

July 2015

Uncrashworthy Aircraft and the Manufacturer's Liability

Robert Kent

Please take a moment to share how this work helps you [through this survey](#). Your feedback will be important as we plan further development of our repository.

Follow this and additional works at: <https://ideaexchange.uakron.edu/akronlawreview>



Part of the [Air and Space Law Commons](#)

Recommended Citation

Kent, Robert (1980) "Uncrashworthy Aircraft and the Manufacturer's Liability," *Akron Law Review*: Vol. 13 : Iss. 3 , Article 7.

Available at: <https://ideaexchange.uakron.edu/akronlawreview/vol13/iss3/7>

This Article is brought to you for free and open access by Akron Law Journals at IdeaExchange@UAkron, the institutional repository of The University of Akron in Akron, Ohio, USA. It has been accepted for inclusion in Akron Law Review by an authorized administrator of IdeaExchange@UAkron. For more information, please contact mjon@uakron.edu, uapress@uakron.edu.

UNCRASHWORTHY AIRCRAFT AND THE MANUFACTURER'S LIABILITY

I. INTRODUCTION

EVER SINCE man entered the field of aviation, airplanes have crashed. The ratio of aircraft which have fallen from the sky to the total number in use has dropped greatly since man's first attempts at flight. But aircraft crashes are still very much a reality. During the period 1967-1976, approximately 97,211 individuals were involved in 46,576 general aviation (civil non-commercial aircraft) accidents.¹ This is an average of 4,657 accidents per year.² Six hundred seventy-six accidents proved fatal.³ It has been estimated that "at least 70 percent of the aircraft in production today will eventually have an accident."⁴

In a major pioneering study completed in 1952, A. H. Hasbrook found that of 913 light plane accidents involving 1,596 occupants and resulting in 389 fatalities, 143 people died in structural environments that remained intact or were merely distorted.⁵ Hasbrook concluded that these 143 people, or roughly one-third of the total number killed in light plane accidents died unnecessarily, for they died in what are generally considered to be survivable crashes.⁶ Recent studies of general aviation accidents have shown no substantial improvements in occupant protection.⁷ Accidents similar to those in the Hasbrook study have resulted in the litigation of the issue of crashworthiness.

Crashworthiness from an engineering point of view is "the relative ability of a particular vehicle design to withstand crash forces with minimal structural damage."⁸ In law the term refers to the ability of the vehicle to protect the passengers from exacerbated injuries following a collision.⁹ These "enhanced injuries"¹⁰ occur when a secondary impact (secondary to the vehicle colliding initially) occurs between the injured party and

¹ R. SNYDER, GENERAL AVIATION CRASH SURVIVABILITY (Society of Automotive Engineers, Inc. Technical Paper Series No. 780017 (1978) [hereinafter cited as SNYDER].

² *Id.* at 3.

³ *Id.*

⁴ J. BRUCE & J. DRAPER, CRASH SAFETY IN GENERAL AVIATION AIRCRAFT, Report of the Nader Student Group, Center for Responsive Law (Jan. 1970).

⁵ A. Hasbrook, *Severity of Injury in Light Plane Accidents: A Study of Injury Rate, Aircraft Damage, Accident Severity, Impact Angle, and Impact Speed Involving 1596 Persons in 913 Light Plane Accidents*, Av. Cir. 55-105 (Sept. 1959).

⁶ *Id.* at 22, 79.

⁷ SNYDER, *supra* note 1, at 12.

⁸ *Id.* at 2.

⁹ Haase, *Automobile Crashworthiness: Evans Takes A Backseat*, 21 VILL. L. REV. 72, 73 (1975-76).

¹⁰ Foland, *Enhanced Injury: Problems of Proof in "Second Collision" and "Crashworthy" Cases*, 16 WASHBURN L.J. 600 (1977).

a specific part of the interior or exterior of the vehicle, or when the injuries are enhanced or increased over what they would have been had the vehicle been designed differently.

