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Product Liability

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by

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Abstract:

This IQP studies the inter-workings of product liability law and its relationship with engineering. Two books as well as a number of videos were used as resources. Throughout the project several product liability lawsuits were analyzed from both a lawyer and engineer's perspectives. A jury of peers is asked to make the final judgment on the presentation of case materials. As a result of the project, there is a greater understanding of the engineering world and its effect on society.

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Chapter 1: AN ENGINEER IN THE COURTROOM

1.1 Introduction:

This book was used to learn the basics of an engineer's role within litigation process. Helpful facts and tips that will give an engineer insight into the activities of a courtroom include knowing what types of accidents may lead to litigation and understanding how they are caused. Knowing what types of processes to expect in the courtroom, such as discovery, the deposition, the trial, and how to best conduct one-self in those situations are discussed throughout the book. The book's purpose, in general, is to teach the engineer how to be aware of how they can best assist the attorney during the entire process.

1.2 Nature of Accidents:

There are several different categories and types of accidents that an engineer can come in contact with while working in the courtroom, some of these are:

1. **Collision:** Two bodies trying to occupy the same space at the same time
    a. Two moving machines or vehicles
    b. A vehicle or machine hitting a fixed object
        b.1. A vehicle or machine hitting a parked or stopped machine
        b.2. Airplane crashes
    c. A vehicle hitting a person
        c.1. A person running into a moving machine
    d. A person running into another person
2. **Slip and Fall Accidents:**

a. A loss of traction between the foot and the surface it was in contact with

b. Tripping

b.1. Scuffing

c. Physical malfunction of the person

c.1. Dizziness

d. An unexpected change in a level surface

e. A loss of step support

f. A loss of balance or support of the body

g. A fall from a ladder or step

3. **Loss of Control:**

a. Inadvertent motion

4. **Hit By a Falling Object:**

a. Being hit by a rolling object

5. **Suffocation:**

a. Drowning

6. **Electrocution:**

7. **Poisoning:**

8. **Shock & Vibration:**

9. **Entanglement:**

10. **Cuts and Abrasions:**

11. **Fire:**

a. Chemical burns

b. Explosion

c. Radiation

d. Burns from contact with hot surfaces

12. Mechanical Failure:

13. Struck by a moving projectile:

a. Firearms or other such devices

b. War

14. Natural or Environmental Factors:

a. Heat

b. Cold

c. Lack of water

d. Animal attacks

e. Wind

f. Lightening

15. Homicide:

a. Suicide

b. Legal Intervention

16. Other Accidents:

1.3 Why Go To Court?:

There are many reasons why a person may feel the need to have their problems settled in the legal system. Every citizen has the right to seek redress if they feel they are entitled a remedy or damages in a court of law. The litigation system starts with one person-filing suit against someone else because they believe that their relationship with

the opposite party has been unbalanced. Generally, in the area of product liability the unbalance is due to an accident. The next step in the process proceeds with naming claims or the specific complaints that one party may have with the another party's product. Finally, both parties can either arrive on a settlement out of court or the case will go to trial for a judge and jury to decide.

1.4 Avoiding Litigation:

There are six significant ways a company or group can avoid the litigation process altogether. These begin simply with manufacturer designing products with safety in mind, which will help to "avoid the accident." Another technique is "protection from the accident" by using shields or guards it becomes difficult or impractical for any hazard to be reached. There are also ways to "make the accident safe" by designing a machine a product in such a way that even if the accident does happen, little or no injuries result. An example might be the addition of rollover bars to protect the operator from any accidental tipping of the machine. Also it may be necessary to "warn operators of any impending accidents" by adding warning systems such as a safety light that goes on or beeps to let the operator know that it may be dangerous to proceed. It is also important to "warn the operator of the possibility of an accident". This is simply done by putting warning decals on the machine or specific instructions in the owner's manual, helping to guaranteeing that a person is made aware of any conditions that may lead to accidents. At least an attempt is made to pre-condition the operator to take the right course of actions should an accident occur. Finally, it is necessary to "protect the operator or other personnel from the

accident if it should happen." A way this is accomplished is by the addition of seat belts, hard hats, or other safety devices.

In the design process an engineer should include considerations of all adverse affects of the product, and design it with safety as the major consideration. A good designer should foresee all possible uses, misuses, and environments through which a product will be operated and subjected to. An engineer must make reasonable choices during the design process, but perfection is not required or even possible. Proper documentation of such choices, decisions, their reasons, and the use of good professional judgment on the part of the designer are required. Finally, an engineer must warn future operators of hazards that are hidden and cannot be eliminated, and provide a way for the user to communicate all feedback while also providing good instructions for the possible use and maintenance of the product.

1.5 The Litigation Process:

The actual litigation process can be broken down into three major categories. The first one is the claims of the plaintiff, which consists of the summons of the defendant and the complaints against them and their product. The next category is the defendant's response to complaints, and they attempt to provide defense for their product. The last part of litigation is the discovery process, which consists of interrogatories, requests for production, requests for admissions, inspections, depositions, and the final trial.

1.6 Engineers and Engineering Information:

Engineering information consists of any blueprints and records available for the product in question. Other information is obtained from a fact witness, who may provide information about what they actually perceived happen, an eyewitness. Also, there are the expert witnesses, who can provide opinions on what happened and who was at fault based on their expertise and the facts that have been documented.

1.7 How the Engineer Can Help the Attorney:

Since an engineer knows more about the technical aspects of a product and a lawyer knows more about the legal aspects, there must be a special relationship formed between the two that allows them to work together. An engineer is needed to explain technical concepts to an attorney that he may have a difficult time understanding what is going on in a given situation. Such as the uses and applications of a certain product, tests and analyses performed on a certain product. They can explain product system parts, machine operations, and the design and development processes involved. An engineer can help answer questions such as, why a product is successful, and how the product was developed, tested, and evaluated. An engineer can help the attorney by providing engineering literature pertinent to a case, listing all possibilities of use of a product, and assisting with the actual examinations, interviews, and depositions. An engineer may help with translation of technical information into simpler terms for the jury and possible explanations of a complex technical process, as well as, evaluations of the risks involved with certain designs. Also the engineer must testify, listen, and react to testimony as both

a technical person and layman to assist the jury in making an educated verdict should a case make it to trial.

1.8 The Discovery Process:

The discovery process is one of the most important parts of a trial because it is an attorney's first chance to interrogate witnesses to find out the extent of their knowledge. An important tool in abetting witnesses into following a path of questioning an attorney has pre-determined is to ask questions that he/she already knows the answers to, which can confirm to the jury what is believed to have happened. Also, it is extremely important to request evidence to prove a point to the jury, however a lawyer must be very deliberate in showing the jury all evidence to guarantee that they understand the significance of what is shown or explained. What the attorney is trying to do is trick a witness into being caught with a "smoking gun," irrefutable proof or absolute information needed to win a case. This whole process consists of a general discovery process, where there are requests for the production of operator's manuals, parts books, service and technical manuals, warnings, etc. Then there is the admission section where the attorney will be trying to get witnesses to admit that certain statements are true. The next part, discussed in the next chapter of the book, is the deposition, the formal testimony taken before a trial used to gather information about a case.

1.9 The Deposition:

The deposition is used to establish the facts of a case and to determine the origins and basis for those facts. It is used to determine the opinions of an expert witness and can

be used to explore the basis for those opinions as well. One of the deposition's most important functions is to aid a lawyer in seeking out information needed to discredit or impeach any witness, by making it appear that a witness is not giving valid testimony. Also, it can be a means of learning the plans and strategies of the opposing side.

There are general rules that an engineer should abide by when giving a deposition. These rules will help an engineer give the best and most helpful deposition possible. Listen carefully to the questions being asked, and pause before you answer the question so you can gather your thoughts and say exactly what you mean. Also, answer only the questions asked, answer truthfully and completely to the best of your ability, do not volunteer information, and do not argue or advocate with the opposing side.

1.10 The Trial:

The whole trial process goes as follows:

Picking a jury

Opening statements

Plaintiff presents their case

Defendant presents their case

Final arguments

Charge is read to the jury

Jury Deliberation

Verdict is read

Appearance and conduct in the courtroom are important during a trial. An engineer should dress professionally and always address the judge as "your honor". Those present

in the courtroom will include the judge, the court clerk, the court reporter, the marshal, the jury, and both parties involved.

1.11 Questions:

As an attorney, the types of questions asked take an integral role in the persuasion of the jury. An attorney is free to ask specific or general questions, open and closed questions, leading and non-leading questions, formal and casual questions, simple and complex questions, and probing and outlining questions. It is not only is it what questions are asked, but how they are asked. Inflection and voice pitch changes can allow any lawyer to lend certain meaning to questions. The careful wording of questions or answers can carry far greater meaning than the mere words used. As for engineers, it is most important of all to answer questions truthfully.

1.12 Accident Reconstruction:

Accident reconstruction has helped many attorneys throughout the course of history to prove their points or to disprove the facts and opinions of the opposition's. There are six main rules that an engineer should abide by in order to provide a valid and believable accident reconstruction. They are as follows. They must agree with the laws of physics, and with the majority of information and evidence available. The reconstruction must be able to be explained in layman's terms. An engineer should biased or produce big surprises. The reconstruction must be able to withstand attacks and scrutiny. If an engineer follows these suggestions his/her accident reconstruction should prove to be an important tool to help an attorney win a case.

1.13 Definitions and Techniques Employed by Attorneys:

Adverse Witness: A witness called to testify by the opposing attorney

Balance of Evidence: The comparative weights of the evidence used by both sides

BAR: a.) A location of legal activity

b.) "BAR Association", a grouping of attorneys

c.) Prevent or keep out

Charge: Instruct or a complaint brought up against you

Hearsay: Something other than what a witness experienced, saw, or heard first hand

Proximate cause: An action or event without which the accident would not have happened

Puffery: Exaggeration or overstatement of a product in order to sell it

Tort: A legal wrong committed

1.14 War Stories:

The following is another set of tips that can be used by engineers and lawyers to help in accomplishing their intended goals. Never ask too many similar questions and don't fight or argue with the witnesses. Cross-examination should be kept short and know the answers before any questions are asked. Always attempt to tell a story and paint a vivid picture for the court that is easy for the jury to understand. Remember to stop when the point has been made, don't assume anything, listen carefully, and plan ahead. Don't try to fool the judge and jury.

