

# ME349

## Mechanical Engineering Design Projects

### Product Liability

Product liability is a part of what is referred to as Tort Law. Torts are civil wrongs recognized by law as grounds for a lawsuit. These wrongs result in an injury or harm constituting the basis for a claim by the injured party. The primary aim of tort law is to provide relief for the damages incurred and deter others from committing the same harms. The injured person may sue for an injunction to prevent the continuation of the conduct causing the injury or for monetary damages.

Product liability refers to the liability of any or all parties along the chain of manufacture of any product for damage caused by that product. This includes the manufacturer of component parts (at the top of the chain), an assembling manufacturer, the wholesaler, and the retail storeowner (at the bottom of the chain).

Products containing inherent defects that cause harm to a consumer of the product, or someone to whom the product was loaned, given, etc., are the subjects of products liability suits. Well-known examples of product liability suits include:

- Poorly designed cars, trucks, motorcycles and recreational vehicles;

- Unsafe power tools and appliances including everything from lawnmowers to heavy construction and farm machinery;

- Hazardous children's toys, clothing or other accessories such as car seats and cribs; and,

- Pharmaceuticals or other health care products that cause dangerous side effects or death.

Many states have enacted comprehensive products liability statutes. These state statutory provisions can be very diverse. Because of this, the United States Department of Commerce produced the Model Uniform Products Liability Act (MUPLA), which serves as a voluntary guide for use by the states. There is no federal products liability law.

In any jurisdiction one must prove that the product is defective. There are three types of product defects that incur liability in manufacturers and suppliers: design defects, manufacturing defects, and defects in marketing. Design defects are inherent, that is, they exist before the product is manufactured. While the item might serve its purpose well, it can be unreasonably dangerous to use due to a design flaw. Manufacturing defects occur during the construction or production of the item. This is typically only affects a few of the number of the product being produced. Defects in marketing deal with improper instructions and failures to warn consumers of latent dangers in the product.

Product Liability claims are based on three theories of law: strict liability, negligence, and/or breach of warranties.

### 1) *Strict Liability*

Strict liability holds that the manufacturer of a product is responsible to anyone injured by the use of an unreasonably dangerous product. Strict liability wrongs do not depend on the degree of carefulness by the defendant. Translated to product liability terms, a defendant is liable when it is shown that the product is defective. It is irrelevant whether the manufacturer or supplier exercised great care; if there is a defect in the product that causes harm, they will be liable for it. Tort law typically requires that to prove strict liability, a person must show that:

The product was defective and unreasonably dangerous;  
The product was defective when it left the manufacturer; and,  
The defect caused injury to the person bringing the claim.

For example, consider a manufacturer who makes a car with defective brakes. The Manufacturer sells that car to a Dealer, who resells it to the Owner, who resells it to a Consumer. The Consumer is injured when the car crashes because the brakes don't work. The Consumer can recover from Manufacturer in "strict tort liability," by showing that the brakes were in a defective condition unreasonably dangerous to users at the time the car left the plant. This is true even though Manufacturer used all possible care in designing and building the car, and even though Consumer never contracted directly with Manufacturer.

Strict product liability applies not only to the product's manufacturer, but also to its retailer, and any other person in the distributive train (e.g., a wholesaler) who is in the business of selling such products. In the above example, the Consumer can recover against the Dealer, even though Dealer merely resold the product and behaved completely carefully.

A product gives rise to strict liability only if it is "defective" and also "unreasonably dangerous." Therefore it is helpful to have a definition of the meaning of "defective and unreasonably dangerous": A product meets these twin requirements of "defective" and "unreasonably dangerous" if it is "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." Therefore, if a product obviously presents a particular danger to all reasonable consumers, it is not defective or unreasonably dangerous because of that condition.

What is the definition of a "design defect"? A "design defect" must be distinguished from a "manufacturing defect." In a design defect case, all the similar products produced by manufacturer are the same, and they all bear a feature whose design is itself defective, and unreasonably dangerous.

Two types of common design-defect claims are structural defects and the lack of safety features. While structural defects are a concept that most engineers would be familiar with, the lack of safety features is a subtler idea.

Lack of safety features:

The manufacturer is liable if plaintiff shows that a safety feature could have been installed on the product with so little expense (as compared with both the cost of the product and the magnitude of the danger without the feature) that it is a defective design not to install that feature.

## 2) *Negligence*

A claim of negligence focuses on the actions of the manufacturer in designing and producing a product. In other words, did the company fail to exercise reasonable care in the manufacture of the product, and/or did it ignore its own (or industry standard) production, inspection and safety guidelines?

For example, consider a car manufacturer, who carelessly fails to inspect brakes on a car that it makes. If a person buys the car directly from the manufacturer, and crashes when the brakes don't work, the buyer can recover from the manufacturer under ordinary negligence principles.