The courts have imposed upon the manufacturer a duty to use reasonable care in the design and manufacture of a product, to minimize injuries to its users, and not to subject its users to unreasonable risk of injury in the event of a collision or an impact.¹¹ The court in *Dyson v. General Motors Corp.*¹² defined an automobile manufacturer's responsibility when it said, "It is the obligation of an automobile dealer to provide more than merely a movable platform capable of transporting passengers from one point to another. The passengers must be provided a reasonable safe container with which to make the journey."¹³ One must note that this is not a duty to design a vehicle to withstand all collisions under any circumstances.¹⁴ "The manufacturer does not have to make a product which is 'accident-proof' or 'fool-proof'. Liability is imposed only when an unreasonable danger is created."¹⁵

The concept of crashworthiness has now been accepted by a resounding majority of states if not all states.¹⁶ Although widely used since *Larsen*¹⁷ in automobile crash cases,¹⁸ crashworthiness has only recently been successfully applied to the aircraft. Perhaps this foreshadows the future. The automobile differs only slightly from the helicopter and the airplane. All are products; all are accepted modes of transportation; and all may be designed to be reasonably safe. The doctrine of crashworthiness has been so widely accepted with respect to the automobile that the time has now arrived for the doctrine to be accepted in the field of aviation. Generally in the past, the same standards for product liability applied to other products have also applied to aircraft.¹⁹ Thus it is no surprise that crashworthiness issues are beginning to surface in cases of aircraft accident litigation.

II. DEVELOPMENT OF THE DOCTRINE

During the past fifteen years, the law has abruptly turned in its acceptance of the doctrine of crashworthiness. In 1966 the Seventh Circuit, upheld the dismissal of a suit based on the doctrine of crashworthiness (as it is now known) for failure to state a claim upon which relief could be

¹¹ *Id.*

¹² *Dyson v. General Motors Corp.* 298 F. Supp. 1064 (8th Cir. 1968).

¹³ *Id.* at 1073.

¹⁴ *Larsen v. General Motors Corp.*, 391 F.2d 495 (8th Cir. 1968).

¹⁵ *Id.* at 502.

¹⁶ N. Cousins, *The Second Impact Principles of Crashworthiness*, 11 TRIAL LAW. Q. 21 (1976).

¹⁷ 298 F. Supp. at 1073.

¹⁸ Foland, *supra* note 10, at 600.

¹⁹ 2 S. SPEISER & C. KRAUSE, AVIATION TORT LAW, 475 (1979).

granted. *Evans v. General Motors Corp.*²⁰ has been considered by many to be the leading case denying recovery under the crashworthiness concept.²¹ In *Evans*, a 1961 Chevrolet station wagon was designed with an "X" frame instead of a perimeter frame as used by other automobile manufacturers. The automobile was involved in an accident and Roy Evans died as a result of injuries received. The representative of the estate alleged negligent design of the vehicle, claiming that the perimeter frame provided much more protection for occupants of the car and that by omitting side frame rails, defendant created an unreasonable risk of harm. Plaintiff charged negligence, breach of implied warranty, and strict tort liability. The court questioned the duty which an automobile manufacturer owes to users of its product. The court noted that the plaintiff did not assert that defendant's design could have functioned to avoid the collision; neither did plaintiff assert that the "X" frame caused the collision; nor did plaintiff contend that the decedent would not have been killed had a perimeter frame been used. The court then cited *Campo v. Scofield*²² for the proposition that "a manufacturer is not under a duty to make his automobile accident-proof or fool-proof."²³ The court recognized that the defendant had a duty to insure that the automobile was reasonably fit for its intended purpose, but that "[t]he intended purpose of an automobile does not include its participation in collisions with other objects, despite the manufacturer's ability to foresee the possibility that such collision may occur."²⁴

