THE ENGINEERS ROLE IN PRODUCT LIABILITY LAW

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by

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IQP/MQP SCANNING PROJECT

Abstract

The purpose of this Interactive Qualifying Project is to gain greater understanding of the American legal system. Of particular importance is the relationship between the law and members of the engineering profession. Engineering has always included safety as a design parameter. The number of civil cases involving technical matters has grown exponentially this century with the acceptance of no-fault legislation. For this reason, engineers must be keenly aware of the legal environment in which they will work.

Table of Contents

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1. History

Laws are the series of rules created by a government to bring order to its constituency. Furthermore, laws attempt to normalize the expectations for conduct within society, both in public and private settings. All laws are based on the authority of the government, which, in turn is granted by the people. Without the support and consent of the people, the government has no authority and thus no power. Additionally, in a democratic society, the values and standards embodied in the laws are a reflection of society as a whole. As a result, and particular in the American system of government, the laws and courts are in essence a method of social change, as society changes, so do the laws that govern society.

Civil Law encompasses all areas outside of criminal wrongdoing. In other words, Civil Law exists to remedy disputes between individuals. In contrast, criminal Law enforces violations against the laws of the state- with the resulting reparation paid to the state. Civil Law covers a range of issues from contractual disputes to personal injury. The person or organization that has experienced loss typically initiates a civil case; they are called the plaintiff. The person whom the claim is filed against is the defendant. Both the plaintiff and the defendant will be given time to prepare their cases for the courtroom according to the strict rules of the discovery process.

Another key difference is over the burden of proof. In a criminal case, the prosecution must prove "beyond a reasonable doubt" that the defendant committed a crime. Civil cases are much different, as the plaintiff must only demonstrate that "the preponderance of evidence" is in his favor. In other words, the jury in a civil case must

only be "51% certain" of where fault lies whereas a criminal jury must be 100% certain of guilt.

The American judicial system is truly a remarkable institution. Several factors contribute to this success, but they all stem from one concept: the courts answer to peoples' needs. The courts have very little control over which cases and issues they address because of the very design of the Judicial System. The legal system is an inherently adversarial institution. In civil law, this means that a certain sequence of events must take place before the courts will ever have to rule on a case. First, one party must cause harm to another. In legal terminology this action is called a tort, and the perpetrator is the tortfeasor. If another party experiences some kind of injury or material loss, he may seek reparations through the court systems. There two main types of sanctions the courts can impose. The first, less commonly used penalty, is an injunction, which simply forces the tortfeasor to stop whatever action is causing the damage to the plaintiff. The more common remedy is the award of damages to the affected party. Damages are typically paid in a monetary value that is calculated to match the amount of harm done.

The courts play several key roles in the resolution of disputes. First, they provide a forum for grievances to be addressed. In this way all parties must abide by the same rules, helping the courts remain consistent in their rulings. The courts have two key active roles to play in the litigation process. First is the establishment of facts. By using eyewitnesses and expert witnesses each side presents to the court their side of the argument. The courts must then decide whom to believe. The second function is the

interpretation of the law. After the facts of the case have been determined, the courts must ensure that the law is applied correctly.

In addition to the validating authority of the government, laws gain their actual strength by the coercive power of sanctions. Simply put, anyone who violates the law is subject to the penalties of that law. In a criminal case, sanctions range from fines to imprisonment. In civil cases, sanctions are quite different; the law states a series of guidelines that are used by the courts to apply a decision to a conflict. For example, in the infamous O.J. Simpson trial, the defendant was acquitted on the criminal charge of murder that would have sent him to jail. However, in the Wrongful Death suit, a civil proceeding, the jury returned a verdict in favor of the plaintiff. In this way one can see the distinct nature of the two types of cases.

After the court has reached a decision, the loosing party may appeal the case to a higher court. Due to the courts' hierarchical design, an appeals court may re-affirm or overturn a previous court's decision. However, cases may only be appealed on technical or procedural grounds. In other words, the loosing party may not appeal simply because they want another chance to win, they must have a compelling reason. Such causes for appeal range from improper gathering of facts to misapplication of the law.

One of the most important characteristics of the court system is the importance of precedent. While a jury may reach any decision it wants, the courts must follow certain rules. For example, if the judge of a lower court is debating a case before him, he must determine how similar cases have been decided in the past, and use that precedent to guide him in his ruling. Often, appeals are filed because case law, precedent, has not been followed. The vast majority of cases, the courts must simply determine the facts of

the case and then apply those facts to statutory and case law. Only on rare occasions does a case occur where a higher court must review the law.

In any legal proceeding, both sides must follow strict rules regarding what evidence can be admitted. After the plaintiff files the case, both sides begin the discovery process. During this time, both sides have the opportunity to learn as much as possible about the facts of the case. In part this is accomplished by deposing, interviewing under oath, any eye witnesses and the opposing sides experts or witnesses. Furthermore, both sides must furnish all of the evidence they intend to show at trial. Engineers become involved in the discovery process when an attorney needs expert advice. Engineers may testify to the design of a product, re-create an accident or analyze the opposition's information, to name a few tasks. In many cases, expert witnesses, while only a small part of the legal team, can have a tremendous impact on the outcome of a case.

2. Products Liability

2.1 Historical Framework

Upon the signing of the Constitution, the United States selected three branches of government. The Judicial branch held the responsibility of interpreting the laws and applying them to the disputes of the people. While the need to administer criminal trials has remained constant throughout the years, the field of civil Law has grown exponentially.

Over the last 200 years, there have been many changes in the American legal system. In particular, individuals have gained greater personal wealth and rights.

Consequently, individuals and corporations have had greater opportunity to come in to conflict, and are more willing than ever to bring their dispute to the courts. This shift has caused a change in the proportion of criminal and civil cases: Civil cases now represent majority of the cases before the courts.

Another reason for the increase in civil cases is new laws that allow far more cases to be brought to court. What has changed is the acceptance of "strict liability" or "no-fault liability." This area primarily applies to consumer products and is thus often referred to as product liability law. To illustrate this difference, consider a person who buys a car in the 1950's. Shortly after buying the car, he is involved in an accident, and it is learned that the accident resulted from a design flaw in the automobile. Under 1950's laws, it would be impossible for the driver to sue the car's manufacturer because the car was purchased through a third party, a dealer. Likewise, the dealer cannot be sued because he did not make the car. In this way it was very difficult to sue product manufacturers unless the product was directly ordered from the company. In recent decades, cases involving product liability have become quite common. Today, manufactures are held to a much higher standard of responsibility for protecting their consumers.

2.2 Negligence

Of common concern in civil cases is the concept of negligence. Often times the plaintiff's case depends on proving that the defendant was negligent- that his actions or inaction caused the tort to occur. Four points must be established to prove negligence in a personal injury or products liability case. First, the defendant has a responsibility to

exercise "due care," for example a manufacturer must take the necessary steps to show products are not being manufactured with inherent safety problems. If the manufacturer fails to meet this standard, it is called a "breach." Even if a product is extremely defective, no charges may be filed until that defect actually causes some "harm" to persons or property. Finally, "proximate cause" must be established. Proximate cause means that the product's defect must be the cause or at least a contributing factor to the harm done to the plaintiff. Thus the number of defects in a product is immaterial; all that matters is what defects contributed to the accident.

