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I. INTRODUCTION

Recent years have witnessed the steady decline of doctrinal obstacles to the liability of manufacturers for harm caused by defective products.[1] The resulting expansion of enabling principles in the area of products liability extends to the theory of negligent design,[2] which in turn embraces the potential liability of the automobile manufacturer for the unsafe design of his product.[3] Indeed, the major barrier to recovery under this theory lies not in finding law to support the doctrine, but rather in ferreting out the existing evidence in order to make use of the law.

Despite the growth of common law principles facilitating recovery from manufacturers on theories of negligence, breach of warranty, and strict tort liability, and despite the great frequency of vehicular accidents and casualties, there has not been an accompanying development of case law in the automobile design area.[4] The fundamental reason is that trial attorneys have assumed far too long that the blanket responsibility for both accident and injury

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[1] The three landmark decisions are MacPherson v. Buick Motor Co., 217 N.Y. 382, 111 N.E. 1050 (1916) (negligence); Henningsen v. Bloomfield Motors, Inc., 32 N.J. 358, 161 A. 2d 69 (1960) (implied warranty); Greenman v. Yuba Power Prods., Inc., 59 Cal. 2d 67, 377 P. 2d 897 (1963) (strict liability in tort).

[2] See Noel, *Manufacturer's Negligence of Design or Directions for Use of a Product,* 71 YALE L.J. 816 (1962).

[3] See Katz, *Liability of Automobile Manufacturers for Unsafe Design of Passenger Cars,* 69 HARV. L.REV. 836 (1956).

[4] Cases holding the manufacturer liable for unsafe vehicle design include Carpini v. Pittsburgh & Weirton Bus. Co., 216 F. 2d 404 (3d Cir. 1954) (negligent design of braking system); Goullon v. Ford Motor Co., 44 F. 2d 310 (6th Cir. 1930) negligent design of tractor steering wheel); Hyatt v. Hyster, 106 F. Supp. 676 (S.D.N.Y. 1952) (negligent design of fork lift truck); Railway Express Agency v. Spain, 249 S.W. 2d 644 (Tex. Civ. App. 1952) (negligent design of truck door); Zahn v. Ford Motor Co., 164 F. Supp. 936 (D. Minn. 1958) (negligent design and/or construction of ashtray). See also Blitzstein v. Ford Motor Co., 288 F. 2d 738 (5th Cir. 1961) which found the distributor liable for failing to inspect an imported vehicle and warn of design defect leading to dangerous concentration of gasoline vapor.

belongs to the driver.[5] They have neglected the role of the automobile not only as a culpable factor in the accident (the "first collision"), but also as a direct contributor to the injury (the "second collision"). While the automobile may not be a primary factor in all first collisions — the impacting of the car — it is definitely a primary factor in nearly all of the second collisions — when occupants are thrown against the interior of the vehicle.

The basic reason for this failure of trial attorneys to consider vehicle design, even when their client has no other prospect for recovery, can be traced to the fact that automobile products liability cases involve investigation on two levels distinct in space and time. First there must be an investigation of the situs of the accident and second, a gathering of external evidence to show the creation of an unreasonable risk by the manufacturer through faulty product design. The latter investigation is seldom effectively undertaken by plaintiff's counsel. Most counsel are simply unfamiliar with the sources of engineering information and the techniques of deposing defendant-manufacturer's employees.[6] Alertness to this second level of inquiry leads counsel to a more critical scrutiny and handling of the first level at the accident scene. It is of the utmost importance, for example, to maintain custody of the damaged vehicle for identification of the injurious design and the pattern of injury to the client. Far too often, the vehicle is towed away to the junk yard or to the repair shop for resale on the used car market.

In the past two years, there have been solid indications of a growing recognition of human engineering data and concepts and their use in the courtroom. A leading authority, Professor Ross A. McFarland,[7] characterizes the role of human engineering in highway safety in these terms:

Many characteristics of the driver are relevant to highway safety,

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[5] An outstanding and burgeoning exception has been the recent Corvair litigation. See Ridgeway, *Car Design and Public Safety,* THE NEW REPUBLIC 9 (Sept. 19, 1964). Over one hundred suits involving Corvairs have been brought throughtout the nation, and more than thirty of these cases are presently pending in the Los Angeles, California, Superior Court. Nearly all of these cases allege that the Corvair (1960 to 1964 models) is designed as an inherently unstable vehicle with hazardous handling characteristics under conditions of anticipated use. General Motors denies all allegations of negligence, but it did settle the first Corvair case after three days of trial in June 1964 for $70,000. Pierini v. General Motors Corp., and Washburn Chevrolet (Superior Court, Santa Barbara, Calif.). See also, Sekelik v. Ford Motor Co., Civil No. 61-464, W.D. Pa. April 1963 (Jury verdict of $25,000 for plaintiff who claimed negligence in the laminating process leading to breakage of the Fo-Mo-Co glass in left front door of 1959 Ford). See, Nader, *Patent Laws Prime Source to Secure Safer Auto Design,* 1 TRIAL 26 (Dec. 1964). *But see* note 24 *infra.*

[6] Nader, *Lawyers Asked to Research Auto Design,* NACCA PI&E BULL 13 (April 1963).