But now the tide has shifted. In 1968 *Larsen v. General Motors Corp.*²⁵ surfaced. *Larsen* involved a 1963 Chevrolet Corvair in a head-on collision. The impact caused a severe rearward thrust of the steering mechanism into the plaintiff's head resulting in serious injury. The rearward displacement of the steering shaft on the left frontal impact was greater than that on other cars, which were designed to protect against such rearward displacement. The plaintiff alleged negligent design, negligent failure to warn of the alleged defect, and breach of express and implied warranties of merchantability. Defendant General Motors contended that it had no duty to produce a vehicle in which it was safe to collide or one that was accident proof. General Motors, relying on the *Evans* rationale, stated that a head-on collision was not the intended use of the vehicle and thus that there was no liability regardless of the manufacturer's ability to foresee occurrence of such collisions. The court, however, felt that this was too narrow a construction. In holding for the plaintiff, it stated: "while automobiles are not made for the purpose of colliding with each other, a frequent and in-

²⁰ 359 F.2d 822 (7th Cir. 1966).

²¹ Foland, *supra* note 10, at 600.

²² 301 N.Y. 468, 95 N.E.2d 802 (1960).

²³ 359 F.2d at 824.

²⁴ 359 F.2d at 825.

²⁵ 391 F.2d at 495.

evitable contingency of normal automobile use will result in collisions and injury producing impacts,"²⁶ and that "[t]he intended use of an automotive product contemplates its travel on crowded and high speed roads and highways that subject it to the foreseeable hazards of collisions and impacts."²⁷ The court then went on to speak of the duty owed the user saying:

This duty of reasonable care in design rests on common law negligence that a manufacturer of an article should use reasonable care in the design and manufacture of his product to eliminate any unreasonable risk of foreseeable injury . . . while all risks cannot be eliminated nor can a crash-proof vehicle be designed under the present state of the art, there are many common sense factors in design, which are or should be well known to the manufacturer that will minimize or lessen the injurious effects of a collision.²⁸

It should be noted that *Larsen* was decided on the concept of negligence.

Many courts were soon to follow the concepts set forth in *Larsen*.²⁹ In fact, many not only accepted it but expanded the concept to allow actions in warranty,³⁰ and in strict liability³¹ as well.

Cases which utilize a strict liability theory mainly find this liability in Restatement (Second) of Torts section 402-A.³² Section 402-A states: "One who sells any product in a defective condition unreasonably dangerous to the user or consumer or his property is subject to liability for physical harm thereby caused to the ultimate user or consumer. . . ." This places on the plaintiff the dual burden of proving defective condition and the unreasonably dangerous nature of the defect. But some jurisdictions have recently attempted to lessen plaintiff's burden. The California Supreme Court in *Cronin v. J.B.E. Olsen Corp.*³³ decided that requiring an injured plaintiff to prove not only a defect in the product, but also that the defect was unreasonably dangerous, was a much greater burden than was intended by the court in *Greenman v. Yuba Power Products Co.*³⁴ The effect of this decision is that plaintiffs are now only required to prove that the product contained a defect and that this defect caused the injury. The California

²⁶ *Id.* at 502.

²⁷ *Id.* at 504.

²⁸ *Id.* at 503.

²⁹ Foland, *supra* note 10, at 600.

³⁰ Friend v. General Motors Corp., 118 Ga. App. 763, 165 S.E.2d 734 (1968).

³¹ Dyson v. General Motors Corp., F. Supp. 1064 (E.D.Pa. 1969); Brandenburger v. Toyota Motor Sales, U.S.A., Inc., 162 Mont. 506, 513 P.2d 268 (1978); and General Motors Corp. v. Turner, 567 S.W.2d 812 (Tex. 1978).

³² RESTATEMENT (SECOND) OF TORTS § 402 A (1964).

³³ 8 Cal. 3d 121, 501 P.2d 1153, 104 Cal. Rptr. 433 (1972).

³⁴ 59 Cal. 2d 57, 377 P.2d 897, 27 Cal. Rptr. 697 (1963).

Supreme Court later reaffirmed this position in *Barker v. Lull Engineering Co., Inc.*³⁵

At present nearly all jurisdictions place some duty upon the manufacturer to design a crashworthy vehicle.³⁶ Even the U.S. Court of Appeals, Seventh Circuit, which decided the *Evans* case, has since changed its position. In *Huff v. White Motor Company*³⁷ the court recognized the principle of strict liability for the defective design of a fuel system that caused a truck to ignite upon impact. The court thus placed upon the manufacturer a duty to design the product to be "[r]easonably fit for its intended use and to be reasonably free from hidden defects which would render it unsafe for that use."³⁸ A crash is now determined to be within the intended use.

