions and the effectiveness of the product. Opponents of polycentricity say that the act of placing market considerations before the design of a safe product constitutes making a product liable, as well as possibly unreasonably dangerous.

The relation of design and warning defects outlines the differences between defects which are designed (generally unintentionally) into a product, and warning defects, which can either be the labeling variety, or as a result of imperfect design. Failing to warn of an obvious danger can be grounds for liability, but simply warning of an obvious danger which could be avoided through a feasible alternative design can also lead to liability. As a result of this, simple warning labels and notices on a product do not release the manufacturer of all responsibility towards ensuring the safety of a product. In some cases, the lack of a mechanically engineered warning may also constitute a design defect, such as in a vehicle where visibility and therefore safety could be increased by, for instance, adding a strategically placed mirror. The degree of liability

due to warning or lack of warning of a hazard depends on the decision as to whether the warning is adequate, and/or whether the manufacturer neglected to warn the consumer of dangers present in the product. This must be determined on a case-by-case basis.

The obviousness of a danger plays an important part in liability. It was once held that an obvious danger would automatically render a product not unreasonably dangerous, as it was quite evident that there was an aspect of the machine which could cause harm, such as the exposed blade of a table saw. Many courts hold that plaintiffs who are injured in the workplace should not be denied recovery on the grounds of obviousness of danger, as their exposure to the danger is not voluntary. The obvious danger defense conflicts with the defense of the assumption of the risk. To establish assumption of the risk, “ ‘it must be shown that the plaintiff 1) discovered the defect, 2) fully understood the danger it presented, and 3) disregarded this known danger and voluntarily exposed himself or herself to it’ “. (Phillips, 203) The burden of proving this lies on the defendant. On the other hand, if it was a case of the patent danger rule, the defendant would not be required to prove that the plaintiff was aware of the danger and voluntarily exposed himself. If the danger present is truly obvious, than the failure to warn of a hazard that is apparent to the ordinary user is not unreasonably dangerous.

Crashworthiness is the ability of a product to protect against injuries caused by the collision of the product with another object. Most often, this is used in the context of automobiles and other vehicles impacting fixed objects or other vehicles, and the degree to which the components of the car, such as the fuel tank, are able to withstand the impact. However, it may also reflect the ability of safety devices, such as fire extinguishers, to maintain the same level of operability before and after the impact, so as

to remain useful. Most courts find that products must be reasonably designed against foreseeable accidents, but that injuries resulting from unforeseeable accidents are not the responsibility of the manufacturer.

2.6 Chapter 6 - Inadequate Warning and Instructions, and Misrepresentations

In the case of warnings and instructions being argued, the plaintiff will generally accuse the defendant of a failure to warn. However, “A plaintiff is generally not required to make an election between pursuing a case on a strict products liability theory of either design defect or failure to warn. A plaintiff may proceed with both theories if both are viable.” (Phillips, 2007) The distinction between a warning and an instruction is that an instruction is intended to provide for the efficient use of a product, and a warning is intended to insure its safe use. To be effective in the eyes of the law, a warning must describe both the nature and the extent of the danger in question. Warnings may need to cover not only the toxic qualities of a product (if applicable), but also include instructions for its safe disposal. In the case of a dangerous poison, the manufacturer may be required to warn of the absence of an antidote, if one does not exist. Warnings must also consider the environment in which the product will be used. They must also warn of concealed dangers which may not be obvious to the user. With regards to when a warning is considered sufficient to avoid liability, the plaintiff cannot argue that a more strongly or clearly worded warning if the plaintiff had not read the warning in the first place. But the responsibility lies on the plaintiff to show that, had a warning been given, that the accident in question would have been avoided. Warnings are required for some

dangers, but if the danger is obvious, a warning may not be required, though this can be strongly contested, and can become very complex in some cases.

The standard of liability involves determining whether a negligence or strict liability standard should be used in failure to warn cases. It is difficult for consumers today to protect themselves from risk of serious danger caused by the wide variety of products they purchase. The manufacturer is better equipped with knowledge of the product and can better handle economic consequences of accidents caused by defective products. As a result, the consumer must rely on the integrity and competency of the business community to insure his safety. In addition, by laying costs due to defective products on the manufacturers, incentive is provided for them to actively improve the safety of their products. Liability can sometimes be judged by scientific knowability, in that a defect or hazard which was “knowable” at the time of production (by means of research or performing tests which were available at the time) will render the manufacturer liable and negligent in producing the item. However, this can be a difficult area for a jury to understand and use effectively to judge a case with, especially when the issues involved become very complex. The “state-of-the-art” standard often used is usually defined in terms of the “scientific or technological knowledge available at a given time, while the negligence standard of due care is defined in terms of what a person knew, had reason to know, or should have known regarding a danger and the means of avoiding it. these two standards are not necessarily the same, even for a manufacturer with assumed expert knowledge in the field, since the reasonable person cannot always be expected to know that which is in fact knowable.” (Phillips, 221)

The persons to be reached by a warning are those who would not be aware of the dangers inherent to the product. An expert in the field in which the product may not require warnings on a product, as he is familiar with them and the dangers they pose, while a person who has little or no knowledge of the field may well be unaware, and therefore more susceptible, to the dangers involved in the use of the product. However, an expert may require warnings if the product contains different or additional hazards from the typical products in the field.

Countervailing representations are cases of misrepresentation in which a warning is downplayed, or is misleading. This can also be brought on by descriptions of the product which do not accurately portray its safety, leading to a lack of caution on the part of the user, after being lulled into a false sense of security. It is important to give an overall accurate image of the products safety, by not downplaying dangers, and by not using pictures or otherwise to give a false representation of its safety.

Post-sale duties to warn occur when a product may be believed to be safe at the time of sale, and then sometime after the fact a hazard in the product is discovered. It then becomes the duty of the manufacturer to warn users of the product of its newfound dangers. A warning may suffice in many cases, but sometimes the product may need to be recalled or repaired, generally at tremendous cost to the manufacturer.

Allergic users present a somewhat unusual situation for the manufacturer. The duty of a manufacturer to warn potential users of a product of possible allergic reactions is based on whether the allergy is considered to put a substantial or appreciable number of persons at risk. This can be a fairly loose definition, so a case-by-case analysis is most often required. Common allergies, such as milk, need not be warned of by the

manufacturer, but it may be necessary in the case of products which contain known allergens which may not be obvious.