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> but it must be remembered that the vehicle and certain aspects of the environment are generally more amenable to control than driver characteristics and in some cases show more promise of immediate and specific gains in accident reduction. It is in the control of the vehicle and the driving environment that the human engineer can make his unique and most important contribution to highway safety.[8]

The rapidly developing field of human engineering (or optimum man-machine interaction), sparked by military and space research and development, is of signal importance to counsel in automobile products liability cases. Particularly since World War II's termination and the onset of federal grants for such research, non-industry scientists, engineers, and physicians have published materials dealing candidly with the measures for adapting the vehicle to the needs of the driving task and the protection of the occupants during a collision.[9] Their findings have opened new aspects of the manufacturer's duty of care to those affected by his products. They also illuminate the necessity for more thorough accident investigation[10] — an important part of which is simply the

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[8] McFarland, *The Role of Human Engineering in Highway Safety,* in HUMAN FACTORS IN TECHNOLOGY 213 (Bennett, Degan & Spiegel eds. 1963). Other authorities lend support to this view, *e.g.: Research,* Report of the President's Committee for Traffic Safety, 1961, where it is said at p. 19 that a fundamental principle of safety engineering is to "anticipate every type of accident which may occur because of machine or human failure and then establish safeguards to eliminate the hazard or minimize the injury when failure occurs."

A leading General motors safety engineer had this to say:

> One of the fundamental principles of safety engineering is to anticipate every possible type of accident which may occur because of mechanical failure or human failure and then to establish safeguards to minimize the hazard or injury which may result when such a failure occurs.... Our predecessors had pioneered in safety engineering by taking fundamental steps to avoid accidents, but they did not apply the second concept of the industrial safety engineer, to provide all safeguards in the event that an accident occurred because of human fallibility.

Kenneth A. Stonex, in TRAFFIC SAFETY RESEARCH REVIEW at p. 18 (National Safety Council, 1961). This rare expression by an automobile industry spokesman is strongly directed to improving the safety of occupants in the "second collision."

[9] See bibliographies in McFarland, *id.* at 81-85, 228-29, 245-46, 266-67, 282-83. Two recent and specifically informative papers are: Huelke & Gikas, *How Do They Die? Medical-Engineering Data From On-Scene Investigations of Fatal Automobile Accidents,* Society of Automotive Engineers paper 1003A, Jan. 1965; and Patrick, *Human Tolerance to Impact — Basis for Safety Design,* Society of Automotive Engineers Paper 1003B, Jan. 1965. A compilation in abstract form of the Cornell research, "Abstracts of ACIR Studies 1954 to January 1964," is obtainable from Cornell Aeronautical Laboratory, P.O. Box 235, Buffalo, New York. A detailed source book for information on automobile safety is Robb & Philo, LAWYERS DESK REFERENCE 1965, INFORMATION: WHAT TO FIND, WHERE TO FIND IT 1965 (Rochester, N.Y.: Lawyers Coop. Pub. Co., 1965).

[10] A highly useful and detailed manual for accident investigation and analysis is Baker, TRAFFIC ACCIDENT INVESTIGATOR'S MANUAL FOR POLICE (The Traffic Institute, Northwestern University, Evanston, Ill. 1963).

attribution of new significance to hitherto neglected or subordinated facts.[11]

As Professor McFarland notes:

> [A]ccident reports generally have failed to identify difficulties in man-machine integration as accident causes. Design failures may be so subtle that those responsible for reporting accidents may not be aware of them, particularly if the personnel are not trained in human engineering. However, if defects are present, it is only a matter of time before some driver "fails" and has an accident.[12]

The basic obstacle to increased effective use of the concepts of human engineering in the courtroom is the problem of perfecting the structure and flow of information to counsel, much as was done in the post-war period for forensic medicine.[13]

II. The Muncy and Mickle Cases

Two recent cases handled by small law firms in relatively rural areas of the country reveal that the problems of access to these evidential requisites are by no means insurmountable.