*Passwaters v. General Motors Corp.*³⁹ in 1972 extended the duty owed by the manufacturer to the innocent bystander who might foreseeably be injured by the vehicle. Susan Passwaters was a passenger on a Honda motorcycle being operated on a public highway. The motorcycle collided with a 1964 Buick Skylark which had wheelcovers with unshielded metal flanges protruding outward. Plaintiff claimed that during the accident these flanges came in contact with her leg and caused mangling lacerations. The court concluded that:

[A]lthough the specific injury and the manner in which it occurred may have been difficult to foresee, nevertheless the unshielded operation of propeller-like blades on the four wheels of an automobile created a high risk of foreseeable harm to the general public. The use of highways by pedestrians, the frequency of travel by unprotected persons riding on bicycles, motorbikes and motorcycles is a common occurrence. We think it now settled that a manufacturer does have the responsibility to avoid design in automobiles which can be reasonably foreseen as initially causing or aggravating serious injury to users of the highway when a collision occurs.⁴⁰

The court in *Driesenstok v. Volkswagenwerk A.G.*⁴¹ tried to put the reins on the "foreseeability" concept as extended in *Passwaters* so that it would not be overbroadly applied. *Driesenstok* involved a Volkswagen microbus that crashed head-on into a telephone pole. The court warned that "foreseeability" was not to be equated with duty. The key phrase was "unreasonable risk" of injury.

The question of causation is one frequently raised in second collision

³⁵ 20 Cal. 3d 413 573 P.2d 443, 143 Cal. Rptr. 225 (1978).

³⁶ Cousins, *supra* note 16.

³⁷ 565 F.2d 104 (7th Cir. 1977).

³⁸ *Id.* at 110.

³⁹ 454 F.2d 1270 (8th Cir. 1972).

⁴⁰ *Id.* at 1275.

⁴¹ 489 F.2d 1066 (4th Cir. 1974).

crashworthiness cases.⁴² A defendant manufacturer quite often attempts to escape liability by claiming that the defect was not the cause in fact of the accident, and that, therefore, he should not be held liable. This argument has been rejected time and again, as in *Larsen*, for the policy reason that totally absolving the manufacturer from liability would produce unjust results. Instead, the courts direct their attention to the reasonable risk of injury and whether the defect in the product caused the injury. Even where the accident was caused by the negligence of the driver, the manufacturer may still be held liable for the design defects which caused the enhanced injuries.⁴³

This brings one to the logical point of asking, "for what portion of the damages is the manufacturer liable?" *Larsen* treated this issue directly by stating that:

[A]ny design defect not causing the accident would not subject the manufacturer to the liability for the entire damage, but the manufacturer should be liable for that portion of the damage or injury caused by the defective design over and above the damage or injury that probably would have occurred as a result of the impact or collision absent defective design.⁴⁴

*Huddell v. Levine*⁴⁵ also spoke to this issue stating that "[I]f the theoretical underpinnings for liability in this case are to be given effect, [the negligent driver causing the accident] may be held liable for all injuries, but [the manufacturer] may only be held liable for 'enhanced injuries.'"⁴⁶

III. THE CONCEPT OF CRASHWORTHINESS IN THE FIELD OF AVIATION LITIGATION

While the doctrine of crashworthiness has been well accepted in automobile accident litigation in the past ten years, it is only now beginning to be utilized successfully in the area of aviation litigation. Report on the actual use of such doctrine in the field of aviation is hindered by several factors. It is not known in how many aviation cases the crashworthiness doctrine has been made a part of the allegations. Many of these cases are settled, as are many of all cases before they get to trial. There is also the problem that trial court decisions are not as readily available as are most Court of Appeal and Supreme Court decisions. And since few aircraft crashworthiness issues have been appealed to date, there are few written opinions in existence. These factors and others create problems in reporting on the use of such doctrine in aviation at this time. But nonetheless some information can be found.