2.3 The Engineers Role

The engineer is most commonly involved in civil cases, but may be involved in any type. For instance, in a contractual dispute, an engineer may need to testify to the courts determine if the product of a defendant company satisfied the specifications of their contract with a plaintiff company. In a personal injury case, engineers and other experts must determine if an accident was the result of human error or the failure of some product. In all cases, the need for engineers in the courtroom stems from the technical nature of their expertise and the highly technical nature of the facts in dispute.

2.4 Case Studies

Three cases were examined as a part of this project. The first, Dellea v Automar, debates the safety of an auto hoist. In this case, the plaintiff is an auto mechanic who is injured when the car he is working on falls off a hydraulic lift. He filed a claim against the company who sold the lift as well as the company that installed it. In dispute in this

case is the safety of the lift design, the quality of the lift's installation, and possible negligence by the operator, Dellea. Some of the larger issues discussed in this case deal with what level of safety that should be expected in a product. Can a product be made perfectly safe, etc (save this topic for conclusions?)

The second case is primarily a mater of contract dispute. The Brunswick Corporation purchases a large machine used for plating golf club shafts from Napco. Napco had designed similar machines before, but had never built anything as large as the Brunswick plater before. Soon after installation, the machine began to experience recurring breakdowns. Finally a major component failed, as a result of the many maintenance problems, Brunswick lost many thousands of dollars of business. To cover their losses, Brunswick refused to pay the final installment for the plater. The plaintiff, Napco, is suing Brunswick for the remainder.

In the final case, a printing press operator seriously injured his hand when it was caught between two rollers. The plaintiff, Barton Ankenman, is suing the manufacturer claiming that the lift was design in an unsafe manner because it did not come with safety guards that would shut down the machine if they were removed. At issue in this case is the length to which the manufacturer must go to ensure the safety of the product. Furthermore, what is the level of responsibility placed on the operator in protecting his person?

2.5 Literature Review

2.5.1 The Engineer in the Courtroom[1]

The intent of An Engineer in the Courtroom is to help the engineer be able to avoid any litigation in the first place by designing a machine that is reasonably safe. Also, the book would like to convey the ideas of knowing what will lead to litigation, understanding accidents and causes, learning the litigation process, knowing the importance of engineering decisions, knowing how to help the attorney, and knowing what to expect and what conduct to have. It is the engineers' responsibility to ensure the safety of his product, as well as assume any liability for damages it may cause. If his product causes any damages, the trial process today ensures that justice must be upheld. A trial therefore occurs to determine fault as far as the product is concerned.

The nature of product liability is that actions lead to accidents and it is usual to try and assign someone the blame. Accidents themselves are commonly defined as unavoidable or unpreventable circumstances. It is obvious that in products liability this is not true, as it is an attempt to assign blame so as to say it was not unavoidable. In the safety business, an accident is defined as an unexpected occurrence or an occurrence causing loss or injury expressible economically. All the different types of accidents are listed (i.e. collision, slip and fall, loss of control, etc.) and examples are given.

It is the citizen's right to go to court if he feels he has been wronged. In the same way, it is the attorney's duty and the engineer's job to go to court. Society is not perfect, so disagreements that occur must be settled – in product liability, these occur over product and their intended usage. There is usually a disagreement in the root or

proximate cause of the injury and a conflict between the products' expectations and the operators' expectations. The strict liability is the culpability that resides with those who could have most likely prevented the accident. An engineer loses a product liability case when it is proved either that his product was defective or his case was not good enough to be proven otherwise.

The way to avoid litigation is simple: do not design a defective product. There are several different ways to avoid defects: design the product so an accident is not possible. This includes making the product safe as it is. You can design to protect from a possible accident through the use of shields, guards, locks, etc. Make the accident safe by designing so that if an accident occurs, no damage will result. Furthermore, you can warn of an impending accident (through lights or horns for example) and warn of a possibility of an accident (using signs and painted color schemes). A final way is to simply protect the operator or personnel from the machine.

The litigation process begins when the accident occurs, but the trial proceedings begin when a suit is brought as a result of this. The steps of litigation occur as follows: a claim is filed and a response is made as to whether the defendant agrees or disagrees with the claim. If the defendant agrees than the litigation is over and a settlement is made. Continuing with a response of a disagreement by the defendant, are the defenses or his reasons for the denial of the claim. Next is the discovery process, followed by interrogations, requests for production, requests for admission, and inspections. The next step is the deposition phase where the opposing party questions witnesses under oath. At the trial, each side presents their opening statements, case, evidence, witnesses, and arguments. Post trial proceedings include reactions, possible legalities, and a settlement.

The engineering experts' job is to help with the technical aspects of the case. He is there to assess the aspects of machine design and applications as it pertains to the case. He is needed to either defend or critique the design or thinking behind the design. He is needed to anticipate and prove technical aspects of the case to the judge and jury. His qualifications will need to be proven or disproven depending upon the side.

Other various aspects of the engineers' job should be mentioned. In his depositions and testimonies he must reply to questions never giving too much information as to incriminate himself. However, he must qualify himself as a witness and present a testimony that will help to sway the jury. He also must perform an accident reconstruction. This is the developing of possible scenarios that occurred in the accident and their probability. The reconstructions must be physically possible, in agreement with the mass of the evidence, explainable to everyone, arrive at a conclusion, not be a surprise, and stand up to reasoning.

Among other things, the book also provides detailed information on the discovery process, depositions, the trial, attorneys' definitions and techniques, stories form real world cases that pertain to product liability law, and a summary providing general tips for the engineer involved in litigation.

2.5.2 Products Liability in a Nutshell[2]

Products Liability in a Nut Shell was written by Jerry J. Phillips. Phillips begins with basics such as what a product is and what defects are as well as some examples. Other important introductory topics include negligence, damages, strict liability and how these affect the parties, the plaintiff and the defendant. Particularly important in product

liability suits are defects and warnings- two areas commonly cited by plaintiffs as the cause of accidents. The final topic discussed regards the burden of proof and the tricky problem of demonstrating proximate cause. This book gives a brief but thorough summary of many of the key concepts involved in products liability. Unfortunately the book also contains enough legal jargon to confuse the student reader.

2.6 Video Series1[3]

Tape 1 of the video series is about the opening statement of a trial. It is suggested that the opening statement be trite, apologetic, tentative, and unpersuasive. This is the lawyers' first opportunity to give the jury a good impression so he should seize this opportunity. The opening statement should give an orientation, a setting for the story to begin. The opening statement should be much like a story telling. The purpose is to immediately grab the sympathy of the jury for your case.

The example given is a case by a Mr. DeCoff. Mr. DeCoff is representing an eight-year-old named Christopher Kelley. He uses this story telling technique in an intimate way with the jury. He tells he jury when he is going to approach them and conditions them to the story they are about to hear. Another technique he uses is to anticipate the jury's questions. In his statement, not only does he anticipate the questions but he answers them too. Techniques such as these help the jury to become familiar with the speaker (the lawyer) and to trust him.