In *Muncy v. General Motors Corp.*,[14] the plaintiff-pedestrian was struck by a runaway automobile while she was standing on a sidewalk. The vehicle had lurched over the curb when a disembarking passenger inadvertently struck the accelerator pedal with her foot. The driver, prior to alighting, had removed the key from the ignition thinking that by doing so she had shut off the car's motor. In the first trial on the merits, plaintiff's emphasis rested on a stuck

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[11] *Ibid.* Consider the following failure to use human engineering, particularly where there is no clear instruction or warning to the driver:

> Owners of many new automobiles were cautioned that under certain circumstances the "parking brake" on their car might appear firmly set, but still allow it to roll backwards freely. The Association of Casualty and Surety Companies advises that this can be especially dangerous if a driver parks his car in the family driveway, many of which slope. The insurance organization said this condition arises because of recent changes in the design of the parking or emergency brake system of nearly all passenger cars and many light trucks. If the parking brake is set without the simultaneous application of the hydraulic service (foot) brakes, the bottom of the brake shoes are brought into contact with the drums on the rear wheels, but the shoes are not fully engaged. With the parking brake in this condition, the Association says, the car cannot roll forward, but it can move freely to the rear. If, on the other hand, the motorist is pressing his foot on the hydraulic brake while he is setting the parking brake, the shoe and drum engage completely and the car will move. As a safety precaution, the Association urges motorists to get into the habit of applying the foot brake while they set the parking brake.

Safety Newsletter, Automotive and Machine Shop Section (Oak Ridge National Laboratory, Oak Ridge, Tenn., Oct. 1963). This is a condition where, given a backsliding vehicle and injury, driver "carelessness" can more fundamentally be analyzed as a product of engineering carelessness.

[12] McFarland, *supra* note 8, at 215.

[13] See 2 Belli, Modern Trials §§ 268-279 (1954).

[14] Civil No. 906, E.D. Tex., Marshall Div., April 10, 1964. (An appeal is pending in the United States Court of Appeals for the Fifth Circuit.)

accelerator claim. It was alleged that this condition was attributable to General Motors' workmanship. A hung jury led to re-trial of the case in April, 1964, when the emphasis was shifted to the defective design of the ignition switch. The complaint against General Motors alleged improper design of the ignition switch in that it permitted the withdrawal of the ignition key while the motor of the automobile was running and the vehicle was in gear. This time the jury returned a verdict against the defendant, General Motors.

Muncy is a graphic example of the use of previously neglected sources of evidence to establish a case of liability based on the manufacturers' neglect to consider human engineering in the design of his products. Plaintiff's counsel proceeded on a fundamental premise of human engineering — namely that the design of automotive equipment should strive for maximum compatibility with human motor and perceptual capabilities.[15]

Examination of expert witnesses for General Motors produced admissions that "human factor" (or human engineering) designing was recognized and that when the automatic transmission was first installed with this ignition switch design, the precaution was taken of arranging the gear lever so that the motor could not be started with the automatic transmission in gear. This was followed by an admission from the designer of the switch that the danger of one inadvertently leaving the car in gear with the motor running when the ignition key was withdrawn was taken into account when the automatic transmission was put into use (soon after World War II), but was considered too remote to require a re-design of the switch.

The plaintiff's counsel made advantageous use of patents in the area of ignition switch design and instrument controls held by

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[15] The growing emphasis by accident researchers on the safety engineering responsibility of the highway system to drivers, whose misjudgment is so often a function of engineering defects in the vehicle-highway system, is reflected in the following remarks by the Federal Highway Administrator:

> Perhaps the time has come to examine some of our present safety programs and some of our present safety concepts. The truth, as I see it, may be painful.
>
> Accident records as they are now collected show driver failure as the principal cause of most traffic accidents. Yet we know that we can and do design freeways with fine safety records. Isn't this some evidence that often the driver is *not* really at fault in an accident? In many cases haven't we given the driver a task beyond the capacity of his senses, nerves, and muscles?
>
> We must face up squarely to this premise: the majority of drivers are performing as well as we can reasonably expect, under existing conditions. From that premise it is logical to reason that the conditions must be changed — we must improve the road, the vehicle, and the basic control measures of the system.

Address by Rex M. Whitton, National Safety Congress, Conrad Hilton Hotel, Chicago, Ill., Oct. 28, 1963.