⁴² Foland, *supra* note 10, at 612.

⁴³ Polk v. Ford Motor Co., 529 F.2d 259 (8th Cir. 1976).

⁴⁴ 391 F.2d at 503.

⁴⁵ 537 F.2d 726 (3rd Cir. 1976).

⁴⁶ *Id.* at 738.

In 1974 a United States District Court in Mississippi reluctantly refused to apply the doctrine of crashworthiness to a case involving an aircraft alleged to be negligently designed and defectively constructed.⁴⁷ In *Williams v. Cessna Aircraft Co.*, the engine of a Cessna 188 burst into flames, and the plane crashed. On impact, the pilot's seat collapsed and the restraining safety harness separated allowing the pilot to be thrown violently into the instrument panel and killed. Plaintiffs did not allege that the decedent would have survived the crash except for this failure. Rather, they alleged that this contributed to his death. The District Court, recognizing that Mississippi had followed the logic of *Evans* in the cases of *Walton v. Chrysler Motor Corp.*,⁴⁸ *Ford Motor Co. v. Simpson*⁴⁹ and *General Motors Corporation v. Howard*,⁵⁰ rejected the validity of the concept of crashworthiness and "second collision" in the state of Mississippi. The court stated that, "Sitting as a Mississippi trial forum, our task, however, is not to criticize or ignore precedent, but to follow it where the facts warrant."⁵¹ In Mississippi, the doctrine of crashworthiness is recognized for no vehicle. Mississippi is one of a small minority of jurisdictions which have changed the stance on crashworthiness. Possibly, if the concept were applied in the near future to an automobile, its application to aircraft would follow.

In *Bruce v. Martin Marietta Corp.*⁵² the Tenth Circuit approached acceptance of the concept of crashworthiness. This case involved a plane which had been manufactured and sold to Eastern Airlines in 1952. Having changed ownership several times, it was owned by Ozark Airlines at the time of the accident. On October 2, 1970, the plane had been chartered to carry the Wichita State University football team and a group of their supporters to a football game in Logan, Utah. The plane crashed into a mountain west of Silver Plume, Colorado. The plane first struck several trees and then traveled 425 feet before coming to a complete halt. During this accident, the seats in the passenger cabin broke loose from the floor and were thrown forward against the plane's bulkhead, blocking the exit. Fire then erupted. Thirty-two of the forty passengers on board died as a result of the fire. Plaintiffs brought actions against several defendants including Martin-Marietta, the manufacturer. Plaintiffs claimed that defendants failed to design, manufacture and/or maintain the plane in a sufficiently crashworthy fashion. In particular, plaintiffs claimed that the seats and seat fastenings were not manufactured to withstand a crash, and that the aircraft was not designed to minimize the possibility of post-crash fire. Defendants offered evidence that when manufactured,

⁴⁷ *Williams v. Cessna Aircraft Co.*, 376 F. Supp. 603 (N.D. Miss. 1964).

⁴⁸ 229 So. 2d 568 (Miss. 1969).

⁴⁹ 233 So. 2d 797 (Miss. 1970).

⁵⁰ 244 So. 2d 726 (Miss. 1971).

⁵¹ 376 F. Supp. at 607.

⁵² 544 F.2d 442 (10th Cir. 1976).

the plane's design was within the state of the art. Plaintiffs claimed that state of the art is not material when a claim is based on strict liability. They claimed that showing a design defect in 1970 (barring any subsequent alterations to the plane) established that the plane was defective in 1952. The court recognized the fact that there was authority in some jurisdictions for the proposition that state of the art is not relevant in cases involving strict liability.⁵³ However, this court chose to reject that approach. Instead the court said that to establish strict liability under section 402-A of the Restatement of Torts (Second), the plaintiff must show that the product was dangerous beyond the expectation of the ordinary consumer. The court claimed that the state of the art at the time of manufacture aids in determining the expectation of the ordinary consumer. The court then went on to say, "Plaintiffs have not shown that the ordinary consumer would expect a plane made in 1952 to have the safety features of one in 1970."⁵⁴

In analyzing the *Bruce* decision and in particular this last statement, one obtains the distinct impression that the court would have accepted the doctrine of crashworthiness in the field of aviation but felt that the evidence in this particular case was insufficient to prove plaintiff's case. Possibly if the plaintiffs had proven that the ordinary consumer had expected greater safety features of the plane manufactured in 1952, the result would have been different. Even though the plaintiffs lost this particular case, it is a stepping stone toward the acceptance of the doctrine of crashworthiness in the field of aviation litigation.