The manufacturer is the person in the distribution chain most likely to have been negligent. He may be found negligent because he:

- (1) carelessly designed the product;
- (2) carelessly manufactured it;
- (3) carelessly performed (or failed to perform) reasonable inspections and tests of finished products;
- (4) failed to package and ship the product in a reasonably safe way; or
- (5) did not take reasonable care to obtain quality components from a reliable source.

Keep in mind that this doesn't mean a manufacturer must make all products perfectly safe. Some products, by their very nature, can result in injury if used improperly. For example, eye injuries can result from using many power tools without wearing eye protection. However, the manufacturer probably would not be liable if there were adequate warnings to wear eye protection while using the tool.

## 3) *Breach Of Warranty*

A warranty is the manufacturer's promise that a product will perform as intended. If the product doesn't perform as warranted and causes an injury in the process, the

manufacturer can be held responsible for injuries or damages under a breach of warranty claim.

There are two sorts of warranties, “express” ones and “implied” ones.

*Express warranties:*

A seller may expressly represent that her goods have certain qualities. If the goods turn out not to have these qualities, the purchaser may sue for this breach of warranty.

For example, consider a car manufacturer who promises that a particular car has “shatterproof glass.” While a consumer is driving the car, a pebble hits the windshield, shatters the glass, and damages the consumer’s eyes. The consumer can sue the manufacturer for breach of the express warranty that the glass would be shatterproof.

*Implied warranty:*

The existence of a warranty as to the quality of goods can also be implied from the fact that the seller has offered the goods for sale.

In many states, a basic warranty is implied under the Uniform Commercial Code (UCC) even if no warranty is offered with the product. The UCC states that a manufacturer can be liable if the consumer is hurt using the product as intended. The UCC imposes several implied warranties as a matter of law. Most important is the warranty of merchantability. To be merchantable, the goods must be “fit for the ordinary purposes for which such goods are used.” For example, a car which, because of manufacturing defects, has a steering wheel that does not work, is not “merchantable,” since it is not fit for the ordinary purpose— driving — for which cars are used. In other words, the product must properly serve the purpose that the manufacturer intended by selling the product

*Strict Liability vs. Negligence*

The crucial difference between strict liability and negligence is that the focus in strict liability is on the quality of the product as it functions in the real world, and negligence is based on the quality of the manufacturer's behavior or conduct in producing the product.

For a product seller to be liable under strict liability, the product must be "in a defective condition and unreasonably dangerous" to the user. This liability exists even if the "seller has exercised all possible care in the preparation and sale of the product."

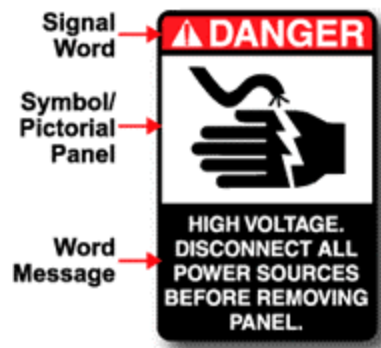
Even if a manufacturer has taken reasonable step to ensure that the product was not substandard in manufacture, design, or instructions and warnings, it is, unfortunately, of no consequence in strict liability if the product is judged to be unreasonably dangerous to the user. Suppose the plaintiff argues that the basic design of the product is flawed, or that the warnings and/or instructions were inadequate.

The question under strict liability is whether or not the product, as designed, including its instructions and warnings, created unreasonable dangers to the user.

### *Labeling of Hazards*

Failure to warn is a claim based upon a manufacturer failing to provide directions for the safe use of a product and/or failing to warn the consumer against dangers inherent in product misuse. An example is a manufacturer selling a pain killer without any warning that use of the medication has side effects upon people with heart defects.

Example at right shows a typical label used to indicate a hazard.



Below are the ANSI Z535.5-1997 Designs and Definitions.

#### **▲ DANGER**

*Danger* indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.

#### **▲ WARNING**

*Warning* indicates a potentially hazardous situation, which if not avoided, will result in death or serious injury.

#### **▲ CAUTION**

*Caution* indicates a potentially hazardous situation, which if not avoided, will result in minor or moderate injury. It may also be used to alert against unsafe practices.

## *Joint and Several Liability*

The common law rule of joint and several liability makes each and every defendant in a tort lawsuit liable for the entire amount of plaintiff's damages, regardless of that defendant's proportion of fault for the damage done. In other words, it allows a person to recover damages from one or more defendants. This rule is absolute. Even a defendant who a jury finds to be 1 percent liable may be required to pay the entire amount of the judgment.