Misrepresentations can arise from deceit, negligence, strict tort, or strict warranty. It is not necessary for a defect to be shown in a product beyond that the plaintiff's injury is due to misrepresentation on the part of the supplier. Misrepresentation can sometimes be based on the appearance of the product itself. A number of product defenses and liabilities can be avoided if strict liability for misrepresentation is imposed.

2.7 Chapter 7 - Problems of Proof

Cause-in-fact is the first aspect of the problems of proof which are discussed. This dictates that the plaintiff must show that the defendant's product was defective and that the defect caused his injuries, as well as that the defect existed when the product left the defendant's control. To this end, he must reasonably eliminate alternate causes which are not attributable to the defendant. With this done, he does not need to identify the precise defect which caused his injury, making his case somewhat easier. In a strict liability action, it is not necessary to disprove every possible alternate cause in order to have the case submitted to a jury. It need only be shown that the material fact to be proven may be logically and reasonably inferred from the circumstantial evidence. In cases where there are several possible causes for an accident, liability may be split up between them.

Proximate cause and foreseeability address both the direct cause of the accident, and the degree to which it could have been predicted. It is stated that in strict liability "the knowledge of the article's propensity to inflict harm as it did is assumed regardless of whether the manufacturer or seller foresaw or reasonably should have foreseen the

danger.’ ” (Phillips, 251) For a manufacturer or other seller to be strictly liable for injuries inflicted by a product, the product must have been used in a way which was foreseeable, while in negligence both the danger and use of a product must be foreseeable. Proximate cause is such that an accident is the direct result of the defect claimed to be present, and that the accident would not have occurred without the presence of the defect.

Misuse of a product, when unforeseeable, is grounds for preventing recovery by a plaintiff. However, misuse which is considered to be foreseeable does not render a product immune from liability.

Alteration of a product may change its “behavior” in court. If a substantial alteration causes an accident, it may be deemed unforeseeable, thereby barring recovery by the plaintiff, unless the alteration should have been anticipated, due to characteristics of the product which invite such changes.

With regards to damages, Sec. 435 of the Rest. 2d of Torts states that “1) If the actor’s conduct is a substantial factor in bringing about harm to another, the fact that the actor neither foresaw nor should have foreseen the extent of the harm of the manner in which it occurred does not prevent him from being liable. 2) The actor’s conduct may be held not to be a legal cause of harm to another where after the event and looking back from the harm to the actor’s negligent conduct, it appears to the court highly extraordinary that it should have brought about the harm.” (Phillips, 262)

Plaintiff misconduct and comparative fault are vital issues in a liability case. There are three major types of plaintiff misconduct which can cut or limit the degree of recovery possible: contributory negligence, which is negligence on the part of the

plaintiff to ensure his own safety, assumption of the risk, which is a knowing and voluntary confrontation of an appreciated risk, and misuse, including alterations to the product, which is the use of a product in an unintended or unforeseeable manner.

Contributory negligence and assumption of risk are usually treated as defenses, with burden of proof lying on the defendant. Contributory negligence is determined by the standard of a reasonable person, based on the knowledge the plaintiff had at the time of the accident. The danger present may be latent, but later discovered by the plaintiff.

In the case of strict liability, some courts say that contributory negligence is no defense in a products liability case, but that assumption of risk can be a defense. Contributory negligence of the plaintiff does not constitute a defense when said negligence is merely a failure to discover the claimed defect in the product, or to guard against the possibility of its existence. Unforeseeable misuse of a product is a bar to recovery in strict liability, unless the plaintiff can prove that the product was in fact defective and was the proximate cause of injury. A product is defective only when it is unreasonably dangerous for normal and foreseeable use.

Comparative fault is used when fault is spread between the plaintiff and the defendant. There are three basic methods of comparative fault. The plaintiff can recover if “1) her fault is less than that of the defendant, 2) if it is not more than that of the defendant, or 3) if the defendant is at fault in any degree.” (Phillips, 269) The first two types result in the plaintiff being completely barred if his fault equals or exceeds that of the defendant. The third method is the one usually preferred in courts. If the plaintiff is allowed to recover, his recovery will be decreased by the degree to which he was at fault. As an example, a defendant 20% at fault will only receive 80% of his damages. When

multiple defendants are involved, joint and several liability come into play, which may result in a situation in which the defendant least at fault could be held liable for all damages. Comparative fault is often used in cases involving unreasonable assumption of risk.

Subsequent remedial measures are measures which, if put into effect before an accident, could have prevented it, or at least made it less likely to occur. However, simply because they are undertaken after a legal case does not therefore prove negligence on the part of the defendant, nor are such actions allowed as evidence. The fact that safety-enhancing actions are taken by the defendant shows that they have a commitment to safety, even if a product was not legally defective, and said actions should not be used to punish or accuse them. If these actions were admissible as proof of negligence, it would stifle the ongoing process of product redesign and improvement. This rule, however, does not exclude remedial measures taken by a party other than the defendant, or evidence of remedial measures taken by a defendant after the plaintiff's accident when said measures are undertaken involuntarily. The rule does not apply unless the evidence relates to actions which can be accurately described as remedial measures. In addition, evidence of subsequent remedial measures may be admitted in trial for purposes other than showing negligence.

Miscellaneous problems of proof may arise over several types of problems. One is a history of unsafe and safe use, relating to both the product in question and similar products, is admissible for several purposes, including “demonstrating proof of notice of the alleged defect by the defendant, the magnitude of the danger, the foreseeability of user conduct, the defendant's ability to correct the defect, and causation.” (Phillips, 285)

Spoliation of evidence occurs when evidence is willfully or negligently disposed of evidence which is vital to a case. The person disposing of the evidence may be held liable by the plaintiff for damages which could have been recoverable. Spoliation by the plaintiff may bar a claim against the defendant. Expert testimony is very often used in liability cases to establish causation of the accident, damages done and many other matters involved in the case. Expert testimony may be given on many subjects, but not ones which are considered to be common knowledge, or may not be given when the expert is not adequately qualified in the field at hand. The issues of state of the art and industry custom can play an important role in liability cases. These are often confused by courts, but state of the art is usually defined as “the scientific or technological knowledge available or existing when a product is marketed.” (Phillips, 294) Ideally, this knowledge will reflect what was known by the manufacturer at the time of the product’s design and manufacturing. Codes, reports, and technical literature are used to help define standards to which products should be upheld, and may be admissible on the issue of defectiveness, due care, and other disputed areas of a case. Discovery has been used and abused of late, beyond its mere purpose of aiding both sides in their quest to learn more about the situation at hand. Some people feel that it is overused, or that it may be used in manners which violate certain people’s right to privacy. Regardless, it is still a vital part of the legal process, if an imperfect one, as is the rest of the system.