The year of 1977 saw more aviation cases involving the issue of crashworthiness. In *Cousins v. Instrument Flyers, Inc.*,⁵⁵ plaintiff was injured when the rented plane which he was piloting ran out of fuel and crash landed in a field. Plaintiff relied on the second impact theory claiming that the aircraft was defective because it lacked a shoulder harness and other crashworthiness features, such as recession of instrument panel knobs, breakaway instrument panel, and energy absorption device at the front end of the plane, and proper seat attachment. The court stated that his reliance on New York's second impact theory was of no avail because plaintiff was contributorily negligent, thus barring recovery. It is unfortunate for the plaintiff that the court chose to apply New York law. There had been a question as to which jurisdiction's laws to apply. Many jurisdictions find that contributory negligence is no defense in strict liability cases. Since plaintiff's action was barred due to contributory negligence, the court never reached a decision on the crashworthiness issue. The court may have found for the plaintiff if not for contributory negligence since New York does recognize the "second impact" theory.

⁵³ *Id.* at 447.

⁵⁴ *Id.*

⁵⁵ 58 App. Div. 2d 336, 396 N.Y.S.2d 655 (1977).

In *Wilson v. Piper Aircraft Corp.*⁵⁶ four people were involved in the crash of a Piper Cherokee. Three of the four died. Plaintiffs, representatives of the decedents, claimed, among other allegations, that the aircraft was not equipped with crashworthy shoulder harnesses or with crashworthy seat belt brackets and attachments. The court looked to the insufficiency of the evidence in rejecting the crashworthiness issue. So here again, but for the insufficiency of the evidence, the aircraft crashworthiness issue might have been resolved favorably for the plaintiff.

Not all aviation cases involving crashworthiness have disfavored the plaintiff. During the past few years there have been some astounding successes. The very first success known to this author occurred in 1972 in *Smith v. Cessna Aircraft Co.*⁵⁷ In this case James Smith, David French and their two sons were on board a Cessna 210 single-engine aircraft which was attempting takeoff from a private airstrip in Dallas County, Texas. Approximately one-half of the distance down the runway a door that had been tightly secured popped open. The pilot aborted takeoff, cut the throttle and applied the brakes. The plane failed to come to a complete halt by the end of the runway and rolled down a slight slope, hitting a barbed wire fence. The plane had never left the ground. At this point there was only slight damages to the plane and no injury to the passengers. Shortly thereafter fire erupted in the cabin area, burning the fathers. Both men were forced to evacuate the plane before their sons could be freed. Attempts to re-enter the plane failed and both sons burned to death. James Smith lived for a period of five days and then succumbed to his burns. David French, the lone survivor, was left with serious and permanent injuries.

At the trial plaintiffs, David French and Joyce Smith (wife and representative of James Smith's estate), brought actions in negligence, warranty, and strict liability. Many of these allegations involved uncrashworthy features.⁵⁸

⁵⁶ 282 Or. 61, 577 P.2d 1322 (1977).

⁵⁷ No. 70-9255-L (193d Jud. Dist. Ct. Dallas County, Tex. Oct. 1972).

⁵⁸ In particular, plaintiffs claimed that:

- a). CESSNA AIRCRAFT COMPANY failed to use fuel line fittings and connections between the tanks and fuel lines which would not spill fuel in the event of an impact such as occurred herein.
- b). The Defendant CESSNA routed fuel lines within and adjacent to primary impact and anticipated displacement areas of the aircraft in such a way that the fuel lines were in danger of being severed or ruptured in the event of an impact such as occurred herein.
- c). The Defendant CESSNA employed the use of rigid rather than flexible fuel line throughout the aircraft.
- d). The Defendant employed the use of rigid fuel line connections to various components along the fuel line system and specifically the reservoir tanks.
- e). The Defendant CESSNA failed to provide fuel lines with sufficient slack or curl in the area of the wing to fuselage root connections such that the lines could accommodate a displacement of the wings such as occurred herein.