General Motors and others in presenting his case. Employment of these patents represented an unprecedented pre-trial and trial technique in automobile products liability litigation. Not only were they highly informative as to the "state of the art" and various alternatives in ignition switch design, but they also facilitated locating the General Motors experts in this field for testimony at trial. Further, they provided a basis for conducting more thorough examinations of defendant's employees. Finally, the trial record shows that, over defense counsel's objections, a General Motors patent was offered into evidence to show the company's awareness of the need for anticipation of driver error or miscalculation in the design of controls. This was patent Number 2,929,261 (Charles Chayne, assignor to General Motors) which states that vehicle controls

> must not only be easily operated but also accessible to the operator with a minimum of inconvenience. Furthermore, safety is a concern since the control must be of the type that an operator would not inadvertently operate under normal conditions.

While in the *Muncy* case faulty engineering design was shown to be the cause of the accident which then led to the injury (the first collision), the case of *Mickle v. Blackmon, Cherokee Const. Co., and Ford Motor Co.*[16] was based on the premise that although the collision between the two cars involved was not the fault of engineering, the resulting injury (the product of the "second collision") was. Plaintiff, a 17-year-old girl, was riding in the front seat of a 1949 Ford. The car entered an intersection and collided with another vehicle at a speed estimated to have been between twenty and twenty-five miles per hour. Plaintiff was thrown against the gear shift lever by the force of the collision. The lever entered her back just under the left shoulder blade and penetrated her spinal cord, rendering her a paraplegic. Suit was brought against the driver of the other vehicle and Ford Motor Co., for unsafe design and manufacture of the gear shift lever on which plaintiff was impaled.

Plaintiff sought to prove six points in support of her allegation against Ford that the design of the shift lever was unsafe:

(1) The lever protruded substantially beyond the rim of the steering wheel — needlessly increasing its potential to injure in the event of an accident. In support of this the actual steering column of the vehicle in question was introduced into evidence.

(2) The knob which the defendant installed on the exposed

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[16] Circuit Ct., 6th Judicial Cir., York County, S.C., March 1963.

[17] It was shown that the bottom half had three supporting braces to a core which held the ball upon the lever and that the top half was completely hollow. The halves were adhered together by glue.

end of the lever did not provide an adequate and safe protective guard. The knob — a thin, plastic, round ball made in two parts — was introduced into evidence.[17] Testimony was introduced showing that in the 1951 Ford, a knob was used that was twice as thick as the one used in the 1949 model and was made of material which did not crystallize into fault or craze lines as did the knob used in 1949.[18]

(3) The method used by Ford to fasten the knob to the gear shift lever actually facilitated the knob slipping down the lever when struck. This point was substantiated by the use of an engineering expert, the garageman who kept custody of the vehicle, and a large photograph.

(4) Ford Motor Co. did not employ a shoulder or collar in the design of its lever to prevent the knob from sliding down the rod when struck, leaving the end of the lever exposed and unshielded.

(5) Other automobile manufacturers, in designing their gear shift levers, did not allow the lever to project so far beyond the rim of the steering wheel; used threads or splines, in circular grooves, to secure the protective shield (knobs) on the gear shift lever; and provided a shoulder or collar to prevent the knob from sliding down the lever and exposing the end of it.

(6) Experts who testified at the trial were of the opinion that the design and construction of the gear shift lever and knob by Ford was unsafe.

The jury returned a verdict against Ford Motor Co. for injury cause. The driver of the vehicle was exonerated.

III. CONCLUSION

The *Mickle* case illustrates in detail both the conceptual and evidential impact of the accident-injury research findings made by researchers at various universities over the past fifteen years. Indeed, a chief expert witness for the plaintiff, John O. Moore, was formerly director of the Cornell project which for over a decade has collected and analyzed motor vehicle injury statistics from many states in order to determine the pattern of occupant-injury inside the vehicle. It has been the Cornell data[19] which has pinpointed the leading instrumentalities of injury in a vehicle. These were found

[18] Plaintiff referred to Boeing Airplane Co. v. Brown, 291 F. 2d 310 (9th Cir. 1961) as authority for making the comparison to the later knobs.

[19] Abstracts of ACIR Studies 1954 to January 1964. Leading causes of injury cited by Cornell are discussed in *Hearings Before the Special Subcommittee on Traffic Safety of the House Committee on Interstate and Foreign Commerce*, 84th Cong., 2d Sess. at 923 (1956).

to be: the steering assembly, the door latch (failure), the instrument panel, the rearview mirror, the seat anchorage (failure), and the windshield.