1.15 Tips for the Engineer Involved in Litigation:

Final tips for an engineer in the courtroom:

Don't try to run the game

Always be truthful

Don't become frightened or overcome

Be prepared to listen and follow directions

Follow instructions precisely and accurately

Tell the truth

Chapter 2: PRODUCTS LIABILITY: In a Nutshell

2.1 Definition and Scope:

2.1.1 Product:

A product is a tangible personal property or good; however, product liability law today has extended beyond personal-tangible goods. Several rules govern the process of deciding how product liability law is applied to a situation. The first rule states that product liability law is not restricted to cases involving products, and it can be applied to very specific situations. The situation is defined when the defendant is in the best position to spread the loss and prevent the injury. Tort/Product Liability can also apply to other public concerns such as freedom of speech and the difficulties of proof.

2.1.2 Defect:

A defect is defined as the reason for imposing liability, against a product supplier, due to the supply of a defective product.

Product Defects: There are three types of product defects, which are termed as actionable wrongs. The first is a manufacturing or production flaw. This is a random flaw, which is not typical of the product. The second is a design defect, which is an inadequacy in the design of the product. The last type is a defective warning or instruction. Misrepresentation is not technically a defect, however it fits under this category nonetheless. An important consideration when examining the topic of defects is the difference between a production and a design defect. The reason for this consideration is that strict liability applies only to production defects. A second consideration is necessary when dealing with the topic of misrepresentation. Misrepresentation is not

easily distinguishable, from other defects, for three reasons. The first is that the product may carry express representations. The second is that the products' appearance may imply safety. The last reason is that inadequate warnings and misrepresentations are unable to be separated.

Conceptual Standards for determining defectiveness: The term "defect" is used to describe any actionably wrong with the product when it leaves the sellers' hand. A distinction exists between a dangerously defective product and an unmerchantable product, especially when the only loss is an economic one.

1.) Consumer Expectations: There is a strict definition for the term "unreasonable danger." "The article sold must be dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics." In design cases, expert evidence is necessary if defectiveness is to be established. "The foundation of a consumer expectation case is usually shaped by expert testimony, regardless of whether the case is brought in strict liability or in negligence.

2.) Presumed Seller Knowledge: Strict liability, when based on innocent misrepresentation, does not require a risk-benefit analysis.

3.) Risk-Benefit Balancing: Risk-Benefit analysis is used by the courts in the determination of design defects. There is a seven-step standard used in risk-benefit analysis:

a.) The usefulness and desirability of a product.

b.) The likelihood and probable seriousness of injury from the product.

c.) The availability of a substitute product that would meet the same need and not be as unsafe.

d.) The manufactures ability to eliminate the danger without impairing the usefulness or making the product too expensive.

e.) The users' ability to avoid the danger.

f.) The users' anticipated awareness of the danger.

g.) The feasibility on the part of the manufacturer, of spreading the risk of loss by pricing or insurance.

4.) State of the Art: The burden of eliminating a danger may be greater than the risk that the danger itself creates. It is possible for a product to be deemed unavoidably unsafe. This situation requires the absence of the knowledge or ability to eliminate a danger.

5.) Unavoidably Unsafe Products: Strict liability does not apply in the case of an unavoidably unsafe product.

6.) Defect and Unreasonable Danger: The Burden of proof of negligence, in a case of an unreasonably dangerous product, lies with the plaintiff.

2.1.3 Sale:

A sale is the passing of title from the seller to the buyer for a price.

2.2 The Cause of Actions and Damages:

2.2.1 Negligence:

Negligence arises in various ways. These ways all have to do with the inadequacies in: inspection, processing, packaging, warning, design, marketing, or in any

manner in which the defendant fails to uphold a reasonable standard of care. The Plaintiff is responsible for demonstrating that the accident is not possible in the absence of negligence. In addition, the plaintiff must show that it was the defendant's duty to eliminate the danger. Lastly, the plaintiff must, with evidence, remove responsibility for the accident from all parties except the defendant.

2.2.2 Statutory Violations:

This form of cause of action relies directly on the terms of the statute or the intent of a legislative or regulatory body.

2.2.3 Reckless Misconduct, Concealment, and Deceit:

Reckless misconduct justifies the recovery of damages for emotional distress. This form of distress is not otherwise unrecoverable.

2.2.4 Strict Liability:

Implied Obligations: a. The warranty of merchantability

1.) Unless excluded or modified, a warranty that the goods shall be merchantable is implied in a contract for their sale if the seller is a merchant with respect to goods of that kind.

2.) Merchantability is contingent upon the following:

a.) Must pass without objection in the trade under the contract description.

b.) In the case of fungible goods, must be of average quality within the description.

c.) Must be fit for the ordinary purposes for which such goods are used.

d.) Must run, within the variations permitted by the agreement, of even kind, quality and quantity within each unit and among all units involved.

e.) Must be adequately contained, packaged, and labeled as the agreement may require.

f.) Must conform to the promises or affirmations of fact made on the container or label if any exist.

3.) Implied warranties are permitted to arise during the course of dealing or usage of trade, unless otherwise permitted

a.) The warranty of fitness for a particular purpose: Strict liability applies in the case of particular purpose warranty. This is unusual and worth mention because strict liability does not normally apply in merchantability or strict tort.

b.) Strict Tort Products Liability

Tort Law states:

1.) One who sells a defective or unreasonably dangerous product to a consumer is liable for physical harm caused to the consumer or his property 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.

The above law applies regardless of whether the seller has exercised all possible care in preparation. This law also applies if there is no contractual agreement between the buyer and the seller.

c.) Abnormal danger

There is a list of standards, which determine whether a product is abnormally dangerous.

The existence of a high degree of risk

1.) The likelihood that the harm will be great

2.) The inability to eliminate the risk through the exercise of reasonable care.

3.) The extent to which the activity is not a common usage

4.) The inappropriateness of the activity to the place where it is carried on.

5.) The extent to which its value to the community is outweighed by its dangerous attributes.

d.) Misrepresentation: a. Express warranty

1.) Express warranty by the seller

a.) Any statement or promise by the seller, which relates the goods, establishes an express warranty, which must be conformed to by the seller.

b.) Any description, which is used, in the making of a bargain, must be accurate at the time of sale.

c.) Any model used in the creation of a bargain must be accurate at the time of sale.

2.)The seller creates an express warranty, even without using the word "warranty", if an affirmation of the value of the goods is given.

e.) Strict tort

Strict tort states that a seller is still liable for harm done by a product sold even if:

1.) It is not made negligently or fraudulently, and

2.) The consumer has not bought the product under any form of contract.

2.2.5 Damages:

General: The plaintiff is entitled to recover for any foreseeable damages, in tort or warranty.

Emotional Distress: There are differing opinions on whether recovery is an option for sufferers of emotional distress, assuming there is no accompanying physical damage. If physical damage exists, recovery can be made based on emotional distress.

Punitive Damages: Very few plaintiffs are awarded punitive damages in cases of personal injury.

Joint and Several Liabilities: Joint liability is imposed when the damages are practically indivisible.

2.3 The Parties:

2.3.1 Plaintiffs:

A person who sues any products defendant for the purpose of recovering personal injuries. This person could be a buyer, user, consumer, or any bystander who could be in harms' way.

2.3.2 Defendant Seller of New Products:

Manufacturers: In the case of a manufacturer, there are a variety of parties who may be sued. The final assembler may be sued as well as any manufacturer of any component part. These parties may be sued if the part is defective. However, even if the component meets the specifications, the manufacturer is still at fault if there is a foreseeable risk involved with installing the component into the final product. The manufacturer is responsible for its product before and after it is assembled. It is responsible for the components, which go into the product and the assembly of the product, even if they don't actually produce the components or assemble the product

themselves. If a manufacture's name is on the product, they are responsible for any problems, which occur.

Middlemen and Retailers: The retailers are not liable for any latent defects in a product, unless the defect could have been found under routine inspection. "The Sealed Container Doctrine is a term of art used to relieve non-manufacturing sellers of implied strict liability for latent defects not discoverable by reasonable inspection, whether or not the product is sold in a sealed container. This document, however does not apply to cases of misrepresentation. This also doesn't apply if there is any attempt at a repair or a re-build. In this case the retailer is considered the new manufacturer. A middleman may also be found guilty, on some level, if it receives a commission from the sale of a defective product. If the middleman doesn't receive any commission, then it most likely won't be held liable.

2.3.3 Defendant Used-Product Sellers:

A seller 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. Also the seller cannot be found liable if it is "not equipped to pass on the quality of the goods and had no direct impact on the continuing relationship with the manufacturer." The only time that this does not hold true is in the case of a regular used product seller. They are still considered part of the chain of distribution, and thus are liable.

2.3.4 Defendant Successor Corporations of Product Sellers:

This section deals with the buying and selling of entire businesses, and how the responsibility for previously manufactured parts is distributed. There are two major rules in this area of product liability. First is the Turner Rule, which spells out how the buyer of business can be liable for the defective products of the previous owner. The Turner Rule states: "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; 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 of the effective continuation of the predecessor." The second product liability is the Ray Theory, which comes into play when the successor gains control of all or substantially all of the manufacturing assets of the predecessor. "It is based on policies based on virtual destruction of remedies against the predecessor through the acquisition, the ability of the successor to spread the risk, and the fairness requiring it to do so as burden reasonably attached to the benefit of acquiring the good will of the predecessor."

2.3.5 Defendant Lessors, Bailors, and Licensors of Products:

Lessors are liable for any injury, which occurs to the customer when using the lessor's defective product. This is true provided the defect occurs during the rental period. A long time lease is considered the same as the purchase of a product. In general, the lessor is held responsible if he either "marketed or placed the product in the stream of commerce."

2.3.6 Defendant Employer-Suppliers of Products:

Employers are held liable for certain injuries, which occur to employees in the workplace. These instances include the cases where the employer knew about a potential problem area on a machine and did nothing about it.

2.3.7 Defendant Providers of Services:

Representational Conduct: In this category there are three types of people who can be held strictly liable. They are: product certifiers, trade associations, trademark licensors franchisers, and advertisers. This would be due to misrepresentation of a defective product.

Professional Services: The providers of professional services are not held responsible under strict liability, whereas the providers of non-professional services are. Also, product related services are covered by strict liability.

Pure Service Transactions: Strict product liability does not apply when a pure service is provided and where no product is involved.

2.3.8 Defendant Real Estate Suppliers:

Builder-Vendors: Builders of dwellings or buildings are strictly liable for injury cause by defective construction. This applies whether the building is large or small. Liability is based on the assumption that the contractor should have superior knowledge and skill regarding the construction of the building.

Lessors: Lessors are required to upkeep the building that they are leasing out. The person leasing the property has the right to expect the dwelling to be well maintained, up to the level at the time that the lease was signed.

Occupiers of Premises: The landlord is strictly liable for injuries caused by a latent defect, if present at the time of the lease. A landlord is considered part of the production and marketing enterprise. This rule holds true unless an occupier's actions can be considered abnormally dangerous. In that case, the occupier is liable.