In 1973 a California superior court rendered a judgment for the sum of \$432,000 in an aviation crashworthiness issue. In this case, *Fuller v. Capitol Sky Park*,⁵⁹ a crop duster negligently flew his plane into the ground while dusting crops. His seat belt failed, and he was thrust out of the plane resulting in permanent paraplegia. The defective seat belt was not the cause in fact of the accident but was the proximate cause of his injuries. The court thus found the manufacturer liable.

One of the most important cases in recent years involving the utilization of the doctrine of crashworthiness in aviation is *Eichstedt v. Cessna Aircraft Co.*⁶⁰ Significantly, the plaintiff succeeded on an initial claim that the design of the aircraft was uncrashworthy. In this case, decedent was a passenger in a six passenger Cessna airplane which crashed near Galena Creek Canyon, Nevada, during an aerial survey of proposed power line routes between Reno and Lake Tahoe. During this survey the plane unexpectedly lost power and crashed on the north wall of the canyon. Mr. Eichstedt survived the initial impact and climbed from the plane under his own power. He later succumbed to internal injuries received from the crash. Plaintiffs alleged improper installation of the seat belts used by decedent, absence of shoulder harnesses, and the seat upon which decedent was sitting left its track upon impact. All three alleged defects presented crashworthiness issues and were pursued under theories of negligence, warranty, and strict liability. The jury responded to plaintiff's claims by finding the manufacturer liable and awarding plaintiffs the sum of \$900,000. The case seems to be at this point a milestone in aviation crashworthiness litigation.

July of 1978 produced a favorable result for the plaintiff in *McGee v. Cessna Aircraft Co.*⁶¹ Helen McGee sought damages from Cessna for injuries sustained in the crash of a 1968 Model 177 Cardinal Cessna. Plaintiff charged negligence in the design of the aircraft and design defects in the fuel system which made the plane inherently unsafe. Expert testimony showed that there was an accumulator fuel tank located on the passenger side of the firewall separating the passengers from the engine. It rested at the feet of pilot and co-pilot and was part of the floor of the cockpit. The Cessna aircraft also had a nonretractable nosewheel attached to the aircraft by a metal strut. This strut was connected relatively close

f). The Defendant CESSNA routed fuel lines in the vicinity of ignition sources when it was not necessary to do so.

g). The Defendant CESSNA failed to minimize hazards of a crash such as occurred herein by centralizing and protecting fuel lines but instead the Defendant spread the fuel system in such a way that it existed over, above and on all sides of the occupants of the aircraft and literally surrounded them with a potentially dangerous hazard.

⁵⁹ No. 20364 (Super. Ct., Sacramento Div. Feb. 1973).

⁶⁰ No. 282 029 (Washoe Cy. Dist. Ct. Nev. Aug. 1977).

⁶¹ 82 Cal. App. 3d 1005, 147 Cal. Rptr. 694 (1978).

to the accumulator tank. In the actual accident in which the plaintiff was involved, the strut ruptured the accumulator tank and fire erupted. Of the four occupants of the plane, only the front two were rendered unconscious. The rear seat passengers evacuated the plane and proceeded to pull the other two occupants out. Helen McGee was removed last. She suffered extensive third degree burns over both of her legs which eventually led to the amputation of both legs. The trial court entered judgment on a verdict in favor of the manufacturer. Plaintiff appealed. On appeal, Cessna contended that the crashworthiness concept should not be applied to aviation cases and that aircraft safety design requirements are matters to be left to legislative determination. The court of appeals rejected this contention and held that the plaintiff was entitled to have the manufacturer's responsibility for the airplane's crashworthiness evaluated under the principle of liability in tort. However, on remand, the court entered judgment for defendant Cessna.⁶²