The content of the opening statement is dependent upon the case you are presenting. Certain elements of the case must be made apparent. DeCoff uses the most important points of his case right in his opening statement and tells the jury this. He

defines in his own terms the legalities of the case. He states essentially the purpose of his case, and says that he will prove his stance to the jury. A problem arises in the content as to whether or not the defense's argument should be dealt with. If the defenses' argument is touched upon, you have the power to give whatever first impression of that stance that you like. The most common approach in this video is to make it of lesser importance. In the Kelley case, DeCoff does take the approach to make the defense's case seem of lesser importance. He also decides to deal with credibility and compensation and discussed the jury's responsibility

We now move to a second example or approach of how to give an opening statement. The second approach is louder and more direct. He does not approach the jury here as he is louder and already has their attention in a less subtle way. The emphasis of his opening statement is to be deliberate and repetitive to show a point. He tells of important information but rather does not disclose what it is, perhaps making the jury want to hear the testimony and listen with particular interest. The problem arises here that he must explain an injury that is difficult to describe. He slowly and deliberately lays out each little detail to make sure everyone understands completely. Now that he has established himself as fair, he is like an observer with which the jury can identify. He concludes with a non-emotional statement of facts and the jury easily sides with him.

Tape 2 of the video series was about direct examination. Direct examination establishes the time, date, and person of witnesses through the asking of questions. The approach varies, as the two approaches tend to be primacy and recency. Primacy is the

theory that when something is heard first, it makes an impression. Recency is the theory that when something is heard last it makes the largest impression.

The first question to ask when examining the expert witness is of what is desired from the witness. A plan must be made beforehand as to which questions will the experts' testimony help the most in the case? Depending on whose witness, the next line of questioning would be to either accredit or discredit the witness. When accrediting a witness, it is best to establish his expertise and then relate his expertise to a relevant part of the case. This leads to a detailed description of the expert's opinions, calculations, and descriptions.

There are a few general notes that an expert should keep in mind whenever testifying. He has to remember when making calculations not to stand in the way or else the jury will not see them and the point is lost. Also, the witness's speech must be loud enough for the jury to hear - the witness should not be speaking only to the lawyer (or the lawyer to the witness for that matter). The numbers that a witness gives must be explained. There are two ways to go about this: 1.) An expert could give the bottom line numbers and leave the explaining of the numbers to the defendant so he can bore the jury or 2.) The expert can explain the numbers himself if particularly difficult in the interest of clarity.

Next the Plaintiff undergoes direct examination. Here everything must be ready and waiting for the jury to examine. The authentication of the exhibits should be done before the trial so there is no unnecessary stoppage of the trial. Very simply, the questions asked of the plaintiff are 'yes' and 'no' questions and exhibits are used to incriminate the defendants -this is all to establish a liability of the defendants. Some

good questions to ask would be of how the Plaintiff's life was changed in the accident, since this leaves a lasting impression this helps to drive the point. Some general rules for the lawyer (as well as any witness) would be not to yell at or shake (literally or figuratively) the jury members to get the point across but rather to use posture, inflection, and other subtle means.

Tape 3 of the series is another tape about the opening statement. This tape focuses on two techniques to get the jury on your (the lawyer's) side. First is the portrayal the ordinary guy. He restates the case, then performs a role reversal where he asks the jury to switch places with him. The story telling technique is used again here as he develops a plot and character. He puts the jury in the plaintiff's shoes: this man lived the life of a king, but that life was taken away from him by a defective hoist. He interjects in the story that he will not mislead them (the jury) and interjects other points and legal problems from his case. Then he gives a descriptive telling of the crushing of limbs, putrefying of flesh, and a stinking stump. He talks of the different forms of compensation - asks the tough question of what price can you put on pain and suffering? This opening statement he ends not asking for a dollar amount, but asking for "100% justice".

The next lawyer uses an example of an innocent victim. He tells story of the protagonist and his injury. He goes on to explain in detail the subtlety of the injury for impact and clarity. Meanwhile, he takes care to gain a sense of identification between himself and the jury conveying that they will learn together. He shows what the plaintiff has lost, using the device of repetition he conveys the slow degradation that the plaintiff experiences. Later on, when he has his expert on the stand, he builds his credentials as an

economist and thus he builds his argument. Now he establishes compensatory and punitive damages and confidently tells exactly why the jury will return a verdict in his favor. Overall, good stories, lessons, and intimate feelings have been shared. The jury accepts the lawyer and plaintiff as real people so the statement was effective.

Tape 4 is about the cross-examination of non-medical experts. The tape begins with the lawyer introducing the expert to the jury. He has the expert state his experience as well as the fact that he gets paid to be there. Now this may seem curious, but this tactic is used so the lawyer can establish integrity with the jury and at the same time make his opponent look like a 'hired gun'. The first thing the lawyer and opposing expert must do is establish a framework or common ground, which they both agree on and work from there. The lawyer tries to establish a boundary of reasonableness. He must remain patient when trying to prove a point and remember that repetition is key. The example here was of an expert witness that reconstructed a truck accident. He took the truck driver's testimony and worked with that, not knowing about a second witness who testified differently. Because the lawyer was patient, he uncovered on the stand that the expert had not been told about the second witness. So in using this device of repetition, he set the expert up in building to his conclusion - which is the last key point in this video: that all examinations should have some sort of destination or conclusion in mind.

Tape 5 was another video on cross-examination. The main point of this tape in the series was to show how the cross-examination should be used to advantage rather than be intimidating. A key is that the lawyer must exercise psychological control using

advantages such as physical presence, eye contact, control of the pace, and the use of leading questions. If the lawyer maintains an aggressive approach than he will retain the control of the questioning. The main points of attack for the lawyer will be in using statements from the deposition to show the witness's bias and finding discrepancies to show contradiction. If the witness is particularly evasive, an effective technique is to ask simple questions so that everyone understands. It is important to use his contradiction to build to a conclusion so perhaps the jury will not see him as a legitimate witness and negate his testimony. Also important is the use of visual aids, evidence, rules, regulations, and codes because there might be some concrete rule that was violated that he cannot dispute and once admitted right on the witness stand he cannot back down from. This subtle approach is normally much more useful in obtaining this type of admission from the witness. A more direct approach usually makes the witness defensive and you will not get an admission like that from the witness if he becomes defensive. So this proves yet another benefit of a more subtle approach in cross-examination.

Tape 6 moved on to the depositions of the witnesses. The parties present at a deposition are you, your lawyer, the opposing lawyers, the stenographer, and maybe some other court appointed representatives. The purpose of a deposition is for the opposing side to ask questions so they can build their case. You are giving a testimony the same way you do in court only without the jury, judge, or audience. There are some certain tips to keep in mind when answering. When answering, concentrate on only the asked question - do not volunteer any information. Volunteering information can be fatal to the case. The opposing lawyer has the right to explore any information that you

volunteer, so do not willingly help the opposing lawyer in any way other than answering the questions he asks.