3 JOHN FRAZIER VS. S-B POWER TOOL COMPANY

3.1 Background

On May 14, 1996, John Frazier, the plaintiff, was ripping a piece of pinewood approximately $\frac{3}{4}$ inch thick, $2\frac{1}{2}$ inch wide and 27 inches long on a portable table saw when an alleged kickback caused his hand to come into contact with the blade. The table-saw was a Skilsaw 10-inch bench-top table-saw with a self-aligning rip fence. The contact with the blade resulted in amputation of his thumb, index finger, long finger, and ring finger. His little finger was left unharmed.

John Frazier was 76 at the time of his accident. He is a retired man, working one day a week at the Braintree Co-operative Bank inspecting property, subdivisions, and construction sites that the Bank has mortgaged or is looking to mortgage. At the time of his accident, he was engaged in various woodworking projects at his daughter's house in Agoura, California.

3.2 General Accident Description

The following is the plaintiff's description of the accident, as stated in his deposition. The deposition of John Frazier was sworn and examined on July 16, 1997 at the Offices of Sugarman, Rogers, Barshak, & Cohen, 101 Merrimac Street, Boston, Massachusetts.

John Frazier was ripping a length of pinewood to be used in a project at his daughter's house. The wood measured $\frac{3}{4}$ inch thick, $2\frac{1}{2}$ inches wide, and approximately 27 inches long. He was ripping it down to approximately $2\frac{5}{16}$ inches wide. The machine he was using to do this was a Skilsaw 10-inch portable table saw with a self-aligning rip fence. About half way through the piece of wood it kicked-back, causing his

hand to slip under the guard and contact the saw blade. A kickback occurs when a piece of wood binds against the blade causing it to be forcefully thrown back toward the operator. During the incident in question, Mr. Frazier stated that when the kick back happened the piece of wood started bouncing and the next thing he knew his hand had been severed.

Mr. Frazier claims his injuries are due to the table saw being defective. He claims the anti-kickback pawl installed on the machine did not prevent the kickback. He also claims the rip-fence failed to align correctly causing the kickback. The Expert on the plaintiff's side stated that the rip-fence had too much movement at the exit side of the machine and caused the kickback. He also claims that the blade guard was inadequate and the anti-kickback pawls failed to prevent a kickback. Furthermore, he stated that the manual does not state the rip-fence must be aligned every time.

3.3 Investigation and Analysis

We acted as experts for the defendant in this case. We analyzed the accident as described by John Frazier. The table saw is equipped with a splitter-plate that mounts behind the saw blade. Attached to this plate are the blade guard and anti-kickback pawls. The anti-kickback pawls work by allowing the wood to pass out of the back of the saw by moving out of the way. When a piece of wood tries to leave toward the front of the saw, such as in a kickback, the sharp spines of the anti-kickback pawl dig into the wood holding it tight. The blade guard is held down over the blade by gravity. When the blade guard is lifted, it will rest in an upright position exposing the blade.

John Frazier's claims that the saw is defective are unfounded. His claim that the anti-kickback pawl failed to prevent a kickback is proved invalid by the fact that the

piece of wood never left the saw. A kick back is defined as the sudden movement of the piece of wood being thrown back at the operator at a high rate of speed. In his deposition, Frazier claimed the wood started to bounce on the table. If the anti-kickback pawls had failed, the wood would have shot off the table. The fact the piece of wood stayed on the table proves that the anti-kickback pawls performed as designed.

The Expert's claim that the rip-fence failed to align properly is easily explained by Mr. Frazier's testimony. In the assembly instructions for the saw, it explicitly states that the rip-fence must be aligned, and tested prior to its first use. Frazier stated that he failed to perform this calibration. The instructions go on to say that if the rip fence is improperly adjusted it will fail to self align. It is our belief that Mr. Frazier's failure to complete this task resulted in the wood jamming between the fence and blade.

The instructions include a section on proper cutting techniques. This includes using push sticks for ripping a piece of wood less than 6 inches wide. The instructions and warnings on the machine instruct the user to keep their hands out of the path of the blade. The only way for Mr. Frazier to make the kind of cut he was, was to use a push stick to guide the wood. If he had also followed the directions and positioned the blade just above the piece of wood he would not have been injured in the manner he claims. As

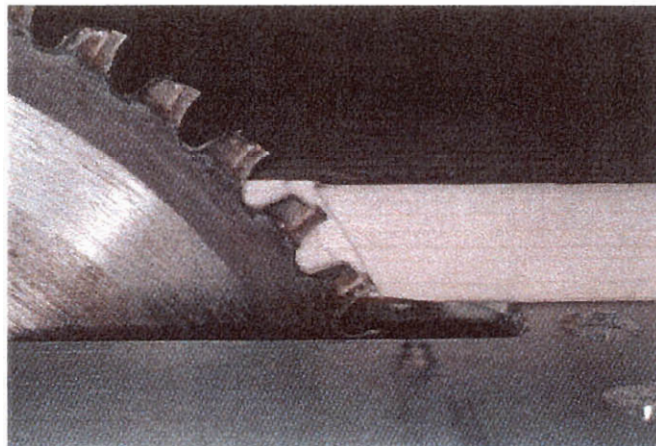


Figure 1

shown by examining the piece of wood (Figure 1), the blade was in fact several inches above the work piece.

3.4 Accident Reconstruction

The single fact that proves the accident did not happen as Mr. Frazier stated is the nature of his injury. His left hand was cut across the ring finger, long finger, and index finger and lengthwise down the middle of the thumb. The little finger was unharmed. If his hand had entered the blade from the position he claims he had it (on top of the board), his little finger would have been the first to enter the blade (Fig. 2). In addition, his hand would have been forced back toward him from the motion of the blade causing him only to injure the first few fingers.