IV. STANDARDS FOR DESIGN OF CRASHWORTHY AIRCRAFT

There are several sources of standards for crashworthy design in the field of aviation. One such source is the Federal Aviation Administration. The Federal Aviation Administration has been granted the power by Congress to set up minimum standards governing design of civil aircraft.⁶³ However, the standards relating to crashworthy design have fallen far short of adequacy. For example, section 23.561(b) of Volume 14 of the Code of Federal Regulations⁶⁴ states that "the structure must be designed to give each occupant every reasonable chance of escaping serious injury in a minor crash landing." This standard is so extremely vague that it leaves the manufacturer with little guidance for sufficient crashworthy design. As for seat belt specifications, section 23.1413 of Volume 14 of the Code of Federal Regulations⁶⁵ states that the strength of seat belts and harnesses may not be less than the ultimate load specified in section 23.561. Section 23.561 sets the forward inertia force to which a belt or harness should be able to withstand at nine g's of pressure. It has been shown in research tests that the average human can tolerate forty g's of forward deceleration.⁶⁶ The government standard is obviously insufficient.

Another source of design standards for crashworthiness is the Society of Automotive Engineers, Inc. which publishes recommended standards for aircraft design.⁶⁷ These standards do cover some of the features which are considered crashworthiness features. These are merely recommendations

⁶² Cal. Super. Ct. for County of San Diego, April 4, 1980.

⁶³ 49 U.S.C. § 1421 (1970).

⁶⁴ 14 C.F.R. § 23.561 (1969).

⁶⁵ 14 C.F.R. § 23.1413 (1978).

⁶⁶ R. SNYDER, *BIOENGINEERING OF IMPACT SURVIVAL IN BUSINESS AIRCRAFT*, 1289 (Society of Automotive Engineers, Inc. Technical Paper Series No. 690335 (1972)).

⁶⁷ Society of Automotive Engineers, Inc. *Aerospace Recommended Practices*.

and not mandatory requirements. The United States Army has published an intricate crash survival design guide to aid engineers in designing military aircraft.⁶⁸ This information could very well be utilized in designing sufficiently crashworthy aircraft. But here again, use of this information is not mandatory.

A final source of standards for crashworthy design features is those standards of quality which each individual manufacturer may place upon itself. The manufacturer desires to design aircraft which will be relatively safe. However, the manufacturer has other interests to consider as well. The manufacturer wishes to design an aircraft which will be quick, attractive, and energy efficient. He must also keep costs down for both the consumer and himself. These factors many times conflict with the need for crashworthy design. Therefore, the forces of the free market are insufficient to set crashworthy design standards. Some may argue that if the consumer does not demand an aircraft with such design features, then such should not be forced upon him. But where does this leave the innocent bystander who is merely an occupant on such aircraft?

V. CONCLUSION

The doctrine of crashworthiness will in all probability become very much an accepted concept in the field of aviation litigation. The doctrine has been so well accepted in land travel that it seems doubtful that it will be rejected in air travel. Because of the similarities between the two modes of transportation and the ability to design both automobiles and planes with significant crashworthy features, it is unlikely that the courts will distinguish between the two.

The probability of the doctrine's acceptance in aviation litigation is enhanced by the social need for its acceptance. The possibility of liability on the part of the manufacturer may aid in causing the manufacturer to strive for much needed crashworthy design features. At present there is little stimulus to provoke such new design other than the forces of the free market.

In cases such as *Smith v. Cessna*, *Eichstedt v. Cessna*, and *McGee v. Cessna* we have witnessed the birth of the doctrine in the field of aviation. We have seen the same principles which have proven so successful in automobile accident litigation applied for the first time to airplane crashes. As the doctrine is utilized more in the field of aviation, the safety conscious consumer can only hope that the doctrine will lead to the ultimate goal, the design and manufacture of a sufficiently crashworthy aircraft.

ROBERT KENT

⁶⁸ CRASH SURVIVAL DESIGN GUIDE, (USAAMRDL Technical Report 71-22, U.S. ARMY 1971).