A good way to answer questions is to listen carefully, pause, give concise answers, and do not volunteer information. A good thing to keep in mind when asked a tricky question is to ask him (the opposing lawyer) for another question or to rephrase the question so you can understand it better. This will help you understand the question better and give you time to think out the response more thoughtfully. When you think you are really in trouble, look to your lawyer for help, ask him if he has any objections to the question (especially the form) and go from there.

The deposition is also a good window to see the approach that the opposing lawyer will take in the case. Before trial, your lawyer will go over the deposition again and find where the opposing lawyer will most probably attack you (the expert) on the stand. He can even probably tell you the preliminary questions that you will probably be asked. This way you can prepare the answers beforehand so you do not slip up and say something that is destructive to your case. Ask the lawyers advice in how you should answer, maybe even ask what tactic he is going to take in his line of questioning.

The final thing to be stressed is to always answer truthfully. The opposing lawyer will find every contradiction and it will destroy your case. If you do not remember an event, than say you do not remember. Never fill in details as they will become contradictions and you will be discredited as a witness, also possibly destroying your case. Always, always remember to tell the truth – even if the truth is detrimental to your case, a lie will be fatal.

Tape 7 is a summation of the tape series. Once again, the importance of wanting the jury to think and create images is stressed. The term 'alienation' in the context of product liability is brought up – here it means to remove a situation and put it in a different light. The affect of this is to put the finality of the case squarely on the jury's shoulders.

Once again the importance of the use of imagery is shown. A lawyer should paint a picture of his clients' suffering to the jurors. The jurors should be able to feel the pain of his client as he takes them through the injury and pain that he suffered. The following are a few examples given to illustrate this point: In the case of a paraplegic, the necessity is shown for compensation for the loss of his mobility. In the case of a burn victim she loses her beauty. But what is the price of beauty? In a world of beauty, what price can be attached to a loss of beauty; what compensation is there for the loss of a potential future husband and children? Another case is of an immigrant mother killed and leaving behind five children. What is the value on the irreplaceability of the mother? The lawyer does not ask for sympathy, he pleads for justice.

The basic principles and skills necessary to become involved in product liability law are once again defined. Analytical skills are the most important in this part of the law. It must be evident to the lawyer that the same argument cannot be used in any case. Each case is going to be inherently different and therefore cannot be treated completely the same. Instead, a lawyer should apply all the concepts from individual study and keep his technique the same all the time. This is because, as with all product liability law, the circumstances and the individuals will always be different.

3. Case 1: Dellea vs. Automar New England and Northeast Lift Installers

3.1 Case Summary

The Plaintiff in this case, Dellea, was injured in the arm in an accident in his auto service station. He claims that the injury was the result of a dangerously defective hydraulic lift that failed while he was raising a car. The plaintiff claims the lift was defective due to lack of safety restraints and failure of the lift was responsible for the injury to his arm. If the plaintiff's claim of injury and fault is upheld, Dellea will be entitled to recover damages for his injuries. The dollar amount of the damages will be calculated by considering such factors as pain and suffering, lost wages, and expenses such as medical bills and damage to the garage.

The dispute primarily considers the necessity of safety devices or restraints on the auto lift. The plaintiff claims the safety restraints should have been sold as standard equipment with the lift, not as optional accessories. Also, warning signs about the hazards of improper lifting techniques were not on the lift and are part of the plaintiffs claim regarding the defective nature of the lift. These disputes can be broken into smaller issues involving the original manufacturer, the re-manufacturer, Automar, and the installers, Northeast Lift Installers.

If the warning labels should have been on the lift, then who should be held responsible, Automar or Northeast? Also at issue between Automar and Northeast Lift Installers is the blame for the delivery of a different lift (other than the one agreed upon

in the purchasing contract) and the aforementioned safety issues. If it is found to be a contributing factor in Dellea's injury, which company is at fault for the wrong lift being installed in the garage? Is the dealer at fault for not providing adequate safeties or is the installer responsible for installing the lift without warning about the hazard of operation without the safeties? This situation is further complicated by a conversation between Dellea and Automar regarding the necessity of the safety devices. In this conversation, Automar assured Dellea that the lift could be safely operated without the safety restraints. The final major dispute is over the slope in the carriage of the lift. Slope is a characteristic describing how much the lift arms deflect downward. Dellea claims that upon delivery the lift had excessive slope in the arms of the lift. If this is true, the slope could cause the motion of a car up on the lift and subsequently contribute to an accident such as the one that occurred.

The main defense that the defendants have is in the remanufacture of the lift. The American National Standards Institute (ANSI) provides guidelines regarding the safety of lifts. In dispute is over which year's guidelines apply to the lift. Which standards would a lift manufactured in 1985 and remanufactured for sale be held to – 1985 ANSI standards or those from the most current year? This gray area is what the courts must assess. The ANSI lift guidelines published in 1985 did not outline the necessity for safety restraints. Neither was it required under the guidelines that a lift from that year should have warning labels regarding safe operation of the lift. Furthermore, if there was slope in the carriage of the lifting arms, how much is acceptable? It is reasonable to expect that the re-manufactured lift would not be in perfect condition and after years of

lifting, but the question remains how much wear is acceptable and what exactly should be expected in the purchase agreement.

Also in dispute are some of the Plaintiff's claims. First, there is a question of Dellea's injury. The question pertains as to whether or not there was a medical condition dating back to before the injury. His medical records indicate that there was, but this injury itself was most definitely caused by the arm of the lift striking him. Did the subsequent striking of Dellea's arm by the lift only worsen a pre-existing condition or perhaps do nothing at all to him? Also in question is the loading of the lift. Was Dellea using the lift properly or did an improper loading contribute to or even completely cause the accident? Once again, these questions must be answered and are left for the courts to decide.

3.2 Summary of facts

The plaintiff ordered a remanufactured Mohawk Lift (9,000 lb. Lift). Northeast Lift Installers installed a remanufactured different lift, a TP-9. This lift was similar to the Mohawk lift but lacked the standard safety features and warning labels for loading and lifting vehicles. The TP-9 failed while in the process of lifting an automobile. This resulted in damage to the auto, the Plaintiff's garage, and the Plaintiff. Dellea was struck on the arm by one of the lifting arms, which had swung out from underneath the car. The extent of his injuries that the Plaintiff currently has prevent him from capably performing the same tasks and duties he used to do at work as well as everyday tasks.