The medical report states that the blade entered the palm side of his thumb then

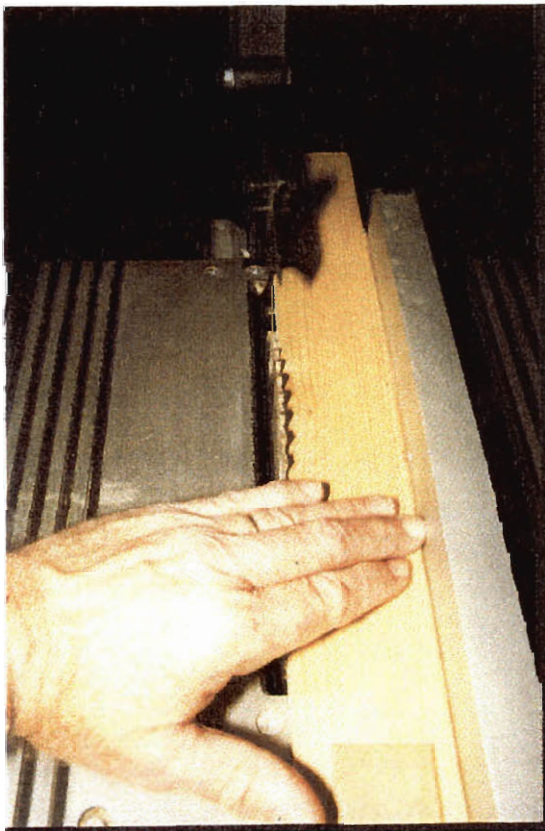


Figure 2

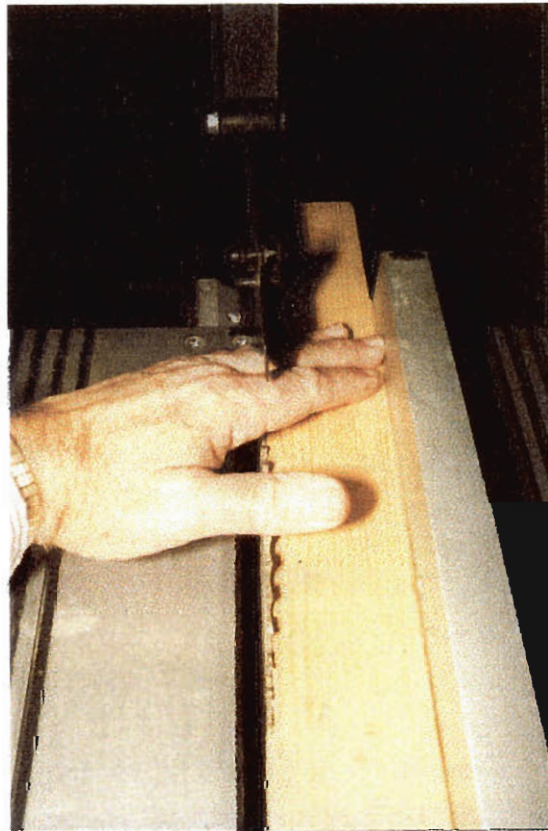


Figure 3

cut his fingers. The only way for this to happen is for his hand to have been on the far side of the blade (Fig. 3). When his thumb contacted the blade, his hand was pulled in by the rotation of the blade. His hand moved across the blade, missing his little finger, resulting in the injuries obtained by the plaintiff.

If the blade-guard had properly been in place there is no way his hand could have been in the position it was. We believe the blade-guard was resting upright when John Frazier placed his hand by the back of the blade to lift the anti-kickback pawl that had dug into the wood as the result of the wood jamming. Because of his failure to turn off the machine after the jam, Frazier's hand entered the blade from the rear while trying to clear a jammed piece of wood.

3.5 Final Assessment

John Frazier is 100% responsible for the injury he obtained on May 14, 1996. The warnings on the machine clearly state, "NEVER REACH IN BACK OF OR OVER SAW BLADE" (Fig.4). His failure to follow the assembly instructions, his failure to use



Figure 4

the blade-guard in the instructed manner, and his disregard for his own personal safety resulted in his injury. No defect was found in the table-saw that could have contributed to his injury.

4 THE ESTATE OF LAURA HERNANDEZ VS. MICHAEL MACKENZIE

4.1 Background

About 9:00 AM, July 21, 1992, Laura Hernandez was returning to her home in Winchendon when she collided with a tractor-trailer driven by Michael MacKenzie. Laura Hernandez died in this collision.

Laura Hernandez was a working mother and was returning home from her 11-7 shift at a local department store. She left work and headed north on Route 12 through Ashburnham. Just before the center of Ashburnham, she collided with Michael MacKenzie's tractor-trailer.

Michael MacKenzie worked for Taylor Transportation. His job included filling swimming pools with water from a tank semi-trailer. On July 21, 1992, he was heading back from filling a pool in Ashburnham along Route 12 when he collided with Laura Hernandez's car. He was driving an International Day Cab tractor with a 43-foot tanker-trailer attached. Michael MacKenzie was not injured in the accident.

4.2 General Accident Description

Michael MacKenzie arrived at work about 6:00 AM. He had had approximately 8 hours of sleep the night before. After arriving at work he driver the tractor-trailer to Whalom Lake to fill the tank with water. He then drove to a customer's house in Ashburnham to fill their swimming pool. MacKenzie states that he used most of the water in the tank to fill the pool. He left the customer's house and headed south on Route 12 toward Westminster. Just after he left the center of Ashburnham, he entered a turn in the road. Just as he came out of the turn, he struck Ms. Hernandez's automobile.

The first time Michael MacKenzie saw Ms. Hernandez's automobile was the rear of her car, over the hood of his truck. The impact caused the hood of the tractor to fly up, obstructing his view. He applied the brakes and skidded to a stop. His final position was against a guardrail on the opposite side of the road with the trailer blocking the northbound lane and extending into the southbound lane.

Laura Hernandez struck the front left side of the tractor. Her vehicle was spun around counter-clockwise about 180 degrees. She came to rest against the guardrail on her side of the road. She died on impact.

4.3 Investigation and Analysis

4.3.1 Road Geometry (Fig. 5)

In order to fully analyze the case we decided that it was necessary to go to the accident scene to measure portions of the road. We found that the road was not a simple curve with one radius, but a complex curve with three different radii. As MacKenzie entered the curve, he would have experienced a radius of 520 ft. and as he continued, he would find that the turn sharpens to a 450 ft. radius then eases back to a 520 ft. radius. The road then continued straight up an incline. The total turn encompassed 60°.