2.3.9 Contribution and Indemnity:

One who is found intentionally liable is not entitled to contribution. The Indemnity Doctrine says that "one passively or secondarily at fault was permitted to recover in full against one who is actively or primarily at fault." Some courts say that there is recovery relative to the amount of fault laid upon a person. This is called comparative fault.

2.4 Factors Affecting Choice of Remedies, Jurisdiction, and Procedure:

2.4.1 Reliance:

"Proof of reliance is expressively as a condition to recovery for conscious, negligent, and innocent misrepresentation resulting in personal injury." However the express warranty provision says, "an affirmation merely of the value of the goods or a statement purporting to be merely the seller's opinion or commendation of the goods does not create a warranty." In order to recover for a breach of express warranty, one has to show that the consumer relied on the assurance of the advertisements when buying a

product. If there happens to be an inadequate warning, and that is the basis for a case, there must be proof that the warning was relied on. Otherwise, misrepresentation cannot be claimed.

2.4.2 Disclaimers and limitations of Remedies:

In general: "A disclaimer arises when no remedy is given, while a limitation of remedies exists when the plaintiff is given some remedy which may be different from or less than that otherwise provided by law." Contractual restrictions cannot be used to avoid strict liability in the situations of negligence or warranty. The only time when contractual restrictions are valid against liability is when product liability is not applicable.

General Requirements:

(a.) Conspicuousness and Clarity: Lack of inconspicuousness and clarity will invalidate disclaimers. Writing a disclaimer in small print or hiding it on the back of a form is grounds for invalidation. The disclaimer must be written in "clear and unequivocal terms and contain language which is close enough to express negligence that doubt is removed as to the parties intent."

(b.) Timeliness: A disclaimer must be delivered before a sale takes place or a contract is signed.

(c.) Fulfillment of Essential Purpose: "Where circumstances cause an exclusive or limited remedy to fail of its essential purpose, remedy may be had." In most cases this statement comes into play when a seller fails to fix a defect in a reasonable amount of time.

(d.) Conscionability: If a contract or a contract clause is found to be unconscionable, or leave a buyer with no options, it can be denied or accepted without the unconscionable clause.

As Affected by the Claims Asserted: Disclaimers of fraud, deceit or negligence are not valid. A complete disclaimer of liability is, in most cases, found invalid assuming personal injury is involved. This is a result of the idea that in a case of personal injury, at least a minimal remedy is written into any sales contract. In addition, disclaimers tend to be invalidated if their purpose or result is the relief of obligation imposed by a statute.

Scope and Effect of Disclaimers: Only a party who is directly or indirectly part of an agreement is bound by a disclaimer.

2.4.3 Recovery of Solely Economic Loss:

The Rule and its Rationale: A plaintiff cannot recover if he or she has suffered a solely economic loss, as a result of a defective product. This applies in the case of negligence or strict liability. The rationale behind this rule has multiple parts. The first is that "product recovery, whether in tort or warranty, is limited to foreseeable damages." The second rationale is that negligence and personal injury are not disclaimable. The rule is valid regardless of privity between the plaintiff and the defendant. Solely economic loss is not insurable under product liability because a proof of an "occurrence" is necessary for indemnity to be received.

Definitions of Solely Economic Loss: "Economic loss is typically defined as loss in value, loss of use, cost of replacement, lost profits, and damage to a business' reputation, where no physical accident is involved."

2.4.4 Notice of Breach:

"Where a tender has been accepted..."" the buyer must, within a reasonable amount of time after he discovers or should have discovered any breach, notify the seller of the breach or be barred from any remedy." This is a protection for the seller. It allows them to prepare for a possible claim against them.

2.4.5 Wrongful Death:

A breach of warranty or negligence may be considered a wrongful act, thus may be subject to a wrongful death action. This is due to the fact that culpability exists "in the consciousness and understanding of all right thinking persons."

2.4.6 Procedural Considerations:

Jurisdiction: a. Statutory Causes of Action: In the case were an express warranty is breached by a defendant, state consumer protection statutes gives the plaintiff the right to treble damages and also to collect for attorney's fees. There is a private right of action, established by Congress, for damages where someone is injured due to a violation of a Consumer-Product-Safety-Rule. These are both examples of causes of action brought on by statutes.

(a.) Minimum Contacts of the Defendant: A defendant cannot be found liable for a defect, which occurs outside of his former state. If a retailer does not avail himself " of the privilege of conducting business in the former state" or "to serve directly or indirectly" in the market, then they cannot be held liable. However, if the manufacturer

intends to make a profit from a national market, then the specific state does not exclude the manufacturer from liability.

(b.) Class-Actions and Multi-District Litigation: There are four types of class actions: "1. Where there is a risk of inconsistent or varying adjucation; 2. Where adjucation of some claims will, as a practical matter, be disposed 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 reliefs appropriate; 4. Where questions of fact or law common to the members of the class predominate over the questions affecting only individual members." The first three types are mandatory for all members of the class to follow. The fourth type gives an option. The multi-district litigation statute states that similar pending litigation from one district can be used in pre-trial matters in other districts.

(c.) Inconsistent Verdicts and Erroneous Instructions: Every court treats these issues differently. Some say that a defective product does not necessarily breach warranty and vice-versa. Some however disagree and say, "If any counts in a declaration are good, a verdict for entire damages shall be applied to such good counts."

(d.) Res. Judicata: Collateral estoppel is a term which, "precludes relitigation of an issue that has been finally determined in a prior litigation between the same parties or their privies or relitigation of an issue by one party where that issue has been finally determined against that same party in a previous litigation." Non-mutual defense collateral-estoppel is used when a plaintiff tries to sue a defendant on an issue dealt with in a prior suit. Non-mutual offensive collateral estoppel is used when a defendant tries to relitigate a prior issue.

(e.) Choice of Law: If a federal law decides that its own rule is procedural, federal law is applied over the forum states' law. In the case of change of venue, the transferor court sets the conflict rules for the transferee court. A state must have a significant number of contacts involved in the case in order to apply its own law.

2.4.7 Statutory Compliance:

Compliance with applicable statutes means that the product is inherently not defective.

2.4.8 Defense Contract Specifications:

Non-Government Specifications: If the specifications are conformed to, the manufacturer is not liable. 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'."

Government Specifications: A manufacturer is not liable for a defective product it is in accordance with government contract specifications. There are four elements to this statement: 1. "The approval of the design by the United States must involve a discretionary function"; 2. The United States must have "approved reasonably safe specifications"; 3. "The product must have conformed to those specifications" and; 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."

2.4.9 Statutes of Limitation:

The Applicable Statute: Two or more statute could apply to a case. Either a warranty statute or a personal injury statute or both could be applied. A statute of repose is a limitation whose period runs between two fixed dates, regardless of the situation.

Date of Accrual: An accrual date is the date at which the statue of limitations takes effect. Three common types of these dates are: "1.)Date of the injury, 2.) Date when the plaintiff had reason to know about the claim, 3.) Date when the plaintiff, in the exercise of reasonable care, should have known of the claim."

Tolling Exceptions: A statutory period has the ability to be tolled, or stayed. A reason for this would be the happening of an event, which prevents the period "from beginning or continuing to run as it would otherwise do in the absence of the events occurrence."

2.4.10 Statutory Retrenchments:

Some issues covered by these retrenchments, or limitations are: "limitations on the amount of chargeable contingent fees; elimination of the collateral source rule; provision for the periodic payment of judgments; elimination of strict liability and the adoption of the product state of the art defense; elimination or restriction of recovery for punitive damages.

2.5 Production and Design Defects:

2.5.1 Production defects:

In a manufacturing defect case, the plaintiff proves that the product is defective by showing that it does not agree with the manufacturer's specifications. However if a manufacture determined that a 20% failure rate was acceptable, none of the products falling within this range of failure should be considered defective. Random defectiveness is probably what is taken into account by the concept of production defect. It is not always a useful means of distinguishing production from design defects, if the idea is intended to refer to the rate of failure.

2.5.2 Design Defects:

The Theory of Liability: There are many different views as to what constitutes as liability. The most widely exercised standard of liability is some form of risk-utility analysis. Risk-utility analysis is where the liability of the manufacturer depends upon a departure from certain standards of care. This is basically a matter of negligence on the part of the manufacturer, but many courts would have us believe that their focus is on the product rather than the manufacturer's conduct. Although a jury will take into account the judgment or decision, in other words "conduct" of the manufacturer. However, in strict liability cases, industry custom or usage is irrelevant to the issue of the defect. Instead, the factors of the degree of danger posed by the challenged design, the probability that such a danger could occur, the mechanical feasibility of a safer alternate design, and the adverse consequences to the product and to the consumer that would result from an alternate design. One view as to what design defectiveness is in strict liability is whether

the product did not perform under normal conditions as an ordinary consumer would expect, also if the plaintiff proves that the product's design caused his injury and the defendant fails to show that the benefits of the challenged design outweighs the risk of danger inherent in such a design. However a product that fills a requires/critical need and can be designed in only one way should be viewed differently.

Polycentricity: Sometimes conscious design decisions are described as "polycentric" or "many centered problems", in which each point of a decision is related to all of the others. This describes how some flaws in design may result from concisely inputting one design, which is safe under most conditions, but flawed under lower percentage conditions. Thus trade-offs in the design of a product involve safety, utility, and cost. It is the manufacturers judgment as to whether the trade-off are acceptable, if the trade-offs are known to the public, but still accepted by it. This concept of "trade-off" makes deciding product liability a more complex process. In the Bowman court, it was thought that the jury should be instructed to consider the probability and seriousness of potential injury, and 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 when a manufacturer places market considerations before the design of a safe product, that is when a design is thought to be liable and unreasonably dangerous.

The Relation of Design and Warning Defects: The failure to warn of an obvious danger in the product is a case of liability, but to warn of an obvious danger that can be avoided through a feasible alternate design can also be seen as liable. Thus placement of written warning labels and notices, does not release the manufacturer of all

of their responsibility in the safety of a product. Lack of mechanically engineered warning may also be a case of design defect, as in the case of Simms vs. Thiede (1990). Depending on the situation at hand, the degree of liability due to warning or lack there of is dependant on the view as to whether the warning is adequate and/or the manufacturer neglected to warn the consumer of the dangers.

Obviousness of Danger: Is a manufacturer liable for a product that has obvious dangers, and is misused by the consumer in such a way that he injures himself? That depends on the product and whether adequate safe guards can be implemented and if the dangers were unreasonable. However the obvious danger defense conflicts with the defense of assumption of the risk. To establish assumption of the risk, it must be shown that the plaintiff discovered the defect, fully understood the danger that it presented, and disregarded this known danger and exposed himself to it anyway. In a case of truly obvious danger, the failure to adequately warn of such a danger or hazard that is apparent to the ordinary user is not unreasonably dangerous, as stated by the Tennessee Product Liability Act, Tenn. Code Ann. 29-28-105(d).