The law is motivated by a desire to insure that plaintiffs are made whole. Many people, especially trial lawyers believe that without joint and several liability, injured people could be unable to recover a substantial portion of what should be fair compensation. Many others believe that the law leads to a search by plaintiffs' attorneys for "deep pockets" and to a proliferation of lawsuits against those minimally liable or not liable at all.

Numerous state legislatures and courts have abolished joint and several liability in certain circumstances. 31 states have modified it in some way. 13 have abolished it in many circumstances for both economic and non-economic damages. Four states, California, Florida, Ohio (if the Plaintiff is contributorily negligent) and Oregon have adopted reforms much like these. Others have abolished it if a defendant's fault falls below a certain threshold.

## **Case Studies**

These case studies have been culled from a number of sources. This is the reason they are not uniform in format.

### ***Zimmer v. City of Milwaukee*** (Joint and Several Liability)

An uninsured driver of a car with faulty brakes, despite a stop sign and a crossing guard, hit and killed a six-year old boy in a school crossing. Plaintiff argued that the accident might have been avoided if the crossing guard, instead of signaling the car to stop, had attempted to get the child out of the car's path. The city, as the crossing guard's principal, was found to be 1% at fault, but since it was solvent, had to pay the full amount of damages.

### ***Diving Accident*** (warning defects)

A 33-year-old man in Virginia has dove off the deck next to his aboveground pool dozens of times. One time, however, he hit the bottom and broke his neck, becoming paralyzed from the neck down. Even though the pool was only four feet deep, he had thought he could safely perform shallow dives. A jury found the pool maker negligent in failing to adequately warn the victim and others that they

could be hurt diving into their pool. In fact, the pool maker had even depicted people diving into the aboveground pools in their advertising.

Because of the lawsuit, and the damages awarded to the injured party, this pool manufacturer and others have started to adequately warn people about the dangers of diving into aboveground pools.

### ***All Terrain Vehicle Accident*** (warning defects, design defect)

An eighteen year old man was driving through a Kentucky woods in his all-terrain vehicle (ATV). He was later discovered thrown 15 feet from the overturned vehicle. The accident left the young man with a severed spinal cord and made him a quadriplegic.

He sued the manufacturer, because the vehicle was unsafe for operating on all types of ground, and did not provide proper safety warnings. He also argued that the vehicle was difficult to handle and hazardous to operate. The paralyzed man collected a large sum of money in damages and since then the manufacturer of the ATV has installed automatic warning signals on the dashboard and issued a notice on safe uses of the vehicle.

### ***Skiing Accident*** (warning defects)

At a northern New England ski resort, a woman athlete was practicing for Olympic tryouts. She descended a hill, and headed down the eastern face of the mountain. Seconds later the woman went over a 25 foot vertical jump that was not properly marked. She later died from a spinal cord injury.

Because there were no warning signs at the top of the ski run or immediately before the jump, the ski resort owners were found partially responsible. Now signs have been placed in visible areas to prevent similar accidents from happening.

### ***Tire Failure and Subsequent Accident*** (defect in manufacturing)

An American Eagle motor home equipped with Goodyear steel-belted tires was traveling at approximately 60 mph on a major interstate. Police reports show that the left-front tire blew as the motor home was crossing a causeway over water. The sudden deflation of the tire caused the driver to momentarily lose control of the vehicle and strike a concrete barrier at the side of the highway. The driver stated that he regained control of the vehicle and brought it to a stop. He then retrieved the two sections of the tire tread near where the blowout occurred.

*Investigation:*

A Consulting Group was given the assignment to investigate the tire to determine its liability in this accident.

The blown tire was carefully transported to the Consulting Group evidence storage facility where analysis begun. The tread had completely separated from the body of the tire and was in two sections of approximately equal length. The groove depth on the road surface of the tread was more than 7/32" deep, and the amount of wear was consistent with the reported 26,000 miles on the vehicle odometer. The underside of the tread showed evidence of non-uniform adhesion of the tread to the body of the tire. The non-uniform adhesion was due to a defect in manufacturing. The Consulting Group also found evidence that the radial cords in the body of the tire were terminated in the middle of tread. This is also a defect in manufacturing.

Significant damage was caused to the tire by the wheel rim after the sudden deflation as the driver was bringing the vehicle to a stop. The tire was left intact. The Consulting Group determined it was not necessary to examine the interior of the tire by dismounting the carcass from the wheel. This was in order to preserve the conditions of the tire and wheel unit for future examination by others.

The Consulting Group determined this fact: The blowout of the tire and subsequent damage to the motor home was caused by the separation of the tread and delamination of the cord layer which was the result of defective manufacturing of the tire.

***Greenman v. Yuba Power Products*** (Strict Product Liability)

FACTS:

- A piece of wood flew out of the lathe attachment of a Shopsmith (a consumer power tool) while Greenman was using it, causing serious injuries.
- Greenman sued the retailer and the manufacturer for breach of warranties and negligence.
- The jury ruled in favor of Greenman, and the Defendants appealed.