The speed limit entering the turn for MacKenzie was 30 MPH. At the point of impact, it changed to 40 MPH. The speed limit for Hernandez was 40 MPH and changed to 35 MPH at the point of impact.

4.3.2 Rollover Threshold

The tractor-trailer MacKenzie was driving, according to his deposition, was mostly empty. This assumption allows us to analyze the accident without considering the effect of water moving in the tank. We considered the tractor-trailer to be a typical

Degree measurements given
for direction of North bound traffic
measured from magnetic North.

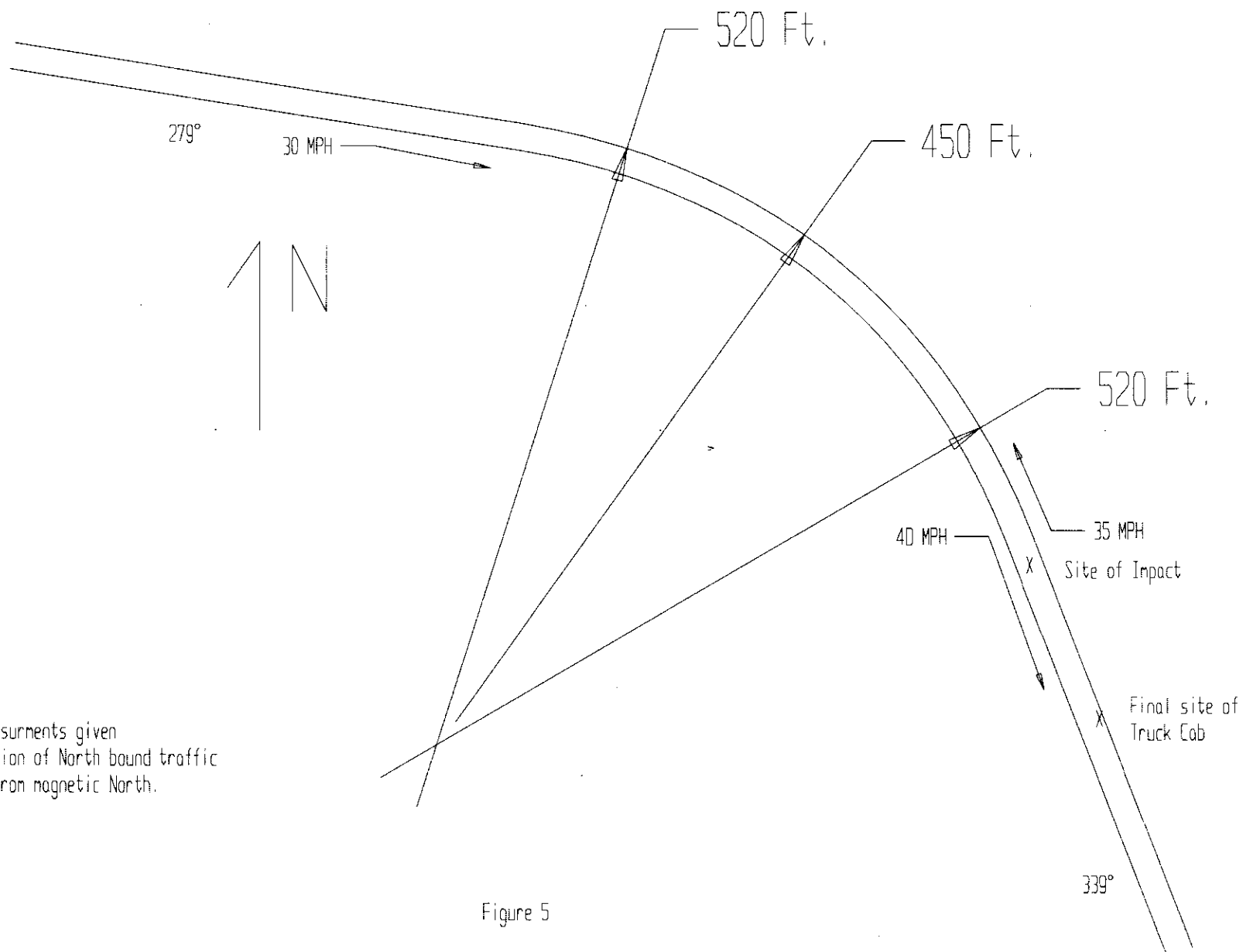


Figure 5

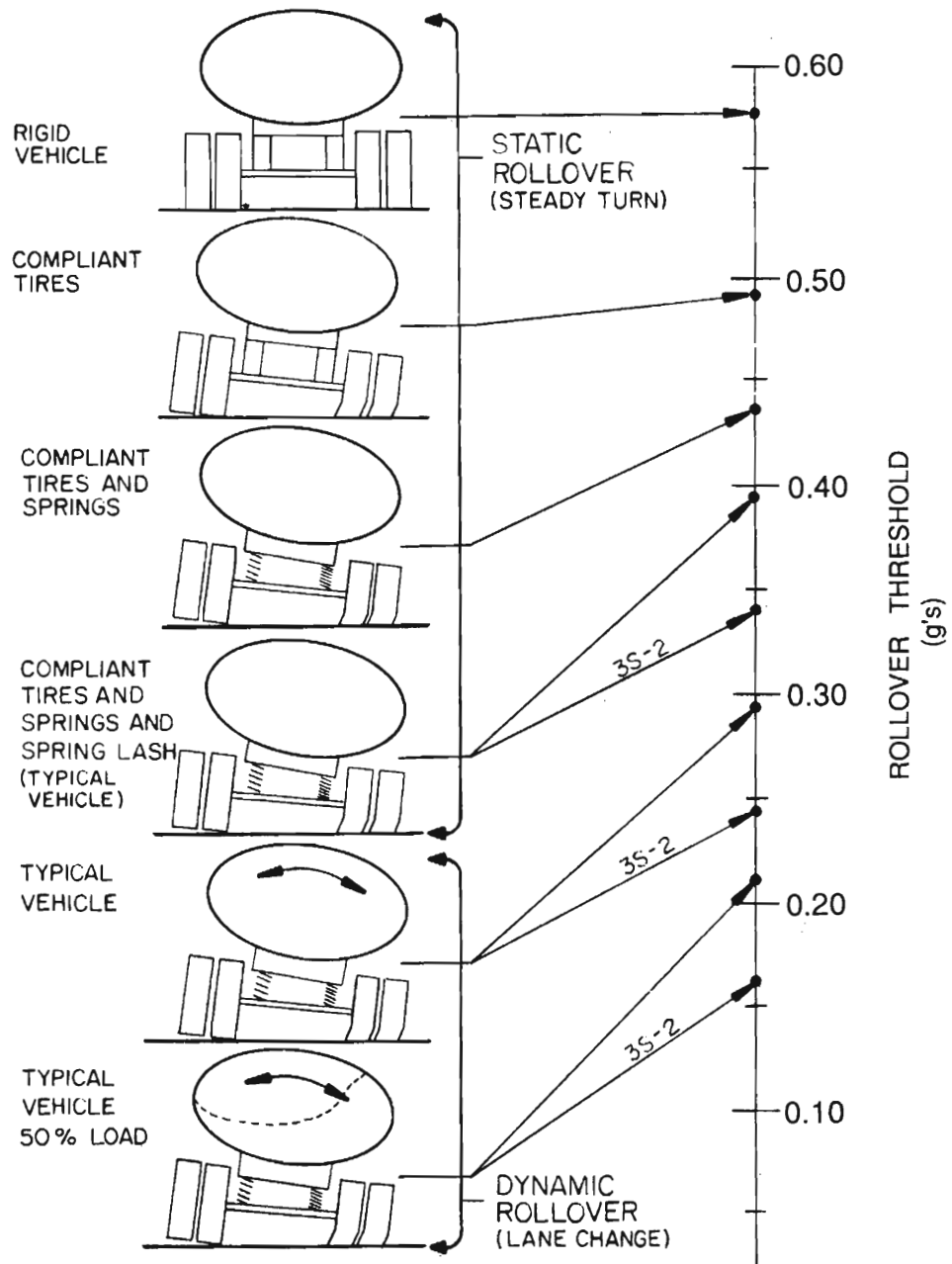


Exhibit 28. Static and dynamic rollover thresholds for idealized and typical gasoline tankers.

78-21

Figure 6

vehicle. This means we assumed it had compliant tires, suspension, and spring lash.

Using this information and Figure 6 we decided to use .24 g's as the rollover threshold for the tractor-trailer.

4.3.3 Tractor-trailer Rollover Speed

Using some equations for rotational movement, we can find the speed at which the tractor-trailer would experience a rollover. In these equations we will use “g” to signify the g-force experienced by the truck, “V” to stand for the rollover speed of the tractor-trailer, and “R” to signify the radius of the turn. We will assume the acceleration of gravity is 32.2 ft./s^2 . We will use the 450 ft. radius because that is where the tractor-trailer will experience the largest acceleration.