Crashworthiness: Crashworthiness is a term used to describe the capability of a product to protect against increased injury from an accident caused by something or someone other than the product. This is mostly used in connection with automobile collisions, as in fuel tank crashworthiness, but may also include such events as when a fire extinguisher fails to work, or a burglar alarm malfunction. Most courts find that most products must be reasonably designed against foreseeable accidents. Injuries resulting from unforeseeable accidents, however, are not the responsibility of the manufacturer.

2.6 Inadequate Warnings and Instructions, and Misrepresentations:

2.6.1 Warnings and Instructions:

In General: A plaintiff is 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. A warning is distinguished from an instruction, in that instructions are calculated primarily to secure the efficient use of a product, while warnings are design to insure safe use. A warning must describe the nature and the extent of the danger involved. For example, a jury could find that a warning on dishwasher soap was inadequate. The warning stated that the soap was corrosive, but it did not warn that the product could cause blindness. Warning may need to detail not only the toxic qualities of the product, but also a safe means of disposal. A manufacturer may be required to warn of the absence of an antidote in the case of a dangerous poison. In addition, it should take into account the environment in which its product will be used when fashioning warnings. In most cases a warning is required in order to enable the plaintiff to use the product in such a way as to avoid a concealed danger. The plaintiff could not complain that a warning with clearer or stronger content would have made a difference if the plaintiff had failed to read the warning that was given. On the other hand, the plaintiff has the burden of showing that, had a warning been given, it would have caused him/her to avoid the accident. If a danger is obvious, it is not required for a warning to be given, but determining cases of defective design is complicated. Sometimes expert testimony is required to determine the adequacy of warnings to a specialized group, such as doctors.

The Standard of Liability: There is a substantial division of authority regarding whether negligence or a strict liability is to be used in failure to warn cases. With today's world consumers, it is hard from them to protect themselves from risk of serious dangers caused by the products they purchase. The manufacturer is better equipped with the knowledge of the product and can handle with more ease. Therefore, the consumer must rely on the integrity and competency of the business community. In addition, by imposing on the manufacturers the cost of failures to discover hazards, we create an incentive for them to invest more actively in safety research. Liability can also be judged by scientific knowability. If a known defect or hazard could be deemed knowable at the time of production through applying research or performing tests that were available at the time, then the manufacturer is liable and negligent in producing the dangerous product. However, it's hard for juries to understand this "scientific knowability" and judge upon these given complex issues. The effort, time, and money applied to safety research are also analyzed to see if the manufacture put up a decent effort in discovering flaws and defects in their products. The state-of-the-art is usually determined 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 knowable.

Persons to be Reached: A warning is mandatory only on specific dangers that an expert is unaware. Commonly experts need not be warned if products they are using are

in their field of knowledge. However, there may be specific dangers of which the expert is unaware, and thus needs to be forewarned. An intermediary is required to give warning to the consumers if they have knowledge of the defects, dangers, and/or past accidents. However, some intermediaries have no knowledge of defects. In most cases of doctors prescribing drugs, the warning can be issued to only the doctor; this is called the "learned intermediary rule" for prescription drugs. In some cases, however, the warning has to be given directly to the consumer via package insert or warning, such as in the case where it is foreseeable that a drug will be used or administered without the intervention of a doctor or learned intermediary.

Countervailing Representations: Misrepresentation of a warning can occur when the warning is downplayed or misleading. Counteractive words that describe the products safety, when in fact it was misleading can make the warning more inadequate. In some cases, salespersons, or manufacturer's detail men, emphasize their products effectiveness, while downplaying or not warning of the defects can also count as misrepresentation. Pictures, and/or appearance of safety can also be a misrepresentation of safety if the pictures or appearance show how safe a product is, when actually it isn't. A variety of circumstances surrounding the packaging, marketing, and appearance of a product may serve to counteract any warnings that are given. Adequacy of a warning depends upon the environment in which the product is marketed.

Post-Sale Duties to Warn: In some cases, a warning is necessary post-sale if a dangerous defect is discovered or known in the product sold. A negligent failure to warn can also exist at the time of sale. The post-sale duty may be greater than one of just warning, as in cases where the product needed to be recalled or repaired. However, in

cases where corporation A buys out corporation B, corporation A is not liable for products sold by their predecessor. On the other hand, corporation A, has the obligation to warn of dangers associated with products sold by it's predecessor if they discover a defect in the product sold by it's predecessor.

Allergic Users: Warnings are subjected based on a substantial or appreciable number of persons contingent to the allergy. This is where the defendant should have known of the risk. The definition for substantial or appreciable number is not easy to define. There has been one case where 373 complaints out of 82 million sales were considered sufficient. Common allergies such as eggs or strawberries need not be warned by the seller, but may be required to warn that products contain ingredients that are known allergens.

2.6.2 Misrepresentations:

Misrepresentation can be based on deceit, negligence, strict tort, or strict warranty. There is no need for a defect on a product to be shown other than the plaintiff's injury is caused by misrepresentation of the supplier. Sometimes misrepresentations arise from the appearance of the product itself. A number of product defenses and liability limitations can be avoided if strict liability for misrepresentation is imposed.

2.7 Problems of Proof:

2.7.1 Cause-in-Fact:

A plaintiff must show that the defect existed when the product left the defendant's control. He must reasonably eliminate alternative causes not attributed to the defendant.

The plaintiff in a strict liability action is not required to disprove every possible alternative explanation of the injury in order to have the case submitted to the jury. The plaintiff need only show that the material fact to be proved may be logically and reasonably be inferred from the circumstantial evidence.

Some count have rejected the market share basis of liability for similar products that have varying degrees of harmfulness, on the ground that the market proportion rationale is inapplicable since the proportion of the market sold does not necessarily reflect the proportion of injuries likely caused by a defendant.

Often the concept of foreseeability is used to describe occurrences that can reasonably be anticipated, while proximate cause is used to describe occurrences that are the "direct", "natural", or "probable" result of another event.

2.7.2 Proximate Cause and Foreseeability:

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." But before a manufacturer or other seller is strictly liable for injury inflicted by a product, the product must be foreseeable, while only foreseeability of use is required in strict liability.

Misuse: Affirmation defense by some courts. Misuse is not treated as a bar to recovery unless it is considered unforeseeable. Unforeseeable misuse is considered a bar. Misuse, when attributable to the plaintiff rather than a third person is closely related to contributory negligence and assumption of the risk. The fact that the plaintiff himself is guilty of criminal conduct in his acquisition or use of a product will not necessarily bar

his recovery on the grounds of unforeseeable contributory negligence or assumption of the risk (Rest 2d of Torts 889).

Alteration: A special problem of misuse concerns the alteration of a product. A substantial alteration that causes the accident may be unforeseeable, barring recovery, unless the alteration should have been anticipated because of the characteristics of the product that invite or encourage the change. Where a defendant furnishes a defectively constructed product, it is foreseeable that the product may be defectively modified in an attempt to correct the original defect.

Damages: Sec. 435 of the Rest. 2d of Torts states, 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 or 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.

2.7.3 Plaintiff Misconduct, and Comparative Fault:

Three types of plaintiff misconduct that can bar or limit the plaintiff's right to recovery are:

1. **Contributory negligence:** the failure of the plaintiff to take reasonable actions for his own safety.
2. **Assumption of the risk**: a knowing and voluntary confrontation of an appreciated risk.

3. **Misuse including alteration of the product:** the use of a product in a foreseeable or unforeseeable manner.

Contributory negligence and assumption of the risk are usually treated as defenses, with the burden of proof on the defendant. Contributory negligence is determined by a reasonable person standard, based on the knowledge of the plaintiff. The danger can be latent, but discovered by the plaintiff. A plaintiff may be aware of one risk without appreciating another.

The effect of plaintiff misconduct in strict liability: Some courts hold that contributory negligence is no defense in a strict products liability action, but that assumption of the risk is a defense. Contributory negligence of the plaintiff is not a defense when such negligence consists merely of a failure to discover the defect in the product, or to guard against the possibility of its existence.

Comparative Fault: Comparative fault has been widely adopted, either by statute or judicial decision. Three principle patterns of comparison: 1. Her fault is less than that of the defendant. 2. If it is not more than that of the defendant. 3. If the defendant is at fault to any degree.

Pure comparative fault is preferred by commentators and is the method usually chosen by judicial adoption. If the plaintiff is permitted to recover, their recovery will be proportionally reduced by the percentage of the fault, if any, attributable to themselves. Thus a plaintiff found 30% at fault can recover 70% of the damage.

Where there is more than one defendant, the general rule is to retain joint and several liabilities in comparative fault.

The reasons for retaining joint liability in a comparative fault, even where the plaintiff is also at fault: 1. The feasibility of apportioning fault on a comparative basis does not render an indivisible injury "divisible" for purposes of the joint and several liability rules. 2. In those instances where the plaintiff is not guilty of negligence, he would be forced to bear a portion of the loss should one of the tortfeasors prove financially unable to satisfy his share of the damages. 3. Even in cases that share a plaintiff is partially at fault, his culpability is not equivalent to that of the defendant. The plaintiff's negligence relates only to a lack of due care for his own safety, while the defendant's negligence relates to a lack of due care for the safety of others; the latter is tortuous, but the former is not. 4. Elimination of joint and several liabilities would work a serious and unwarranted deleterious effect on the ability of an injured plaintiff to obtain adequate compensation for his injuries.

Comparative fault is widely applied to unreasonable assumption of the risk. Some courts apply comparative fault to conduct based on plaintiff misuse of the product. Some courts compare relative fault, others relative causation, and still others a combination of these factors in determining comparative fault or comparative responsibility. Some states by statute apply comparative fault to strict liability action.

2.7.4 Subsequent Remedial Measures:

Evidence of the subsequent measures is not admissible to prove negligence or culpable conduct in connection with the event. This rule does not require the exclusion of evidence of subsequent measures when offered for another purpose, such as proving ownership, control, or feasibility of precautionary measures, if controverted, or

impeachment. The rule is generally held to exclude evidence of remedial measures only if taken by the defendant after the plaintiff's injury, and it does not exclude evidence of such measures taken before the injury.

The rule does not exclude:

Evidence of remedial measures taken by one other than the defendant.

Evidence of remedial measures taken a defendant after the plaintiff's accident when these measures are involuntarily undertaken. The rule does not apply unless the evidence concerns conduct that can fairly be described as a remedial measure.