***Greenman v. Yuba Power Products*** (Strict Product Liability)

HELD: AFFIRMED. FOR GREENMAN.

- Greenman proved that the design and construction of the Shopsmith were defective and that his injuries were caused by the defects.



- “A manufacturer is strictly liable in tort when an article he places on the market, knowing that it is to be used without inspection for defects, proves to have a defect that causes injury to a human being.”
- Purpose of liability is for manufacturers to bear the costs.

***Case: Embs v. Pepsi-Cola*** (Strict Product Liability)

FACTS:

- Embs was buying groceries at Stamper’s Cash Market.
- A carton of 7-Up was sitting on the floor at the edge of the produce counter about one foot from where she was standing.
- Several of the 7-Up bottles exploded severely injuring Embs.
- Embs sued Pepsi but the court ruled against her and dismissed her case.
- Embs appealed.

HELD: REVERSED. FOR EMBS.

- The appellate court extended the protection of the *Restatement (Second) of Torts*, Section 402A “to bystanders whose injury from the defect is reasonably foreseeable.”
- The court based this extension on the policy that “the loss for injuries resulting from defective products should be placed on those members of the marketing chain best able to pay the loss, who can then distribute such risk among themselves by means of insurance and indemnity agreements.”

***Liriano v. Hobart Co.*** (Warning Defects)

FACTS:

- Super Associated store bought a Hobart Corp. meat grinder that had no warning that it should be operated only with the safety guard.
- Liriano, a SA employee, removed the guard and was severely injured when his hand was caught in the grinder. (Liriano was seventeen years old, a recent immigrant, and on the job only a week. He had not been told how to operate the grinder.)
- He sued Hobart claiming that the lack of a warning about the safety guard was negligence. The jury returned a verdict for Liriano.
- Hobart appealed; arguing that the danger was so obvious no warning was needed.

## ***Smith v. Ingersoll-Rand*** (Comparative Negligence)

### FACTS:

- Smith was injured while attempting to start the diesel engine for a compressor manufactured by Ingersoll-Rand Company.
- Smith, a mechanic, was not wearing a hard hat when he was dispatched to start the engine. The door had to be propped open.
- Smith started the engine and the door fell from its open position and hit his head causing severe injury. Smith sued Ingersoll-Rand.
- Ingersoll-Rand defended that Smith's failure to wear a hard hat and his propping the door open in an unsafe manner constituted contributory negligence.

### HELD: FOR INGERSOLL.

- The court recognized that under a "system of comparative fault \* \* \*, a plaintiff would still be able to recover if he was comparatively at fault for his injuries, but his recovery would be reduced in proportion to his percentage of fault."

## ***Green v. Honda Motor Co., Ltd.***

Tex., 234th District Court, Harris County, No. 1,018,125 22 ATLA L. Rep. 35 (Feb., 1979)

Brain damage. Gust of wind went underneath improperly installed windscreen of a Honda causing him to lose control. Plaintiff's head hit pavement causing irreversible brain damage despite safety helmet. \$1.5 million settlement contributed equally by Honda, installer of windscreen; Wixom Brothers, designer of windscreen; Bell helmets.

## ***Burgess v. Adams***

Civ. No. 48804 (1 Cir. Ct., Hawaii, October 14, 1977)

Bell-Topex motorcycle half helmet. Plaintiff, motorcycle officer, involved in accident with car. Thrown from motorcycle at 45-55 mph. Helmet came off. Plaintiff and wife sued employer, driver and owner of car, and helmet manufacturer. Defective design in that helmet would not stay in place upon impact. Damage to left cerebral hemisphere, partial hemiplegia one kidney, temporary blood pressure disorder, broken clavicle, ribs and right radius. Settlement, \$50,000, manufacturer, \$25,000.

***Sutphin, et al. v. American Sports Co. , Inc. et al.***

Motorcycle passenger's head struck rear portion of oncoming vehicle as driver laid motorcycle down attempting to avoid collision. 22-year-old social worker passenger sustained brain damage and remains semi-comatose. Helmet unreasonably dangerous, contributed to passenger's injuries. Jury verdict, \$2,500,000.

***Cornier v. Bell Helmet Corp.***

1976 Super Magnum DOT motorcycle helmet manufactured by Bell Helmet Corp. Failed to protect 23-year-old plaintiff when she was thrown from motorcycle on which she was a passenger. Helmet had failed DOT impact attenuation tests 9 months prior to accident. Plaintiff suffered permanent brain damage, coma, and must undergo head trauma therapy. \$3 million jury verdict. 75 per cent of fault against Bell; 10 per cent against driver of motorcycle; 15 per cent against driver of other vehicle.