$$g = \frac{V^2}{R}$$

$$V^2 = R \times g \times (32.2)$$

$$V^2 = 450 \times 0.24 \times 32.2$$

$$V^2 = 3477$$

$$V = 59 \frac{\text{ft}}{\text{s}}$$

$$V = 40 \text{ MPH}$$

According to our equations, the maximum speed that MacKenzie could have been traveling is 40 MPH.

4.3.4 Experimental g-forces

In order to give our calculations validation we tested the actual g-force around the turn with a g-meter that we designed. (See Fig. 7). It consisted of a weight hanging on a string and a section with angles marked. When we drove around the corner the weight would deflect to the side and we would record the angle. Using the data we found the g-



Figure 7

force experienced at various speeds around the curve (Fig. 8). This data demonstrates that a vehicle going around the curve at 40 MPH would experience approximately .24 g's.

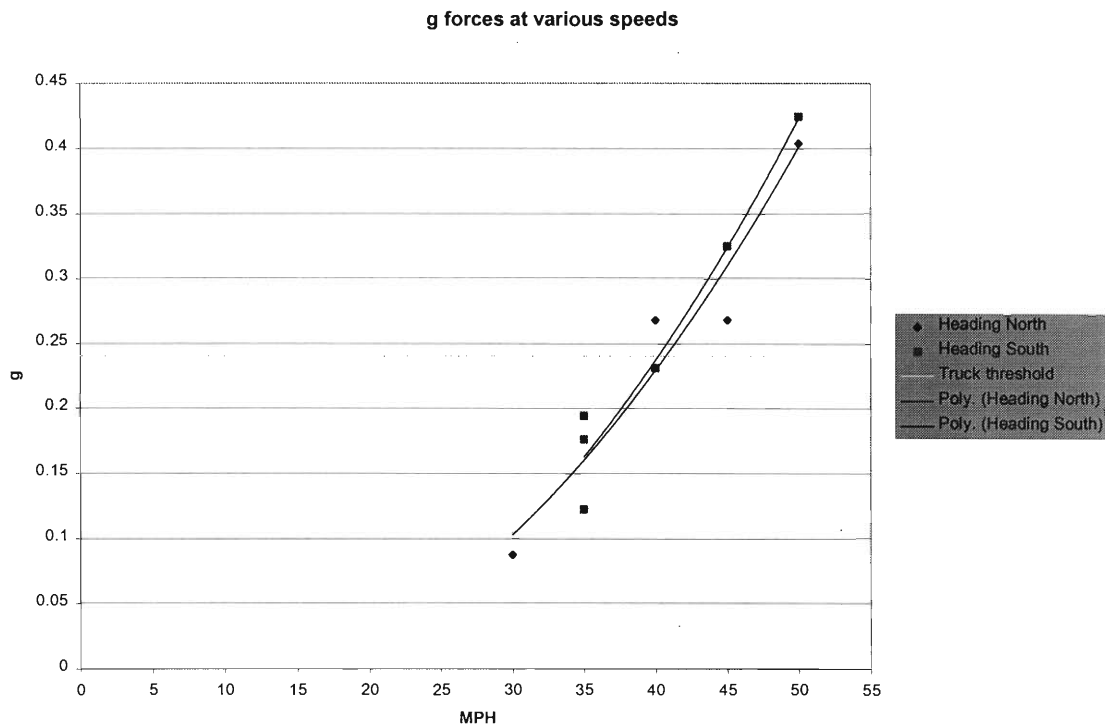


Figure 8

4.3.5 Accident Reconstruction

When a vehicle approaches the rollover point it starts to compress the suspension on the outside of the turn. This causes the vehicle to lean towards the outside of the turn. When the vehicle leans like this the driver can sense the impending rollover and correct his path to avoid the rollover.