3.3 Opinions/Conclusions

Based on the information available to our team, certain conclusions could be made about the case. We believe that the lift, as manufactured, was not defective in design. However, we also believe that the proximate cause of injury was the failure of the provided lift. As one might expect, we concluded that this accident was the cumulative result of three main faults: excessive slope in the carriage of the lifting arms, the lack of safety features and warnings, and improper loading of the lift. The next step would be to assign liability, or fault, as per this injury claim so that compensation can be established. The following chart illustrates our assignment of liability:

Cause	% Cause	Automar	% Total	N.E.Lift Installers	% Total	Plaintiff (Dellea)	%Total
slope	50	50	25	50	25	0	0
loading	25	25	6.25	25	6.25	50	12.5
safeties	25	25	6.25	75	18.75	0	0
Totals:	100		**37.5**		**50**		**12.5**

Table 1

Our team also decided to approximate the damages incurred by the Plaintiff. The assessment is as follows: award actual damages for Plaintiff's medical bills ($1,000), the damages to the garage ($1,000), the cost of the lift and overhead doors that were delivered by defendants ($15,250), the cost of renting the auto owner a rental car ($500), and repair of the damaged car ($3,000). These costs total $20,750. We also award compensatory damages for projected medical expenses ($5,000), lost wages (calculated at $15,000 per year over the next 20 years = $300,000), and a pain and suffering award ($20,000). These compensatory damages total $325,000. The total award is $345,750.

Based on the liabilities that we assigned in Table 1, Automar is responsible for $129,656.25. New England Installers must pay $172,875.00. The remaining 12.5% ($43,218.75) of liability is Dellea's so he cannot claim that portion of the reparation, which represents his liability.

4. Case 2: Napco vs. Brunswick

4.1 Case Summary

In this case, Brunswick Golf Co. bought a large production machine that plates golf club shafts. The machine had a history of problems that seriously hindered business by halting production on numerous occasions. These temporary malfunctions all preceded a catastrophic break of a major component. No one was hurt in the accident, but production was stopped once again and Brunswick was billed for materials and labor to repair this plater of suspect design and reliability. Brunswick, having paid installments for the complete plating assembly, withheld the final payment in lieu of the excessive problems and general unreliability that led to lost business for Brunswick. Napco, the manufacturer of the plating machine, is seeking the final payment for the machine claiming that Brunswick broke the contract for the plating machine.

The major dispute is over the remaining portion of the payments for the plater. Napco believes reparation is owed to them as stated in the contract. Napco claims to have fulfilled their part and delivered a machine to Brunswick that plates golf club shafts. Brunswick, however, does not believe that Napco has kept the contract. Whether it is stated explicitly or implicitly in a contract, there is a certain standard to which all

products must be held. In any contract, the product must be of a certain level of quality in order to fulfill the manufacturer's contract. It must be determined if the product in this case meets these expectations. Therein lies the focus of the disagreement - Brunswick believes Napco did not uphold is end of the contract by supplying a dysfunctional product.

4.2 Summary of Facts

Napco provided Brunswick with a golf club plating machine designed by their own engineers and manufactured/assembled at their own cost. There were many instances where the machine did not work, freezing production, and stopping shipment, delivery, and purchase of the product. The machine itself is a rotary machine that has around ten to eleven different elevators that raise and drop the shafts into chemical bathes. The machine is driven by a main hydraulic cylinder, which provides the power to automate the entire machine.

4.3 Opinions/Conclusions/Calculations

A thorough analysis had to be done in order to arrive at an opinion in this case study. The first question is as to whether or not the accident resulted from fatigue failure. A fatigue failure results when a part undergoes a repetitive stress. The fracture is of a brittle nature and occurs over a period of time (a period of machine cycles). As time passes, minute cracks in the material begin to form, propagating from internal or external flaws in the material. Over time, the cracks continue outward from the original flaw, forming a concentric pattern known as beach marks.

The shaft from the Napco plater clearly shows these typical signs of fatigue failure. The shaft rotated on the plater, undergoing a repetitive stress from the applied load. The broken face of the shaft shows the striations radiating out from a point on the surface of the shaft. This point was the location of a notch for a set screw to attach the collar and serves as a man-made external defect in the shaft. The final note to make about the surface is the smoothness of the area closest to the fracture. The area where the break occurred was worn to a smooth surface, indicating the progressive growth of the failure over time.

Stress Concentration is a major concern in the design of machine components. On a solid rotating shaft, the maximum stress will always be located on the outer edge of the surface. The stress is amplified further by the presence of a set screw tap on the surface of the shaft. The concentration of stress inherent around this point makes it an ideal location for a fatigue failure to start.

The endurance (fatigue) limit is the maximum stress that a material can withstand before fatigue failure. This number is independent of the number of cycles the part experiences. If the limit is exceeded, the part will begin to undergo fatigue failure. These numbers are extrapolated from the S-N graphs on pg.114 (Mechanics of Materials by Hibbeler). When the fatigue failure progresses to a critical value, the part will suffer a sudden failure. According to Mechanics of Materials, the endurance limit for steel is 27,000 lb/in^2.

Our calculations indicate that the maximum shearing stress in the Napco shaft was 37,176 lb/in^2. This value is based on the forces supplied on the Napco engineering drawings. Clearly, the Napco shaft was prone to failure; it was only a matter of time

before fatigue failure would begin to propagate from the set screw tap. Napco's has two faulty aspects in their design. First, the design of the shaft was not sufficient to bear the loading Napco *themselves* calculated would be present. Their main mistake in load calculation was not doing a calculation of the endurance limit. Furthermore, the loading calculations Napco performed did not include dynamic forces so the actual loads were higher than their calculated loads. Secondly, the set screw tap provided the external defect from which fatigue failure fracture could start. Also, it was poor design to locate the set screw in the center of the shaft where the moment and resulting stress concentration are greatest.

It has been suggested that an experiment be run to prove the design was faulty or that Napco's calculations were wrong. If the calculations are indeed so far off that they exceed the safety factor, this will demonstrate negligence on the part of the company as well as the engineers who designed it. By measuring the pressure in the hydraulic lift and the cross sectional area of the cylinder head, then the total loading (force) of the system can be calculated. As it turns out, this measurement has already been made. The cylinder must be checked occasionally so the data for the pressure can be found in one of these measured readings. The force that is measured can then be compared with the estimate that the engineer used in calculations to design the machine. From this data fault can be determined according to the law.

As experts, our group has some possible suggestions for better design. First, a larger diameter shaft must be used in accordance with the endurance limit so that the load limit is not exceeded. Secondly, the design could be altered to avoid stress concentration and curb the onset of fatigue failure. A suggestion is to replace the single set screw

design with two set screws located much further away from the center of the shaft. Alternately, different designs could be utilized to eliminate the need for set screws altogether. A shaft/sheave combination constructed with a self-locking key design is one such example. A final alternative we could offer is a single shaft/sheave combination cast as a solid part that also completely avoids the problem of set screws.

In conclusion, we believe Napco's design is not only defective but also dangerously defective. Also, we believe that the machine delivered to Brunswick does *not* fulfill the contract that was signed by both parties. The machine Napco produced does not work to a reasonable degree of effectiveness to meet the standards for which it was designed. Also, given the machine's history, it is dangerous and could cause a serious injury and should be replaced immediately. The breech of contract was on Napco's part; not Brunswick's as they claimed by the Plaintiff. Our judgment in this case is that Napco is not entitled to the last payment due to breach of contract by Napco. Furthermore, Brunswick has a very compelling option to file a counter claim against Napco for breech of contract by delivering a product of inferior quality that does not meet the expectations of the contract.