Evidence of subsequent remedial measures may be admitted, even in a negligence case, if offered for some purpose other than that of showing negligence or culpable conduct.

R.407 states that evidence of subsequent remedial measures is admissible when offered to prove "feasibility of precautionary measure, if controverted, or impeachment." The feasibility of providing a safer design or warning is often a principle issue in product litigation.

2.7.5 Miscellaneous Problems of Proof:

History of unsafe and safe use: Evidence of unsafe use and of prior accidents with similar products is admissible for a variety of purposes, which include proof of notice of the alleged defect by the defendant, the magnitude of the danger, the forseeability of user conduct, the defendant's ability to correct the defect, and causation.

Spoliation: It occurs when a person willfully or negligently disposes of product evidence vital to a litigant's case. The person who disposes of the evidence may be held

liable to the litigant for the damages they likely could have recovered. The disposer may be the product supplier or another owing a duty to preserve the evidence.

Expert Testimony: Expert testimony may be essential in a products liability lawsuit to establish a prima facie case of defectiveness, causation, damage, and other issues in the suit. Expert testimony is admissible if it will aid the fact finder in its determination of an issue in the suit. Experts may be laypersons, in the sense of lacking academic credentials, provided they have acquired specialized knowledge through experience with a product.

State of the Art and Industry Custom: Courts have difficulty distinguishing between state of the art and the industry custom, and a number of counts permit evidence of industry custom to show state of the art. State of the art is defined as the scientific or technological knowledge available or existing when a product is marketed.

Codes, Reports, and Technical Literature: Safety codes drawn up by industry sponsors associations are admissible on the issue of defectiveness, due care, and other disputed issues in a case.

Discovery: The use and abuse of discovery have become controversial issues in civil litigation, including product liability.

Chapter 3: Videos

The purpose for watching the videos was to have a visual aid to stress the various techniques used in the courtroom. It is important for a successful outcome in this project that we the students have at basic understanding of the impact that body language, voice level, and the phrasing of questions has on witnesses and juries, and the bearing these techniques have on the outcome of a case. The videos were broken into eight episodes, each stressing a different facet of a lawyer's case and the manner in which it is most effective to display them in different situations. The last video is an example of the type of products liability case we will be dealing with later in this project.

Video #1-Opening Statement

The opening statement is an integral part of a lawyer's case. There are several goals that each lawyer should attempt to achieve during this time. The most important goal is to try to create a connection with the victim and the jury while not being melodramatic. Juries tend to be more sympathetic towards people with whom they have common features, just as people act in the world outside of the courtroom. By using such tactics as building a narrative picture of what happened and how the incident leading to the trial affected the victim through imagery and narrative storytelling, a lawyer can sometimes sway a jury into his favor before even showing any evidence as to why the defendant is at fault. This has been proven in a study done in Chicago where it was found that juries believed more about a case from the opening statements than the evidence presented to them.

The findings of this study lead to this new form of opening statement that is described here. The older form was very much the same to every case, it was trite,

apologetic, tentative, and unimaginative, and therefore did not hold juries attentions, as it should try to accomplish in today's courtroom.

During the opening statement, the elements that will come into play in the lawyer's side of the case should be told to the jury, and any ways that your side sees the other side getting a "leg up" on the case should be put to rest as soon as possible in this statement. That is, bring up the opposition's key point to the jury, but only if you can defend them with a legitimate argument. Any terms that will be used frequently throughout the trial that the jury may be unfamiliar with should be explained to them so they can understand it.

At some point during the opening statement it will be important to move into the liability issue. Tell why the defendant is or is not responsible, whichever is pertinent to your case, and explain why. The issue of damages to the victim and the effect these injuries will have on them should be brought up during this time as well. The last statement of the opening should tell the jury what they should do while simultaneously returning to the original theme of the trial.

These are the basic parts to any opening statement. What makes any statement good is the lawyer's own personal style and how they adapt themselves to the courtroom setting and trial situation

Video #2- Direct Examination

Direct examination is the part of the trial where the attorneys on both side take turns bringing up witnesses who give testimony that is helpful to their arguments. Direct examination is sometimes rehearsed outside of the courtroom, since the purpose of this part of the trial is to have the witness say things that are in agreement with the lawyer.

Direct examination is often the most challenging part of a trial for any lawyer. It is important to question the witness in a manner that goes with the mood you are trying to set the in courtroom. The lawyer's tone, body language, voice level, and even how often and when they pause during the questioning are all factors that have a dramatic effect on the witness as well as the jury.

A major part of the direct examination in a products liability case is the area of finances. This is a tender issue to deal with; on the one hand, the lawyer is in court to win money for his client, but on the other, a jury may look down upon a lawyer or victim who seem only after the money, and seem to have no major reason for it. This is why it is pertinent that the lawyer or professional witness outlines each formula for where the values of money are coming from, and were not just made up. Quickly sum up the bottom line, don't dwell on it, because this then lends to the image of greed once again. Above all else, while giving the financial aspect and where the numbers come from, be sure not to lose the jury's attention, because even though it was explained, they may forget and see the plaintiff as simply going for the money once again.

While interviewing a victim, talking about the injuries and the effect the damage has had on the victim's lifestyle is important, but it is more important to bring as little emotional response as possible from the victim, since as genuine as it may be, the jury can interpret this as a theatre sketch used to draw sympathy. This is not the image that a lawyer wants to have in his or her courtroom, as it is considered in bad taste.

While interviewing a defendant, there are several rules to follow as well. It is vital that the lawyer not be interrogative towards a defendant. The best method for getting information out of a defendant is simply by questioning them in ways in which

there is only a yes or no answer involved; lengthy answers from defendants can lead to explanations, and it is best to not let them do this unless they are going to explain something that the questioning lawyer already knows, and is good for their case.

During this direct examination, exhibits and evidence should be displayed to the witness and jury in a clear and organized manner; a sloppy delivery of materials reflects on the jury that the lawyer has not put in the time and energy to this case, and therefore does not care about it. This is a very bad image for a jury to hold a lawyer in.

It is considered best practice in a courtroom to save the viewing of the injury to the jury until the very last part of the direct examination. This is because people tend to remember what they hear first the best, and remember what they hear or see last the longest. The image of the debilitating injury is one that the defendant wants the jury to keep in their minds until well after they give their verdict.

Video #3- Additional Opening Statements

While the main points expressed in the first opening statements video (video #1) are essential to providing the basic information and setting for the trial, other means of conveying information may be necessary depending on the case at hand. The goals stated previously are still in place; adding additional opening statements is simply a means to stress the lawyer's facts and establish a good relationship with the jurors.

The lawyer's use of body language and tone of voice may be used to express how serious or important the issues being brought up in the opening statements are. The lawyer should know how his or her presence in the courtroom affects those people in the jury, and should be able to manipulate jurors through his or her use of these tactics. Usage of repetition in statements to show the importance of the statement is a popular

way to get important information across to the jury, since whenever people hear something multiple times, they tend to remember it.

Other aspects of the case can be brought into the opening statements that are not listed above. For instance, a lawyer may want to take advantage of the opening statement to establish the credentials of the victim or witnesses, and may possibly use this time to discredit the defendant. To do this, some lawyers even use visual aids. It is important to not bring in too much evidence in the opening statements, but the important pieces that the lawyer feels makes his case favorable may be mentioned. It is considered poor taste to bring up an amount of money in the opening statements, as many jurors may feel that the plaintiff is simply after money, and not just for damages rendered. It is best to save this information for an economist or similar expert witness to bring into play during a direct examination.

It is most important of all to be well spoken, clear, concise, and to the point with the jurors during this time of the trial. The jurors are most impressionable at this part of the trial, and it is extremely critical to put to rest any questions the jury may be thinking about the case. Over all, if the lawyer tells a good story about the case, makes themselves heard, and touches on the major points talked about thus far while using their own personal mix of style for the courtroom, they will have the strongest possible opening statement for the case. While not all cases are going to be won, the lawyer must learn from their mistakes and what has worked well in the past to build up their own style that is most effective for them.

Video #4- Cross Examination

The cross examination is the time of the trial in where a witness has already been called by a lawyer and directly examined. The time for the opposing lawyer to question the witness is now. A trial lawyer needs to establish his presence with the jury through cross-examination; it shows that the lawyer knows not only the law, but also about the case and how their side is right.

At the beginning of a cross examination, the lawyer should take a few moments to get to know the witness a little better by asking them open ended questions. This is the only safe time to do this, because the witness was brought forth by the opposition and so in most cases is favorable to that side. After getting to know the witness for a while, open ended questions should be limited to the times when the witness will only give information or explanations that help out the questioning lawyer's case.

During the questioning of a witness, the lawyer should take the tone and mood that is best for the situation as has been described previously. The lawyer should look for holes in the witness's story or conflicting statements to discredit them. This can be accomplished by using the witness as a sounding board to reaffirm statements that help the lawyer, and then use them with some other information to ruin the other side's case. The questioning lawyer must show that he or she has control of the questioning by dominating the conversation and getting the witness to agree with the statements made.

Video #5- Cross Examination of Non-Medical Experts

Nearly all cases of Products liability will involve an expert witness of some form or another. These expert witnesses can include, but are not limited to doctors, economists, inspectors, and the focus of this project, the engineer. These witnesses have

most likely appeared in court before, and in many circumstances the lawyer has hired them on many occasions before this. As a result, these witnesses are very good at being grilled and manipulated by an opposing lawyer, and since the opposition is paying them, they are not as easy to discredit as other witnesses may be.

This is why it is even more important to rely on the techniques explained in the last section on cross-examination. Expert witnesses tend to be very good at gaining the favor of a jury through the use of explanations, as so it is even more critical now to keep the answers to the questions asked so only a one word answer is possible. It is still vitally imperative that the lawyer capitalize on the flaws in the witnesses testimony, and this can be done more easily if the professionalism of the witness is first slandered. The lawyer must be sure not to attack the witness personally, but rather attack the professional nature of the witness revolving around the case. For instance, if it is found that an expert witness has not spent much time on the case, capitalize not on what the expert said about the case, but rather concentrate on the fact that the expert should have spent more time dealing with the case.

Establishing psychological control of an expert witness can be tricky, but by doing so a lawyer may be able to accomplish the task at hand much more readily. This should be done in a non hostile way as not to destroy the expert, but as a means to amplify the pieces of the testimony that gain the lawyer some points for his side of the case with the jurors.

Video #6- The Deposition

A deposition takes place in a conference room or other such meeting area before the start of the trial. It is a meeting place between the lawyers from both sides with their

respective plaintiffs and defendants. This meeting gives the lawyers and important parties within the case a chance to talk things out, under oath, in hopes of reaching some agreement or understanding before they enter the courtroom with the jury present.