In the collision in question the front left wheel of the tractor was broken in a manner that caused the wheel to turn all the way to the left, almost perpendicular to the path of the truck (Fig. 9). The only way for this to have happened is for Ms. Hernandez



Figure 9

to hit the inside edge of the tire. This would be easily explained if Ms. Hernandez was driving across the path of the truck. Since, this is not the case in this accident the only explanation is that the tire of the tractor was turned toward Ms. Hernandez's automobile. The most likely explanation for the truck's tire being in this position is that MacKenzie turned the wheel to the left. If MacKenzie had been travelling close to or over the rollover speed, he would have had to turn the wheel to the left to avoid rolling over. This would explain the damage to his tire.

It is our expert opinion that Michael MacKenzie was traveling along Route 12 South at close to 40 MPH when he entered the turn before the accident. As he went through the turn Michael MacKenzie started to experience a rollover. In order to stop the rollover he turned the wheels sharply left, across the yellow line, and into the path of Laura Hernandez. The resulting collision killed Laura Hernandez and spun her automobile against the guardrail where it came to rest. The tractor-trailer returned completely to the southbound lane and continued to travel until Mr. MacKenzie applied the brakes and skidded to a stop. The broken wheel caused an excessive drag on the left side of the tractor, which pulled the tractor to the left across the northbound lane where it came to rest against the guardrail.

4.4 Final Assessment

Michael MacKenzie crossed over the double-yellow line into Laura Hernandez's lane causing the accident and her death. If he had obeyed the posted speed limit of 30 MPH, he never would have experienced the rollover phenomenon, would have had no reason to turn the wheel left, and would not have crossed into Laura Hernandez's lane.

Because of these faults, we find Michael MacKenzie 100% responsible for the death of Laura Hernandez.

5 THE ESTATE OF HECTOR LOPEZ VS. ENCORE WIRE CORPORATION, EWC LEASING, AND MGS MANUFACTURING CORP.

5.1 Background

On December 10, 1997 Hector Lopez, 25 years old, was removing defective wire from a spool to be sold for scrap. At some point during the procedure Mr. Lopez became entangled in the wire and was pulled into the spool, resulting in his death. The estate of Hector Lopez is suing Encore Wire, EWC Leasing, and MGS Manufacturing for his death.

Hector Lopez was a 25 year-old Mexican citizen, at the time of his death he had one three month-old child and a wife he was supporting. At the time of his death Hector Lopez was working for Encore Wire and was engaged in scrapping wire.

Encore Wire Corporation is a company that draws rod into different types of wire. They then wind these onto large spools. These large spools are then split into smaller rolls to be sold. When a piece of defective wire it is found it is removed from the spool and sold for scrap. This is the process Hector Lopez was involved with at the time of his death.

MGS Manufacturing is the company that designed the Take-up machine that Mr. Lopez was using to remove wire from the spool. The full product (Rewind Machine) that MGS supplied to Encore Wire consisted of a single Payoff machine and a dual Take-up with a common traverse and controls. It later separated the Take-ups and provided additional controls for the separate traverses.

EWC Leasing is the company that purchased the Rewind Machine for Encore Wire and leased it to them.

5.2 General Accident Description

5.2.1 Pre-Accident Scenario

In order for Hector Lopez to perform his task of removing wire from the spool he turned the spool around on the Take-up machine so that when the machine was the wire would unspool onto the floor. After a certain amount of wire was piled on the floor Lopez was to cut it and place it in a box to be sold for scrap.

5.2.2 Accident

After the specified amount of wire had piled onto the floor Lopez went to cut the wire while the machine was still running. At some point the wire became caught on the spool and started to wind the wire back onto the spool. Lopez's leg became entangled in the wire on the floor and pulled him into the spool. According to witnesses, Lopez made 3-5 revolutions before he came to rest. His head was repeatedly battered on the ground with each revolution. He died from severe head trauma.

Immediately after he became entangled Carlos Juan Diego, a fellow employee, rushed over and hit the Emergency Stop button. The machine coasted to a stop but Hector Lopez had already died.

5.3 Unsafe Procedure

The procedure of removing wire from a spool by reversing the spool on a Take-up is extremely unsafe for several reasons. The most significant ones are the fact that the machine was not designed for scrapping operations and the extreme risk of entanglement.

5.3.1 Machine not Designed for Scrapping Operations

The Shaftless Take-up machine was designed to take wire from a source and wind it onto a spool. The Rewind Machine provided to Encore Wire was designed to take wire

from a large spool mounted on a Payoff, pass it through a Spark Tester that tested for defects and a counter that measured the length of the wire, and wound it onto a smaller spool to be sold to a customer. The counter had a safety switch that would cut power to the Payoff and Take-up when wire was not moving through it.

In order for Hector Lopez to use the Take-up without passing wire through the counter, the safety device had to be bypassed. Due to the complexity of the machine, this could only have been done by someone with an advanced knowledge of electrical systems and access to the wiring diagram of the machine. Hector Lopez had neither of these.

The use of this machine in a scrapping operation is dangerous because it is not guarded against any of the risks associated with taking wire off a spool.

5.3.2 Risk of Entanglement

This machine posed an extreme risk of entanglement in any operation. In a normal rewind operation, the controls for the machine were positioned between the Payoff and the Take-up within a few feet of the wire. This put the operator within close proximity of the wire moving at high speed. If there was a break or knot in the wire a lash could severely injure the operator. The operator could be caught in the passing wire and pulled into the Take-up machine.

During a scrapping operation, the loose wire on the floor can become caught in the spool. This would result in the wire suddenly reversing direction and winding back onto the spool. This could also cause a lash that could injure and entangle anybody in the vicinity of the spool could be pulled into the spool.

5.4 Unsafe Design

The MGS Take-up machine has many design flaws that make it unsafe. There is a lack of guards around moving parts, pinch points, and a lack of safety devices.

5.4.1 Guards

The Take-up machine has several exposed moving parts that threaten the safety of operators. The most significant one is the area around the spool. A person standing by the spool is at risk of the wire lashing at them or getting a piece of clothing pulled into the machine. A removable screen guard placed over the arms of the machine would help alleviate this danger. The screen could be made so that it is adjustable to the size of the spool and shuts the machine down when removed.