5. Case 3: Barton Ankenman vs. Web Press vs. World Printing

5.1 Case Summary

An accident occurred on the floor of the World Printing Co. where the Plaintiff, Barton Ankenman, crushed his hand in a printing press. The accident occurred when the Plaintiff attempted to clean a "hickey" - a collection of dust or lint on the roller - off of

the printing cylinder of the printing press. The cylinder rotates together with a smaller lower cylinder creating a nip-point in which the Plaintiff caught his hand, causing the injury. The Plaintiff claims that the printing press was dangerously defective due to a lack of proper safety guards. Furthermore, he seeks damages of over $933,000.00 because of the lack of safety features.

In dispute is primarily the relative safety of the printing press. Although some may consider the design safe, it is questioned whether or not the press is safe enough to allow for non-hazardous operation. The Plaintiff claims that the guards were insufficient for their intended purpose and that the machine should not be operational without the guards in place. The interlocking guards sold by the retailer were not purchased with the press from Web Press but rather manufactured separately by Rand Co. as a cost cutting measure. This raises the question of whether safety was compromised to cut costs. Also in dispute is the decision-making of the Plaintiff himself. The question is essentially whether the Plaintiff was adequately trained and chose to disregard instructions or simply used poor judgement as a result of improper training when he used a plastic card to clean the hickey.

Another dispute is over the need for inching buttons on the machine. Ankenman claims that if there had been an inch button at the location of the hickey than he could have found it safely and avoided the accident. The final question regards the floor practices of the World Printing Co. In dispute is the responsibility of the supervisor and his role in ensuring that the workers follow proper procedures and do not act recklessly. In addition to this floor practice is that of the employees, responsibility is in terms of

following protocol, obeying the warnings and postings, and reading their pressman's manuals and following instructions.

5.2 Summary of Facts

The multitude of indisputable facts in this case makes it seemingly a very clear cut and defined case in comparison to the other two cases. There is little reason to doubt the fact that the Plaintiff's hand was indeed crushed in the printing press as evidenced by all of the witnesses who were on the floor including Sam Clevenson, the president of the company. Also indisputable is the fact that the injury was caused when the press caught his hand and did cause significant injury as the medical records show.

Guards were definitely present on the press. The guards had to be physically moved in order to get at the printing cylinder. The guards were not, however, electronically interlocking guards, which would have shut the press down if someone lifted one out of place. The question remains about the necessity of such a feature, but it should be noted that no such feature was in the design. Another fact about the guards is that they were not the original guards designed by the retailer for that press. Web Press had the guards made for a significantly lower cost than the price the retailer was asking for theirs. In our judgement, it seems that the guards maintained all of the functionality and usefulness that the originals would have had. It is for that reason that we denounce the plaintiff's claim that the independently produced safety guards caused the machine to be defective.

It is fact that the operator, Ankenman, knowingly removed the guard and kept the press operational while he tried to scrape a hickey from the roller. Another fact is the

presence of conspicuous warning labels around the work areas and on the presses. These warning labels explicitly state that all guards *must* remain on during operation, all guards *must* be in operational order, and the machine *must* be in the 'safe' position - machine is not operating - before any cleaning, lubricating, or maintenance is performed.

There is a conflict in the facts about the floor practices. World Printing claims that they do not allow employees to clean hickey's using the technique that the Plaintiff used. Ankenman claims otherwise saying that not only does World Printing (including the head pressman who trained him) practice this technique, but having been at various companies as a pressman he sees this as an industry-wide standard. The Plaintiff goes so far as to state that he knows of no other way to clean a hickey. Obviously, the Plaintiff's statement is the closest to truth since this accident did occur and World Printing apparently must not prevent this practice as well as they would like to believe. It should be noted here that even though there is no 'inch' button on each individual press (the inch button resides on the main control board with the head pressman and at one other printing station) as the Plaintiff claims is necessary, there is a manual crank wheel that can be used to rotate the printing cylinders at each station. The proper procedure as outlined in the pressman's manual is to shut down the press, put it in the 'safe' position, and then manually rotate the wheel until the hickey is found and clean it off.

5.3 Opinions/conclusions

When assigning blame/liability for this case we must examine the press and analyze the main elements that prevent an accident from happening in the first place. The biggest issue to address is the training and floor practices at World Printing. – Proper

training and procedures are widely recognized as the best way to prevent accidents such as Mr. Ankenman's. Though Ankenman was responsible for knowing the pressman's manual and following those guidelines, his on-the-job training (according to his testimony) apparently led him to think otherwise. Ankenman obviously knew that the machine was running and consciously tried to remove the hickey while it was running. Either the Plaintiff blatantly disregarded rules or was completely ignorant of them. Ankenman even testified that every pressman would get caught in the machine at some time or another so he seemed to accept the fact that it would happen sooner or later. For lack of more or better testimony we have to accept the fact that the best we can do is assign equal fault to both Ankenman and World Printing. Ankenman is at fault for ignoring standard procedures and World is negligent for not teaching and enforcing those same procedures.

The next issue is the guard for the main printing cylinders. The main job of the guards is to prevent accidental injury by covering the dangerous nip point of the rollers. The guard still serves this function even if though it was not the original manufacturers' model. The plaintiff claims that the press should incorporate electrically interlocking guards that would halt the entire press if the guards were disturbed during operation. Certainly this would make the press safer, but is it really necessary to add this safety feature or is the press reasonably safe as it is? Our conclusion is that the press is reasonably safe as designed by Web Press when operated in accordance with the safety instructions. Therefore, we deem any extra features on the guards, such as electrically interlocked guards, to be safer, but not necessary. We also assign full blame to the plaintiff, as Web Press Co. provided adequate guards for the press.

The final element that contributes to the prevention of this type of accident is warning labels. Warning labels, which state important safety information, are clearly displayed at several locations on the press. Once again, the full blame lies with the Plaintiff because he simply disregarded the directions and operated the machine the way he wanted to. Our total liability assessment is seen below in Table 2:

Preventative Measure	**%Fault**	**% Plaintiff's Liability**	**Total %**	**% World Printing Liability**	**Total %**	**% Web Press Liability**	**Total %**
Warning Signs	25	100	25	0	0	0	0
Safety Guards	25	100	25	0	0	0	0
Training/Manuals	50	50	25	50	25	0	0
Total % Liability			**75**		**25**		**0**

Table 2.

The total damages claimed by the Plaintiff are $933,851.00. Because the plaintiff was more than 50% responsible for the accident, he is not entitled to the payment of any damages.

7. Trial

7.1 Summary of Events

The trial started out with an introduction to Product Liability Law. Just as in a real trial, the jury had to learn the law and how it is applied. Also, just as a real trial, it

was the lawyers' job to convince the jury who they believe is at fault. In this trial, each group acted as both lawyer and expert witness. We each had the opportunity to state the facts of the case and present our opinion in the case.

The engineer's job in the courtroom was discussed. An engineers' job can be to defend a product – possibly his company's or his own, act as expert witness – give his professional opinion on a aspect of the case, or act as a lay witness. A certain level of professionalism is expected of an engineer in the courtroom whether it be in the interest of his own defense (in the case where he is defending a product) or in the interest of his professional reputation (where he is getting paid for his professional opinion). This conduct includes, but is not limited to, honest answers, asking questions when clarification is required, and asking his associate lawyer questions when unsure how to proceed. An engineer should follow this unofficial code of conduct to avoid problems and to avoid potentially costing his party the case. An engineer will be expected to testify as a witness also so his job is not limited to simply technical research and support in the case.