The deposition is recorded by a court stenographer, and therefore is considered valid evidence in the trial. This is why it is important to make sure what is said in the deposition is nothing that would give a leg up to the opposing lawyers. If the case is not solved during the deposition and goes to court, anything said can be used against any party, since the information was recorded. It is important never to volunteer any "inside" information to the opposing party and to keep answers clear and concise, answering as little as possible while keeping the answers direct for that exact reason. It is more important to listen carefully to the questions asked by the lawyer, and to make sure that you completely understand the question at hand before attempting an answer, and to take some time before answering. This will minimize misunderstanding the questions asked, and will allow for some time to gather thoughts about the answer, since the phrasing of a question recorded on a deposition is easy to misconstrue to a jury by the opposing side.

Above all, always be honest during a deposition, and do not be afraid to answer, "I don't know" to questions that you have no answer for. When in doubt about the nature of a question, one should not be afraid to consult with their attorney before answering the question, since their lawyer knows what is and is not legal to ask a witness.

Video #7- The Conclusion

The conclusion should consist of five or six statements at the end of the closing arguments. The conclusion should be used to wrap up the entire case, put into the light the lawyer speaking wishes to have the jury see it under. All of the rules about body

language and tone of voice still apply, and the conclusion, much like the opening statement, should be used to create an image that is sympathetic with the jury. Alienation is a popular way to conclude. Alienation is taking a story and moving it into a different context, in hopes that this will create even more sympathy with the jury.

The conclusion should be a prepared statement, since there are three parts that should be expressed during this, and the manner in which they are delivered to the jury can make or break a lawyer's case. First of all, the lawyer needs to decide how the story will be delivered to the jury. Secondly, the lawyer should bring forth the actual importance of the jury to their faces. By telling them what they decide will affect the plaintiff for the rest of their life, the jurors will take this a little more seriously than they may have before.

The style a lawyer uses to deliver a closing argument varies with each particular lawyer, just as the style for every other part of the trial does. Whatever form of delivery a lawyer chooses depends on the style that works best for them, and sometimes they adopt new techniques they learn from other lawyers while in the courtroom. The problem with adopting a technique is only if the entire method is plagiarized, then, just as modeling a paper or book after another person, others in the field look down on you. It is best to only apply those techniques that can easily be integrated into the lawyer's own form of delivery, so each lawyer has a slightly distinct method in the courtroom.

Video #8- Summation

Summation is the closing statement of the trial, and so the lawyer should have established a relationship or presence with the jurors previously in the trial. That is why there is no real reason to have a "get to know you" period during the summation. The

summation should instead be based upon three basic principles of argumentation. The first of these is to try to give insight into why their case is a good case, possibly through the use of evidence and witness testimony, but not always. In products liability cases, it is sometimes useful to talk about the importance of products liability and the reason why there are so many cases of it.

The style used for the summation is again one of personal choice. It is generally a more prepared form of delivery to the jurors, one that has been previously practiced by the lawyer. Visual aids can still be used in this part of the case, and especially when talking about the financial part of the case, many attorneys have pre-prepared charts and graphs to explain again where the bottom line comes from. Some lawyers choose to use a blackboard and write it as they explain it, while still others use nothing at all. This is all a matter of personal choice.

It is just as important to think out how sensitive issues such as injuries should be talked about during these closing arguments as well. A lawyer should know exactly how they are going to phrase specific parts of their summation, since they generally do not know the background of the jurors, and therefore do not know how each juror will react to different things. This is a good tactic to use when finalizing a lawyer's credibility, and it should be applied while reasoning out all the parts of the case, and why each one was important to the trial for their side.

Finally, it is considered good practice to remind the jury of their important place in this case. Bringing to their faces the facts that whatever they decide will be final and will affect the rest of the plaintiff's life tends to make them think about the case a little

more seriously. Phrases such as describing the jurors as "The conscience of the community" will help to establish this more readily.

Video #9- 60 Minutes II: A Classic Cover-Up?

This news program is a perfect example of what a products liability case would be about, and it would be an excellent one for a person to win. The case revolves around the 1964-1970 Ford Mustang, an extremely popular classic car that has a major defect in its design that causes serious damages to driver and passengers.

The problem lies is the design of the gas tank. The tank is a drop in gas tank, so that the top of the tank is the floor of the trunk. This was done because it was inexpensive to produce and install, and since the Mustang was originally marketed as a sports car that is affordable to drive, many corners were cut besides this to accomplish the main goal that the entire automobile was built around.

The problems arose when the vehicle was struck in the rear, crushing the gas tank and causing it to spray gasoline into the passenger compartment through the back seat. This would often ignite after collision, and created a huge firestorm inside the vehicle. While Ford insists that these collisions were all high speed, studies have shown that burning deaths in Mustangs is nearly three times that of other cars built in the same era.

It must be understood that at the time the classic Mustang was built, not all aspects of the vehicle were built around safety. First of all, none of the laws we have today governing safety in automobiles were in place then, and so Ford was not breaking any laws by not recalling the Mustangs when they knew about the problem. Ford should then be held accountable from a moral and ethical standpoint; the fact that the executive

engineers knew about the problems with the drop in gas tank as early as 1966, yet did not change the design until 1971.

Ford has been sued over the burning of the classic Mustang over seventy times, and has settled each one out of court with little or no publicity. This shows that Ford is aware that their product is causing damages to people that it should not be, and is an obvious admission to guilt. The president of Ford Motor Company, Lee Iococa, who helped to design the classic Mustang, was even taped by former president Nixon's secret recording devices as saying that "Safety was ruining the automobile industry." This, compiles with the withholding of the crash test 301 video tape that clearly shows the gas tank rupturing and covering the backseat passengers with fuel can be seen as being Ford's way of covering up the issues.

Ford nevertheless continued to produce the Mustang for five more years after the problem was discovered because the car was such a popular item and the dangers of the vehicles were unknown to most consumers. Lee Iococa is quoted by 60 Minutes II as saying "If you want safety, buy a new car." This is a true statement, but Ford should still be held responsible for something they produced in the past, and not just the automobiles they are producing today.

Chapter 4: Case One; Kenneth Bartow V. Extec Screens

The case taken under consideration is a lawsuit filed by Kenneth Bartow and his family against Extec Co. for designing and marketing of a defective and unreasonably dangerous machine. Kenneth Bartow, an employee of O'Connor Brothers, Inc. in Sheffield, MA allegedly injured himself after a fall from atop an icy Extec model 5000S Screening Plant Machine, serial number 3525. He claims negligence on the part of the manufacturer and is suing because of a lack of safety railings that would have prevented his fall.

Lawsuit filed:

Kenneth Bartow		Extec Screen and Crushers Ltd.
Diane Bartow	Vs	Extec of North America
Nicholas Bartow		Extec of America

Mr. Bartow claims damages that originated from the accident, which happened on December 16, 1994, while Mr. Bartow was working on the subject sifter machine, the Extec 5000S. The machine is said to be defective and unmarketable on the basis of its design, assembly, manufacture, distribution, and evaluation. When it was sold to O'Connor Brothers Inc., it was a defective and unreasonably dangerous machine due to the lack of safety devices for users who had to climb on top of the machine in order to make any kind of mechanical adjustments. Extec issued a product statement assuring that the subject machine had been designed under severe operator research and they concluded it to be a superior user friendly, quality time saving machine. Although Extec

stands behind their product, this claim to be a superior machine implying a warranty is the basis for much of the claim.

The plaintiff suffered moderate bodily injury to his head and back, as well as expenses for his medical treatment, which came to $985.46. For the duration of his life he will be unable to maintain living as he once did. He will no longer be able to do his usual activities, nor will he be able to go to work. He suffers permanent disfigurement, bruising, scarring, endures great pain of both body and mind on an ongoing basis, and has been otherwise unable to enjoy life. Both his wife, and his son filed claims. Diane Bartow and Nicholas Bartow claim for loss of consortium as a result of Kenneth's accident and the defective screen machine. The claims filed are as follows.

Counts I, II, III are on the basis of negligence in not installing safety railings, warnings, or providing sufficient training. Counts are filed according to all of the respective identities of Extec Co.

Counts IV, V, VI are on the basis of Breach of Implied Warranty of Merchantability. The subject machine is said to be of unfit standards and is unreasonably dangerous to its operator and should not be marketed as such.

Counts VII, VII, IX are based upon a Breach of Express Warranty. The subject machine was again marketed on basis that the Extec Co. made a guarantee that it was a safe and well-engineered machine.

Counts X, XI, XII are based on grounds of Breach of Implied Warranty of Fitness for a Particular Purpose. These counts are very similar to the aforementioned.

Counts XIII-XVIII are on grounds of Loss of Consortium in which Nicholas and Diane Bartow are suing for loss of Ken's ability to fulfill his previous role in the family.

In all, for all counts, the lawsuits total approximately $30,000,000.

The facts of the case state that on the morning of December 16, 1994, Mr. Bartow was discovered lying on his back near the machine in question. Harold Green discovered him. He fell from approximately 13 ft and consequently landed on frozen ground causing severe injury. He was performing a routine adjustment to the screen and may have fallen due to frost accumulation on the platform of the machine. However, he was not wearing the suggested safety belt and was working alone on the machine, which is against the policy of O'Connor and Brothers, Inc. Additional safety measures were considered but no modifications were made because of the ideal portability of the machine and the attempt to circumvent the accident by use of an maintenance lift instead of climbing up the machine.

In the first report of injury made to the insurance company, the accident is described as a fall from a ladder. Later in his deposition, however, Mr. Bartow claims he was on the platform adjusting bolts for the screen box when he fell.

Picture 1: Bartow's Supposed Leap: Horizontal Distance from Platform is 12 ft.

The spot where Mr. Bartow was initially found unconscious is not consistent with a fall from that platform.

Picture 2: Bartow's Probable Leap: Horizontal Distance from ladder is 7 ft.

It is possible that he would land in this spot if he slipped of the ladder. These two contradicting accounts given by Mr. Bartow lead us to believe that his story was changed to try and get more money by blaming Extec for producing unsafe machinery. The lack of handrails and safety guards is cause for concern, but it is not the reason Mr. Bartow fell from the machine. The ladder that Mr.Bartow designed was meant to make adjusting the screens a one-man job. Normally, a bucket loader is used to raise a man to the platform. Although this method is not safe and should have been discouraged, it is certainly safer than climbing a frosty ladder.