Another important area is where the wire enters the traverse. The wire comes in at a high speed and is fed through a set of rollers. A person operating the machine could get caught in the wire and pulled into the rollers. A guard or barrier around the wire would prevent accidental contact with the wire.

5.4.2 Pinch Points

There are several pinch points around the machine that are not warned about or protected against. After any operation, the spool is lowered to the ground by gravity. This poses no major risk when it is an empty spool weighing only a few pounds, but a fully loaded spool can weigh up to 14,000 pounds. If this is lowered onto an individual's foot, it could cause the foot to be crushed. A second pinch point is between the pintle and the spool. The pintle moves into the hole in the spool by a system of hydraulics. A hand caught in here could be crushed or severed.

These pinch points need to have warnings on the machine that describes to the operator the dangers of these points.

5.4.3 Safety Devices

The MGS Take-up is lacking many safety devices. To start with, there are no warnings on the machine. There should be warnings regarding potential pinch points, entanglement hazards, and lashes.

The Take-up has no active stopping mechanism. If a person becomes caught in the machine there is no way for the machine to come to a quick stop. A brake is an option that the purchaser can request from MGS, but they must ask for it. If a brake had been applied as soon as Lopez became entangled in the machine, he may have survived.

The only Emergency Stop on the machine is on the control panel, out of reach of the spool. An Emergency Stop should also be included within reach of the moving parts. This would allow an employee to stop the machine as soon as an accident happened. An improvement on this idea is a sensor that would stop the machine if a person came within a certain distance of the spool.

The major safety device on the machine was the counter. This, however, was not standard equipment. It was included at the request of Encore Wire for the purpose of stopping the machine in case of a break in the line, not to prevent using the machine to scrap wire. Encore Wire bypassed this with a simple jumper wire to allow the scrapping operation.

5.4.4 Design Conclusion

If any of these guards, warnings, or safety devices had been used injury to Hector Lopez could have been lessened or completely averted. The fact that these simple devices and warnings were not provided shows the gross negligence of Encore Wire and MGS manufacturing.

5.5 Liability of Encore Wire Corporation

Encore Wire is guilty of many charges. The most important of which is Lopez was instructed to operate the machine in a manner that was unsafe. The removal of wire by piling it on the floor from the Take-up was an extremely dangerous procedure. Several other methods of removing defective wire are much safer. One is to use the Rewind Machine and wind the defective wire onto a spool that can be disassembled easily and allow the wire to just fall off. This method is safer for an employee to do.

Encore Wire had knowledge more than a year in advance that the Take-up was a dangerous machine. During a safety inspection by the State of Texas, it was found that it lacked appropriate guards, warnings, and safety devices. They planned on adding guards to the machines and adding warnings. The time frame for fixing these faults planned on finishing before the Lopez accident occurred. Yet, none of these tasks had been completed and as a result, Lopez was killed using the machine.

Another example of Encore's disregard for their employee's safety is the counter safety device that had been bypassed. An experienced individual had put a jumper in the terminal block to bypass the safety device in the counter. This allowed the machine to be used for the scrapping operation in which Hector Lopez died.

Encore Wire failed to provide a safe environment for Hector Lopez to work in. For these reasons, we feel that Encore Wire is partially responsible for Lopez's death.

5.6 Liability of EWC Leasing

EWC Leasing purchased the Rewind Machine from MGS and leased it to Encore Wire. EWC Leasing is responsible for providing a dangerous machine to Encore Wire.

For this reason, we feel that through strict liability they are partially liable for Hector Lopez's death.

5.7 Liability of MGS Manufacturing

MGS Manufacturing failed to produce a machine that did not endanger the operator. The Rewind Machine manufactured for Encore Wire was lacking guards, warnings, and safety devices. By their own admission they had prior knowledge of a similar accident in Camden, New York and did nothing to implement a safer design to prevent this type of accident.

5.8 Final Liability Assessment

We find that Encore Wire, EWC Leasing, and MGS Manufacturing all share in the liability for Hector Lopez's death. The most significant factor in his accident is the negligence on the part of Encore Wire to provide a safe work environment. They knew that using the Take-up for a scrapping operation was dangerous and instructed Mr. Lopez to perform this task even though a safer alternative existed. For this reason, we feel that Encore is most responsible for Hector Lopez's death.

A second important factor in Lopez's death is the unsafe design of the Take-up machine. Had the machine had proper guards, a brake as standard equipment, and an Emergency-Stop within reach of Lopez the accident could have been avoided. MGS Manufacturing should also share in the responsibility for Hector Lopez's death.

EWC Leasing is responsible for buying the Rewinding Machine, but it was installed directly at the Encore Wire plant. The deal with EWC allowed Encore to purchase a machine they did not have the capital to buy. EWC shares only a small part of the responsibility for Lopez's death.

The final weighing of responsibility should be Encore Wire Corporation – 60%, MGS Manufacturing – 35%, and EWC Leasing – 5%. These reflect the degree of negligence that each company displayed.

6 CONCLUSION

The Products Liability Interactive Qualifying Project encouraged us to independently study the law that pertains to product liability. We then applied this knowledge to three cases while acting as experts. The cases of Hernandez vs. MacKenzie and Lopez vs. Encore Wire, et. al. were presented to a jury in a mock trial.

In the case of The Estate of Laura Hernandez vs. Michael MacKenzie, the jury found Ms. Hernandez 20% at fault for her death and Michael MacKenzie 80% at fault for the accident, which took the life of Ms. Hernandez. To the family of Laura Hernandez the jury awarded \$750,000.

In the case of The Estate of Hector Lopez vs. Encore Wire Corporation, MGS Manufacturing, Inc., and EWC Leasing Corp. the jury found Hector Lopez 5% liable for his accident. Encore Wire was found to be 50% liable for Hector Lopez's accident. MGS Manufacturing was found to be 40% liable for the death of Hector Lopez. The jury found EWC Leasing 5% liable for Mr. Lopez's accident. The total award to the estate of Hector Lopez was 5 million dollars.

We feel that this Interactive Qualifying Project gave us a greater awareness for the safety issues surrounding the design and manufacture of machines. In our professional lives, we will be more likely to design safer products. As a result our customers will receive safer, more reliable products and our employers will not have to worry about expensive litigation. This Interactive Qualifying Project provided lessons that are not available to us in conventional classes.

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