An engineer's job outside of the courtroom was established also. When defending a product or acting as expert witness, an engineer should familiarize himself with the product as well as the circumstances behind the incident on trial. He should calculate (or re-calculate) his old work in order to provide concrete numbers, which the lawyer can use to prove the case to the jury. He should reconstruct the accident and/or analyze the mechanism to prove or disprove the presence of defects in the design or in the theory behind the design. The dispute in Products Liability Law is usually over the reasonable safety or the contractual fulfillment of a machine or product. The engineer's

job is to affirm or disprove these disputes so he must focus on this particular aspect of the case and collect all the information he possibly can to help out his lawyer as well as himself. Furthermore, it is his job to learn a little of the applicable law involved in the case. This way, there will be few surprises as to the proceedings in the courtroom. Also, the engineer will find it beneficial to know the questions he should expect to be asked so he can have answers prepared. This is yet another reason why the engineer should always work closely with his lawyer to have the best chance of winning the case.

Continuing with the mock trial proceedings, all of the different processes were explained briefly. The deposition process was introduced to the jury for example. Once the formalities were out of the way, the main part of the case began. The background behind the case was given: the Plaintiff Ankenman was injured when his hand was caught between printing press rollers, causing him permanent injury. His injury was established through medical records and eyewitness testimony from the deposition. His professional career was discussed such as employment history, positions held, training, and so forth. The trial then moved to the more technical aspects of the case.

Since most jury members are probably not engineers or technicians, this part of the trial is probably the most important in any product liability case. This is also where the engineers and other expert plays his key role and in this case where it was critical that we (as expert witnesses) were well prepared. In this case, the entire printing press automation and each press machine had to be explained. The individual presses were examined first. The alleged defect in the machine was the question of the relative safety of the guards. They protected the printing cylinder and the roller below it that together

forms a nip point where the injury occurred. The guard was not in place when the injury happened.

Next examined was the operation of the press line. The whole start/stop/safe/inch procedure was explained to the jury. The jury viewed a video demonstrating the operation of the press line. There is a dispute over the need for an inch button at every station on the machine. This function was not available on each machine so proper procedure called for shutting down the entire production and having the head pressman inch the press from the main control panel. There was also one other station where the press line could be inched. Also, proper procedure could have been maintained if the press operator shuts down his machine and manually turns a hand wheel to advance the rollers. The conflict exists where the Plaintiff, Ankenman, and his experts claim that the press should have had an inch button at every station. Their claim is that the lack of this function directly caused Ankenman's accident and the manufacturer should be held accountable.

The defending company, Web Press, certainly did not agree with this allegation. The Plaintiff caused his accident by violating company protocol. Another technical explanation was necessary by the expert witnesses. During the accident in question, the Plaintiff was picking a "hickey" - a build-up of dust, lint, and ink on the main roller. Hickeys must be removed as they leave an imperfection on the final product. The procedure outlined in the pressman manual is to clean the roller by *turning the machine off*, inching the rollers until the hickey is found, and then clean it off of the rollers with a rag and solvent. The Plaintiff used a different practice where he would remove the guard while the press was running, locate the hickey, and then remove it by scraping it off the

roller with a piece of plastic. The Plaintiff claims that there is no way he could inch the machine from his station aside from shutting the entire assembly down and having the head pressman inch the machine. He claims that shutting the automation down for one press is practiced neither at World Printing (the company where the accident occurred) nor at any other printing company he has ever worked. It is clear that the Plaintiff was not following procedure, however the company apparently did not enforce the proper procedures either.

The difficult question is where the defendant, Web Press, falls into this dispute. The Plaintiff contests that the design is faulty due to the lack of electrically interlocking guards (which would shut the press down if any guard were removed). Web Press disagrees and claims that the guards provide sufficient coverage for safety when safety precautions are taken, warning signs are obeyed, and operation is in conjunction with the proper training. Furthermore, the standards of the American National Standards Institute (ANSI) were also met in the design of the machine. Of the eight other IQP groups involved in the case, four sided with the defendants, Web Press, and four sided with the Plaintiff, Ankenman. Our groups also found in favor of the defendant, making the count five for the defendants and four for the plaintiff.

7.2 Restatement of position in the case

It is clear that our groups' involvement in the case will be in defense of Web Press Co. As summarized before, in general we found 75% of the liability to be Ankenman's, 25% to be World Printing's, and 0% to be Web Press's (See Table 2). We conclude that Ankenman contributed primarily to his own accident by disregarding warnings, the safety

guard, and the pressman manual's instructions. World held partially liable for failing to enforce these safety precautions. World manufactured safety guards separately (through Rand) that met the specifications of the Web guards and provided the same functionality and safety. For their part in the matter, Web Press should be absolved of all responsibility as they manufactured a press that met the standards of the American National Standards Institute.

Electrically interlocking guards certainly would have made the machine safer. But the question remains, was this machine sufficiently safe as manufactured by Web Press? Our group answers 'yes' to that question. The guarding feature on the press, when used in accordance with the proper rules and regulations, is not dangerously defective. Therefor our group can assign no fault to Web Press.

7.3 Outcome/decision

The trial now reached the point where all evidence had been submitted and all arguments made. The jury now went into deliberation to return a verdict on the questions submitted to them before the trial. In Table 3 below is a chart showing how our group answered the questions set forth as well as the jury's responses/verdict.

	Questions:	Our Groups' Responses	Jury's Verdict
1.)	Did Web Press sell a defective machine to World Printing?	no	no
2.)	Did Web Press sell Defective guards to World Printing?	no	no
3.)	Did the Printing Press have a defective STOP/JOG/START control system?	no	no
4.)	Did the Web Press have defective warnings?	no	no
5.)	Did Web Press provide adequate instructions?	yes	yes

6.)	Should Web Press pay any money to Barton Ankenman for his injury? If yes, how much?	no	no
7.)	Should Web Press pay any money to Brenda Ankenman for her loss of consortium (friendship, companionship, etc.)?	no - $0	no - $0
8.)	Did Barton Ankenman contribute to his own accident? What Percent out of 100%?	yes - 75%	yes - 85% to 99%

Table 3.

Also, the groups and the jury were presented with some questions to answer in respect to a possible second trial involving Web Press vs. World Printing which would likely take place if indeed Web loses to Mr. Ankenman and decides to try to regain any monetary loss from the case. Table 4 shows these results below.