It is sensible to think that if Bartow had actually fallen from the platform he would have landed somewhere in its surrounding area, not 12 feet away. This distance indicates that Mr. Bartow would have had to leap off the platform head first and hit his head on the side conveyor and landed so far away. Bartow was right handed and would have been holding the socket wrench in his right hand. Harold Green reported that when he found Ken, the wrench was to his right side, about 5 feet away, although the platform was to Ken's left. The hospital and workers' compensation report note that Mr. Bartow

said he slipped and fell off a ladder at work. This seems to be true because of the orientation of his body in relation to the position of the ladder. He was found on his back, his head was away from the machine, feet toward the wheels, and only 7 feet from the ladder, close enough to hit his head on the side conveyor.

We feel that Bartow is not entitled to any money because of the fact that he lied and changed his story on more than one occasion. As with any litigation process if a witness is found guilty of purgory, his testimony shall not be acceptable in court. Although the machine may have had some safety issues, i.e. lack of safety railing, Bartow worked with the machine on a daily basis and something could have been done to solve the problem far in advance of the accident.

Chapter 5: Case Two; Bruce Perkins V. Eric Rodgers

On September 3, 1999, an accident occurred at around 7:00 pm, involving a 1996 Harley Davidson motorcycle, operated by Bruce Perkins, and a 1999 Mercury Sable, operated by Eric Rodgers. The accident took place on Rt. 101A, Nashua St., near Elisha's Restaurant in Milford, New Hampshire. Across the street from Elisha's Restaurant there is a Hospital. At this location, the posted speed limit is 25 miles per hour.

An accident report was filed by Officer Dana Miller after he arrived on scene. His report states that when he got to the scene he found a motorcycle, lying on it's left side in the east bound lane near the exit to Elisha's Restaurant with heavy front end damage. Close by he saw a Mercury Sable in the middle of the flow of traffic, perpendicular to it, in the west bound lane with extensive damage to the left rear fender. Officer Miller also noticed a skid mark measuring 103 feet 6 inches in length in the eastbound lane that ended at the place the vehicles collided. At this time Officer Chovanec started questioning the two parties involved in the accident. He reported a strong smell of alcohol from the breath of Bruce Perkins, at which point Mr. Perkins stated that he had consumed two beers with dinner and refused to take a Breathalyzer test. He was arrested and charged with DWI and speeding at the scene.

Eric Rodgers was questioned at the scene of the accident. It wasn't until later that he gave his deposition. Mr. Rodgers said in his testimony that he arrived at Elisha's Restaurant between 5:00pm and 5:30pm to get together with his father and a friend. In the time that Mr. Rodgers was at Elisha's, approximately one and a half to two hours, he

had 4 or 5 beers and had eaten some appetizers. At about 7:00pm, Mr. Rodgers got into his car to go and proceeded to take a left-hand turn into the westbound lane of Nashua St., Rt. 101A. The motorcycle that was traveling eastbound struck him as he was turning. This caused his car to be spun around 180 degrees, coming to a hault in the opposing lane facing the exit that he just came from.

When he was asked about the motorcycle, he stated that he only became aware of the motorcycle the second before impact. He stated that he saw a blur out of the corner of his eye (there were telephone poles along the side of the road that could have impaired his vision). Later in his deposition, Mr. Rodgers stated that since he was from Milford he was familiar with the area and could see approximately 120 feet to 140 feet in the direction from which the motorcycle was approached. At the time of the accident Mr. Rodgers said that he was traveling less than five miles per hour.

Bruce Perkins was also questioned at the scene of the accident. It also wasn't until later that he gave his deposition. He stated that the Mercury Sable, which was being driven by Mr. Rodgers, hesitated as it pulled out of the parking lot and was stopped slightly in the lane that Mr. Perkins was traveling. Mr. Perkins then drifted toward the yellow line to avoid the car when all of a sudden Mr. Rodgers pulled out in front of him. According to Mr. Perkins, Mr. Rodgers came up to him immediately after the accident and apologized for cutting him off, explaining that the poles had in fact blocked his view. Mr. Perkins stated that when the accident occurred that he was traveling at approximately 30 to 40 miles per hour, and that Mr. Rodgers was traveling at approximately 10 to 20 miles per hour.

Steve Neil, who was traveling on Nashua St. Rt. 101A, was a witness to the accident, and he observed the whole accident in his rearview mirror. He was traveling directly in front of the motorcycle operated by Bruce Perkins. He first noticed the motorcycle when it entered the road from a driveway and had pulled in behind his car. He then stated that he could clearly hear the motorcycle shifting and revving. This led him to believe that the motorcycle was most likely in second gear when he struck the Mercury Sable. He stated that the speed of Mr. Perkins' motorcycle was approximately 65 miles per hour, and also stated that the motorcycle should have been able to avoid the car. He stopped to help the two involved in the accident and when he did, he could smell alcohol on the breath Bruce Perkins.

We must now evaluate all of our information and form some type of conclusion. The length of the skid mark tells us a lot about the story. It was measured by the police officer to be 103 feet 6 inches. Taking this and the coefficient of sliding friction of rubber on asphalt, 0.7, the minimum speed that the motorcycle could have been traveling was 47 miles per hour. This is nearly twice the posted speed limit, which is 25 miles per hour. In order to cause the damage of the two vehicles, it was then calculated that the more probable speed of the motorcycle was approximately 65 miles per hour, which is 40 miles per hour over the posted speed limit, and nearly three times the speed limit.

Picture 3: Nashua St., Rt. 101A; Elisha's Restaurant on left

The telephone poles aren't as telling as the skid mark. As far as we are concerned, Mr. Rodgers may not have had his line of sight, but that would help explain the posted speed limit of 25 miles per hour. Mr. Perkins would have been able to see the car trying to turn into traffic and he would have had time to slow down if he was in fact traveling as fast as was calculated.

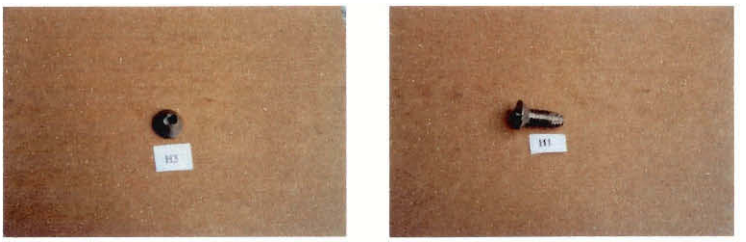
The blood alcohol content of Mr. Rodgers can be calculated using his weight, the amount of drinks, and the time in which he consumed them. Even after consuming five beers in an hour and a half (maximum amount of beers, minimum amount of time) his blood alcohol content would have been between 0.03 and 0.07. This means that he would have still been under the legal limit to drive a motor vehicle in the state of New Hampshire. On the other hand, Mr. Perkins claimed to have had only two beers with dinner, yet both the Officer Miller and Steve Neil stated they could smell alcohol on his breath. We can assume that two beers cannot give off a strong smell of alcohol on someone's breath, in this case Mr. Perkins. However, we cannot just assume that because he may have drank them after dinner, and if he did have only two beers then there was no reason to refuse a Breathalyzer test. This is why he was arrested for DWI.

Mr. Perkins argued that Mr. Rodgers pulled out in front of him at the last second, but the lengthy skid mark tells us a different story. His brakes were locked up at the point of impact and that he was traveling way too fast for the street. If he were not going so fast, then he would have had plenty of time to stop or avoid Mr. Rodgers in his Sable. The impact of the motorcycle on the Sable was enough to make the Sable turn 180 degrees, leading us to believe that Mr. Perkins was traveling close to the approximated 65 mph. It is our opinion that due to his complete lack of driving responsibility, his disregard for posted speed limits, and the alcohol in his system, we place full blame on Bruce Perkins.

Chapter 6: Case Three; Vermont Yankee V. Cianbro V. Rodney Hunt

Vermont Yankee is a nuclear power plant in Vernon, Vermont. There is a circulating water/cooling tower system, in which water is circulated and the water produces energy. As part of their circulation system, there are two hydraulically operated sluice gates that control the flow of water, one at the north end of the plant and one at the south end of the plant. In early 1998, Vermont Yankee hired Cianbro Co. to design, manufacture and install two new sluice gates, as the old gates were around 25 years old. Cianbro then delegated the design and manufacturing of the gates to Rodney Hunt Co.

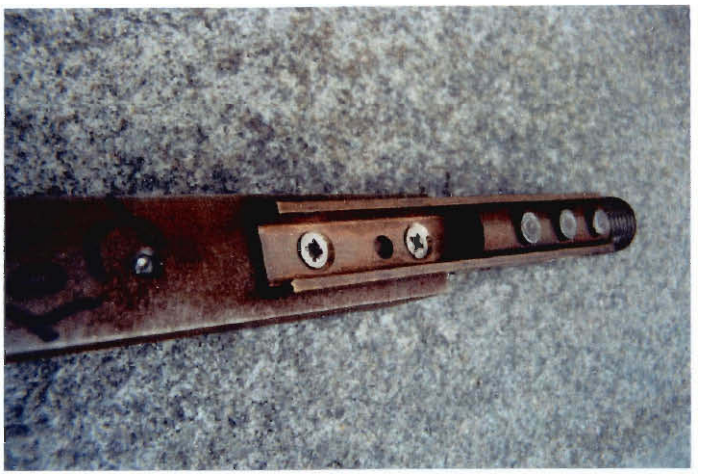
Cianbro finished installing the gates on May 28, 1998. On April 5, 1999, during an inspection by Rodney Hunt, damages were found on the south gate, and it was deemed inoperable. Shortly thereafter, on May 17, 1999, the North gate failed. Vermont Yankee contacted both Cianbro and Rodney Hunt and both companies refused to provide adequate repair. Vermont Yankee then sued Cianbro for a breach of contract and negligent design. Vermont Yankee also sued Rodney Hunt for negligence.



Picture 4: Screws used in Sluice Gates

The screws on the side of the gate were found to be sheared off and the initial cost was thought to total anywhere from 1.2 to 1.8 million dollars. This cost estimate included the removal of old gates and the installation of two new gates.

The sluice gates themselves are 11 feet by 13 feet (height by width) and are hydraulically operated. They are designed to slide up and down flanged frames that are bolted to concrete discharge structure (concrete walls). As was stated earlier, the purpose of the gates was to control the flow of water and also to divert flow to cooling towers. When it was first discovered that there was something wrong with the original gates, there were several problems actually. The gates were biding within the travel guides, there was cracking of cast pieces, and there were general sealing inadequacies.



Picture 5: Sheared screw on worn liner

Cianbro was then contracted to install new gates. The contract between Cianbro and Vermont Yankee stated that Cianbro should provide and install two replacement gates in accordance with Ebasco specifications. In addition, in section 2.6, it states, "existing attachment embedments in the concrete discharge structure may not be usable, may require repair, replacement or modification."