The empirical distinction between accident cause and injury cause — accidents do not *per se* cause injuries — adds an entirely new dimension to the trial of automobile cases. It opens up a vast area for counsel to present in the courtroom the premises and evidence of human engineering research results. Products liability doctrine can be viewed as the normative side of human engineering principles. When the human engineer shows, for example, how it is possible to build automobiles which are safer in case of accident, products liability doctrine then measures this feasibility against legal concepts of duty and standards of care. In addition, as more scientific engineering knowledge is made available, the normative concepts of products liability law are likely to develop with greater precision and comprehensiveness.[20] Such a maturing process, envisaged by the old adage of Roman law — *ex facto ius oritur* (out of the fact comes the law) — has been observable in the products liability cases of the past decade wherein courts have liberalized the scope of warranty and diminished the citadel of privity.

IV. EPILOGUE

It is significant that the vector of such an evolution points toward a fulfillment of a basic purpose of tort law — deterrence of the injurious activity. The deterrence function of tort liability is now rather soundly debunked by commentators who view it largely as a myth employed in law school courses to round out a pedagogical repertory. These writers may be approaching reality insofar as driver and pedestrian behavior are concerned,[21] but that is by no means the entire picture. A major factor in accidents between automobiles and between automobiles and pedestrians, is an engineering accomplishment — the motor vehicle. It appears that decisions adverse to particular engineering designs employed in manufacturing such vehicles would have a substantial deterrent effect on the manufacturers. Let the recent design of the vehicle fin structure illustrate the point. For a period of several years, beginning in 1957 for

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[20] See *e.g.*, *Safety — Like — For Humans, Man,* PRODUCT ENGINEERING, April 27, 1964, pp. 100-101; *Automobile — Tire Safety,* 111 CONG. REC. 5717 (daily ed. March 25, 1965) (Commentary on the unpublished Federal Trade Commission hearings on tires in January 1965); Campbell, *Twenty-Three Fatal Crashes With Seat Belts,* PROCEEDINGS, SEVENTH STAPP CAR CRASH CONFERENCE, (Springfield, Ill.: Charles Thomas, 1965); CONSUMER REPORTS, April 1965, pp. 168-82; *Hearings on Motor Vehicle Safety Before a Subcommittee on Health and Safety, of the House Committee on Interstate and Foreign Commerce,* 86th Cong. 1st Sess. (1959).

[21] See James & Dickinson, *Accident Proneness and Accident Law,* 63 HARV. L. REV. 769 (1950).

most models, automobiles were produced with fins of varying exaggeration with numerous models sporting severely tapered points upon which many pedestrians have been impaled. It is doubtful that public buildings could be built anywhere in this country with such spikes protruding toward passersby. Yet there is no legal bar against mobile, two-ton machines from being so equipped.[22] Were liability to be imposed upon manufacturers for the negligent design of these functionless structures and other projections such as hood ornaments, it is believed that a remedying change in design would have occurred much sooner.[23]

This likelihood stems from the desire of a profit-maximizing firm to avoid: (1) incurring non-budgeted costs applicable to past behavior, (2) receiving adverse publicity, and (3) alerting proponents of public regulation to an additional hazard. For the manufacturer, the mechanics of the deterrence are much simpler than for the driver. It is obviously much easier to control the design of a vehicle than it is to control the behavior of 92 million operators driving 800 billion miles a year.

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[22] Wakeland, *Systematic Automobile Design for Pedestrian Injury Prevention,* PROCEEDINGS, FIFTH STAPP AUTOMOTIVE CRASH AND FIELD DEMONSTRATION CONFERENCE, September 1961, pp. 193-218 (University of Minnesota, Center for Continuation Study, 1962).

[23] In the absence of any company statement, it may be speculated that the increasing litigation over the Corvair had a role in the decision by General Motors to redesign the independent rear suspension system in the 1965 models. For a description of the new design, see *'65 Corvairs,* SPORTS CAR GRAPHIC, October 1964, pp. 26-29. This speculation is enforced by the fact that the suspension design in the '65 Corvairs does not constitute an innovation but was known to the company for many years. See Patent #3,020,061 held by GM and references contained therein. See also, CORVAIR PERFORMANCE HANDBOOK (Petersen Publishing Co., Los Angeles, 1963).

[24] See note 5 *supra.* In the first trial involving the Corvair design, the jury returned a verdict in favor of General Motors. The plaintiff had alleged that a fatal highway accident had been caused by defective design of the Corvair's rear-swing axle. Collins v. General Motors Corp. (Santa Clara County, Calif., Superior Court, Aug. 11, 1965) in The Denver Post, Aug. 11, 1965, p. 37, col. 5.