	Questions:	**Our Groups' Responses**	**Jury's Verdict**
1.)	Did Web Press sell a defective press to World Printing?	no	no
2.)	Did Web Press provide adequate instructions to world printing?	yes	yes
3.)	Did World Printing alter or modify the web press in any way making the press defective?	no	no
4.)	Did World Printing Provide defective guards?	no	no
5.)	Did World Printing contribute to Mr. Ankenman's injuries?	yes	yes
6.)	Did Web Press provide adequate instructions to Mr. Ankenman?	1/2 yes 1/2 no	yes
7.)	If yes, what percent did they contribute to his accident?	0%	0%
8.)	What percent did World Printing contribute to Mr. Ankenman's accident?	25%	1% to 15%
9.)	Should Web Press be awarded any money from World Printing for this case?	all of it	all of it

Table 4

It seems the jury agreed with most of our groups' conclusions about the case. Actually, it is ironic that the most major disagreement was between two partners of our group over the question about World providing adequate instructions to Mr. Ankenman. The question can be interpreted in two ways: 1.) Did World Printing provide strictly adequate

written instructions or 2.) Are the word *instructions* inclusive for the practices that take place on the job site? It is a minor disagreement but goes to show that even within the group there can be minor disagreements that must be resolved before the trial.

7.4 Analysis of outcome

As might be expected, our group was relatively pleased with the jury's verdict. We feel that justice has been served in this mock trial. Although it is not surprising how the jury decided (especially to our group), it is still beneficial to analyze the results and take a better look at the other side of this case as well as their presentation.

The case certainly was not clear-cut as five of the nine groups took the side of the defendants while four took the side of the plaintiff. What exactly helped the jury to arrive at this particular verdict? Sometimes a verdict is not returned in the correct or legitimate party's favor. Being in the right in a legal sense never guarantees victory in a trial. The fault of our court system is that sometimes there is error. Many things can sway a jury one way or another, most of which have nothing to do with whether or not the ethics involved are just and good. A testimony given by a witness has been known to sway a jury. A crafty lawyer can fool jurors to believe a far-fetched notion of the truth or find a loophole to free his client on a technicality. An expert witness can give a testimony and instantly gain the advantage for his side because of reputation alone. Even appearances or congeniality can sway a jury. Why does this happen? Because sometimes when the scale is evened out, all it takes is one ounce of extra poignancy, one shard of believability that makes one story easier to swallow than another. This is why it is important to even out the scale again to gain every possible advantage. As an expert witness, your manner under oath, your conciseness and thoroughness in answering, even

your appearance can 'make or break' of your case. Know that as an expert witness your every move is important and could help win, or very well even lose your case.

Why do is the expert witness's role mentioned here yet again? Because the same factors seemed to matter in the mock trial. Even though throughout the trial it seemed that equal interjections and points were brought up for both sides involved in the case, something swayed the jury to overwhelmingly decide in favor of the defendants. To reiterate, what could turn a case so technical and vague into a decision so one-sided? The answer is in those small things that were mentioned before. One can only speculate, but perhaps there was one piece of evidence, one 'smoking gun' that turned the tide of the vote. Or, maybe it was something simpler; perhaps the lawyers and experts arguing for the defendants were the more aggressive and conveyed their case better even if the plaintiffs' case was better prepared or stronger. The lesson here is that the verdict that was returned, even though overwhelming, may or may not necessarily be the "right" one. Furthermore, as in all law, the most prepared, best organized, and overall the best team of lawyers and experts will win most cases.

8. Importance of law to engineers

8.1 How law has continued to change

Probably the most fascinating and important thing about product liability law is that it is continually changing. With every new case brought to trial and verdict handed down, a new precedent and a new set of rules is set forth. The world of product liability law is therefor ever changing. It is important that lawyers and expert witnesses such as

engineers stay current in this changing world. Any new precedent, no matter how seemingly obscure, may very well help in some case later on in one's professional career.

8.2 Importance to engineers

The importance of Product Liability Law has been quite evident throughout this project. In summary, engineers need to understand Product Liability to defend their products in court. The law is in place to hold engineers to a strict standard of professionalism where it simply is not allowable for them to produce an inferior product. An engineer who does not wish to follow the law will lose money, his reputation, and probably his job. From the opposite perspective, an engineer can be victimized by an unfair assessment of his product. Either way, an engineer is kept honest in his job so as not to put less than his best effort forward.

An engineer can also be involved in a case acting as an expert witness instead of as a defendant. An engineer hired as an expert witness is hired for his professional opinion. He/she is hired to examine a machine and/or accident and help out by giving testimony regarding the technical aspects of the case. In some instances, the expert is hired before reviewing the facts of the case, and may be forced to tailor his conclusions to suit the lawyers that hired him. An unethical expert such as this does not really have an opinion one way or another but rather finds the most plausible solution that will help his side of the case.

8.2.1 Technical nature

Engineers are hired as expert witnesses because of the highly technical nature of what needs to be explained so the jury. Often times, the machinery involved can be complex and difficult to discuss in lay-terminology. The expert witness has made it his profession to do just this. The expert must cut out the unnecessary specifications, technical jargon, and complexities involved in the product and give clear and concise testimony to the jury. He must do this, however, such that he will neither lose any of the usefulness of the testimony nor insult the jury by making it so simple he appears to 'talk down' to them.

The expert's usefulness does not end there though. The expert is also an essential reference to his legal team. It is of the utmost importance to the case that the expert can explain to the lawyer the technical aspects of the case. The lawyer, as the leader, needs to plan a strategy in every phase of the trial proceedings. He must also be able to understand the technical nature of his case otherwise he has no plan for attack or defense. If the expert does not work in close association with the lawyer, then the case does not have a good chance of succeeding.

8.3 Ethics and Lessons

Much of the general public finds the legal profession as a whole to be adrift in ethical matters. Indeed, too many lawyers are willing to earn a fast buck by brining a company to trial on a trumped-up charge and then settling out of court. The real looser in this situation is the consumer, companies can always raise prices to cover losses, and the lawyers almost always come away with something. The laws that govern products

liability were created with the best of intentions, but seemed to have opened a floodgate of litigation. The important lesson to us, as future engineers, is to always follow certain guidelines in the future. Products must always be designed with safety as a primary design consideration. Time should also be spent considering potential missuses of the product and preventing against them. Like any profession, engineers have a certain responsibility to protect the public, thus safety should be given our utmost attention.

8.4 Conclusions about Product Liability

Inherent in product liability law is the ultimate question: can a product be manufactured and designed to be perfectly safe? This is a rhetorical question as there is no real answer but both points of view can still be argued. The immediate answer in the initial generations of a product seems to be 'yes'. However, as more and more misuses are discovered for each product, the designer begins to realize that there probably is no way to make the mechanism free from defect or danger. Guidelines, safety warnings, and instructions for safe and proper usage are all written to help avoid those problems for which design simply cannot account. Once again, operators will find a way to disregard or abuse the machine and cause themselves, someone else, or the machine harm. It seems an engineer is caught in a proverbial 'catch 22' where he cannot succeed no matter what he does. This is not entirely true, but an engineer should keep this risk in mind when designing a product. Product Liability Law teaches the important lesson of thoroughness in an engineer's work. It also stresses the necessity to keep safety as an important consideration in the design rather than as an afterthought. Now, when the time comes for an engineer to defend his product, whether it be in the courtroom or to his supervisor, he

does so with confidence because he knows without a doubt that he has built the best product he possibly can.