The gates were to be designed up to the Ebasco specifications. According to these specifications, the gates should be 11 feet by 13 feet, and made of cast iron. They were to be bronze mounted, motor operated, and have flanged frames (with closed position up and open position down). In addition, the Ebasco specifications call for

safety factors when doing any calculations for the design of any and all of the necessary equipment. The workmanship of the gates should be the best modern practice for high-grade machinery. The sluice gates shall also have side wedges for seating head conditions and side, top and bottom wedges for unseating head conditions and it shall be able to safely withstand the heads listed in sluice gate schedule. The maximum seating head is listed at 32 feet. The maximum unseating head is listed at 23 feet.

In addition to the Ebasco specifications, there is also another set of specifications that needed to be taken under consideration. The AWWA (American Water Works Association) Standards for Cast-Iron Sluice Gates states that the manufacturer shall be the party that manufactures, fabricates or produces materials or products. The purchaser shall be defined as the person, company or organization that purchases materials or work to be performed. The supplier is the party that supplies material or services. This party may or may not be the manufacturer. In this case, the manufacturer is Rodney Hunt, the purchaser is Vermont Yankee and the supplier is Cianbro, who will install the new gates.

ASTMF593 is the standard specification for stainless steel bolts, hex cap screws, and studs. This standard was used in order to determine which fasteners to use for the new sluice gates. According to the standard, the frame design shall have a minimum safety factor of 5 for tensile, compressive and shear strength. The frame should be bolted directly to the machined face of the wall thimble. The slides on each side of the gate shall have 1/16-inch clearance between itself and the gate. The thimbles should be made of cast iron, and furnished by the gate manufacturer. The purchaser is responsible to handle, store, and install the wall thimble, gate, etc. in accordance with the manufacturers drawings. The thimbles should be positioned accurately and supported to prevent

shifting of the gates. In addition to all of these standards, a leakage test is also required. In this standard there is also the equation to calculate the force necessary to activate one of the sluice gates.

$$F=62.4(f)AH + 1.5(P_1)(P_2)$$

$$F=.35$$

Multiply by 1.3 for a safety factor.

Once the specifications were known then Vermont Yankee could send a purchase order to Cianbro for the installation and supplying of two sluice gates. All engineering work will be done for and provided to Vermont Yankee. After Cianbro received this information, they slated their installation date for the two gates. They were going to remove the existing gate and then install the new one on March 30-31, 1998. They would then do the same for the remaining gate April 3-5, 1998. These were rough dates that Cianbro slated for installation. The contractors' responsibility now was to provide and install two gates, remove the existing gates. Any work that is required on thimbles with the exception of stud replacement will be performed on "time and materials" basis. The thimbles were one-piece construction and made of cast-iron.

Cianbro, being the supplier, then delegated the manufacturing of the gates to Rodney Hunt Co. All specifications still apply. The gates were designed and manufactured and the purchase order for the gates was sent from Rodney Hunt to Cianbro for $143,285 for two cast-iron sluice gates. Cianbro accepted the drawings by Rodney Hunt employee Peter Dora. It was noted that Rodney Hunt put into writing that any required field dimensions of existing conditions and equipment are the responsibility of the installing contractor, which was Cianbro. Rodney Hunt specified to install the gates

using fasteners, gate attaching studs and nuts, made of Type 304 Stainless Steel. (ASTM A-276, Type 304 or ASTM A-582, Type 303)

The sluice gate assembly consists of a frame, guides, disc or sliding member, and it is made of cast iron. The wall thimble is the recommended method of mounting the gate because it provides a rigid, machined mounting surface. When correctly installed, a wall thimble assures that the sluice gate will be plum in both directions. There were special design features that Rodney Hunt incorporated with the gates. The gates came with locked in position gate guides and wedge seats guides are bolted to the frame and dowels are used to lock the guide in place. According to Rodney Hunt, their gates had a normal life of about 30-50 years, with little to no maintenance.

Cianbro installed the gates on May 28, 1998. After installation, tests were run and it appeared that the gates worked fine. Later in the year, Vermont Yankee discovered that one of the gates was not working properly. On April 5, 1999, when Rodney Hunt came for an inspection, it was discovered that there were damages to the south gate and it was deemed inoperable and was only to be used in emergency situations. On May 17, 1999, the North Gate failed. It was found that the screws used had sheared off.

Cianbro did their own investigation of the problem and found that the wall thimbles were defective (however, it was stated in the warranty that they would assure thimbles to be adequate). Cianbro's metallurgical engineer, Ken Willens, stated that the screws used had sheared. The screws specified, stainless steel Type 304, were not used. A different screw, stainless steel Type 410, was used instead. These were the ones that held the tongue covers, which also failed. According to Willens, the bolts had failed by fatigue, the dowel pin had either stress corroded or there was a hydrogen induced crack.

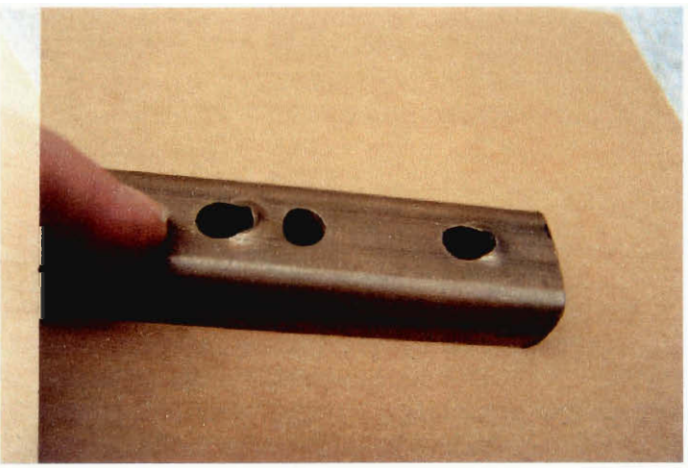
He said that the screws that were used to hold down the tongue covers failed due to excessive force used to tighten; there was hydrogen embrittlement, intergranular break, and a rapid overload of the screws. He attributed the failure to impact loading (over-torquing) during installation. His conclusion was that the screws failed due to over tightening. They were brittle, temper, and had hydrogen embrittlement.

Robert Oliver, an engineer at Vermont Yankee, was also involved in this case. He said that the gates failed because the screws holding the gate tongue liners failed which resulted in a cascading effect where liners slipped. They were ejected from gate resulting in excessive gate movement and further damage to other components. He deemed that the gates could not be repaired and replacement gates were needed. Vermont Yankee made the decision to replace the gates with different design using another vendor.

The original gates were of cast-iron construction and had cast-iron guides. The replacement gates had bronze wear strips on gate tongues and guide slots. Pre-removal, the north gate had tongue liners missing, loose studs and bolts, separation of guide connection. The south gate had sheared wedges, sheared bolts and studs, loose and missing bolts, missing bronze gate tongue liners. Post-removal, the bronze tongue liners showed signs of damage from screw heads and gate motion; screw that held tongue liners to gate were all sheared; the tongue on the south side of the south gate was sheared and distorted the top thirty inches.

Picture 6: Tongue Liner

He also acknowledged that a series 300 stainless steel was to be used, but instead a 410 SS was used. Also, the coefficient of friction of the gates on the liners was much greater than before. The cast-iron on bronze coefficient of friction is .22. The coefficient of friction of bronze on bronze is .88. This would cause excessive friction and damage to the gates.



Picture 7: Stress on the guides

During Oliver's deposition, he stated that his job at Vermont Yankee was as an engineering supervisor in structural mechanical group that was to investigate what went wrong in April 1999, when Rodney Hunt had discovered that the gates were not operating properly. Oliver went to Rodney Hunt to review the design of gates and he was

told there was no design of the gates. In addition, there were no design calculations. He did a preliminary review of the gates and found that the stresses were low so the design was adequate. He said that the doweling was used to ensure nothing catastrophic happened. The strips had fallen off. The dowels were not installed and the design did not comply with the Ebasco specifications. His conclusion was that the gates were not of a robust design, could not be adequately repaired, and would probably fail in the exact same manner.

Rodney Hunt's representative engineer is Paul Gallo. The Rodney Hunt standard for sluice gates had been originally been set in the 1960's, which was again used in the bidding process. In addition to the Ebasco specifications, and the AWWA standards, Rodney Hunt standards add more precision. Rodney Hunt pride themselves in good, sound engineering, according to Gallo.

Gallo stated that the old gates were made at ARMCO, which had since gone out of business, so they could not get the same gates.

Vermont Yankee was already familiar with Rodney Hunt, as Rodney Hunt had been asked to make a hydraulic pump system because the existing electric gearboxes couldn't do it. Therefore, Rodney Hunt was already familiar with the old gates. When Rodney Hunt received the order for the gates, the manufacturing of the gates took roughly 3-4 months, and 85% of the raw materials were produced at Rodney Hunt and tested at Rodney Hunt.

Picture 8: Rodney Hunt Manufactured Gate; tongue spacing

Since the old gates' tongues had worn off, the new drawings included tongue covers and lines due to Ebasco, AWWA, and the Rodney Hunt standards and specifications. A flathead machined screw was used instead of a self-tapping screw on drawings. The flathead screws were not to be found so self-tapping screw was deemed acceptable. Also a 410 screw was used instead of 304; which Rodney Hunt had established as their standard for screw for 15 years.

After Cianbro installed the gates, there was leakage between the gate frame and the wall thimble. According to Gallo, it was 11 months before Rodney Hunt received notification from Vermont Yankee. Also according to Gallo, Ken Willens, the engineer from Cianbro, said that 410 were too brittle, stress corrosion, and would fail quickly when put under water. Cianbro disapproved with Rodney Hunts' conclusion, when in actuality, Willens did not know what caused the failure, which was wall thimble disengagement. Willens stated that when excessive torque was applied during installation two things happen, the head broke off or it was cracked so that its integrity was compromised. Actually, the thread broke before the screw did. When the maximum shear stress is applied, there was no structural damage and no cracking.

Our conclusion of this case is that Vermont Yankee should be held responsible, and so should Cianbro. Vermont Yankee knew of the failure before they informed Rodney Hunt in April of 1999. Cianbro did not bother to install the gates correctly. The existing wall thimbles were not calibrated to the new gates. Rodney Hunt made their design up to standard so the suits against Rodney Hunt can be cancelled. Vermont Yankee and Cianbro can work out their difference, considering they were both at fault.

Chapter 7: Conclusions

The purpose of this project is to give the student a general exposure to the relationship between law and technology. Our goal, as students at Worcester Polytechnic Institute, is to someday become engineers. By studying actual court cases we are exposed to issue that an engineer faces every day. This exposure to everyday engineering challenges will, hopefully, make us better engineers.

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