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Proof of a Defect or Defectiveness

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PROOF OF A DEFECT OR DEFECTIVENESS

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The authors discuss the practical and legal problems involved in proving a defect in a product liability case. The essential differences between design defects and construction defects are characterized in terms of the requisites of proof of each. Primary emphasis is placed upon the effective and efficient discovery and utilization of evidence concerning design and construction standards and the extent to which these standards were considered and implemented in the design or construction process.

The central issue in any product liability case is whether the product contained a defect that proximately caused injuries or damages.[1] It is the alleged failure of the product to properly function in the manner intended that gives rise to the possible liability of the manufacturer or supplier. This article will discuss the proof necessary to establish that a product is defective and various related problems.

Product liability cases are based upon theories of negligence, breach of warranty and strict liability, or a combination of those theories.[2] While each theory is distinct, a brief examination of each will show that they all require proof that the product was defective when it left the hands of the manufacturer, and that the defective condition was the proximate cause of the injuries or damages of which the plaintiff complains.[3]

Under "negligence" principles, a manufacturer or supplier of any product is charged with a duty to exercise due care and caution in

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1. *See* W. Prosser, HANDBOOK ON THE LAW OF TORTS § 103 at 671-72 (4th ed. 1971).
2. For a discussion of the theories upon which product liability actions may be based, see R. HURSH & H. BAILEY, AMERICAN LAW OF PRODUCTS LIABILITY § 1.3 (2d ed. 1974).

   While many courts have adopted theories of strict liability (*See* Prosser, *The Fall of the Citadel (Strict Liability to the Consumer)*, 50 MINN. L. REV. 791, 794-97 (1966), and Annot., 54 A.L.R.3d 352 (1973)), the Court of Appeals of Maryland, as recently as March, 1975, has declined to espouse the doctrine. Frericks v. General Motors Corp., 274 Md. 288, 298-99, 336 A.2d 118, 124 (1975). *See* Moran v. Faberge, Inc., 273 Md. 538, 332 A.2d 11 (1975); Volkswagen of America, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974); Bona v. Graefe, 264 Md. 69, 285 A.2d 607 (1972); Myers v. Montgomery Ward & Co., 253 Md. 282, 252 A.2d 855 (1969); Telak v. Maszczenski, 248 Md. 476, 237 A.2d 434 (1968).
3. Finnie v. Ford Motor Co., 331 F. Supp. 321 (W.D. Pa. 1971); Brown v. Ford Motor Co., 287 F. Supp. 906 (D.S.C. 1968); Hacker v. Shofer, 251 Md. 672, 248 A.2d 351 (1968); Montgomery Ward & Co. v. McFarland, 21 Md. App. 501, 319 A.2d 824 (1974).

providing a product which is reasonably fit and proper for the purposes for which it is intended.[4] While various elements of proof are necessary to establish that the manufacturer was guilty of actionable negligence in the production of the allegedly defective item,[5] a showing that the product contained an unreasonable defect constitutes proof that it was not fit for its intended purpose.[6]

Under the Uniform Commercial Code, both the manufacturer and supplier warrant that the product is merchantable.[7] To be merchantable it must, *inter alia*, be fit for the ordinary purposes for which it is to be used and properly packaged and labelled.[8] While an action based on an alleged breach of warranty is in theory one that the manufacturer or supplier violated the terms of the sale, the essential issue again is

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4. Dean v. General Motors Corp., 301 F. Supp. 187, 192 (E.D. La. 1969); Volkswagen of America, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974); Woolley v. Uebelhor, 239 Md. 318, 211 A.2d 302 (1965); Babylon v. Scruton, 215 Md. 299, 138 A.2d 375 (1958); Maxted v. Pacific Car & Foundry Co., 527 P.2d 832 (Wyo. 1974).
5. Establishment of a "defect" in a negligence case is only one of many requisites of proof. Others include:

   (a) Proof that the manufacturer or supplier knew or should have known of the defect or dangerous nature of the product. Woolley v. Uebelhor, 239 Md. 318, 211 A.2d 302 (1965).

   (b) Proof that the resulting injuries were foreseeable from the use of the product. Moran v. Faberge, Inc., 273 Md. 538, 322 A.2d 11 (1975).
6. *See, e.g.*, Babylon v. Scruton, 215 Md. 299, 138 A.2d 375 (1958).
7. Md. Ann. Code, Comm. L. Art., § 2-314 (1975), specifies that:

   (1) Unless excluded or modified (§ 2-316), a warranty that the goods shall be merchantable is implied in a contract for their sale if the seller is a merchant with respect to goods of that kind. Under this section the serving for value of food or drink to be consumed either on the premises or elsewhere is a sale. Notwithstanding any other provisions of this title

   (a) In §§ 2-314 through 2-318 of this title, "seller" includes the manufacturer, distributor, dealer, wholesaler or other middleman or the retailer; and

   (b) Any previous requirement of privity is abolished as between the buyer and the seller in any action brought by the buyer.

   (2) Goods to be merchantable must be at least such as

   (a) Pass without objection in the trade under the contract description; and

   (b) In the case of fungible goods, are of fair average quality within the description; and

   (c) Are fit for the ordinary purposes for which such goods are used; and

   (d) Run, within the variations permitted by the agreement, of even kind, quality and quantity within each unit and among all units involved; and

   (e) Are adequately contained, packaged and labeled as the agreement may require; and

   (f) Conform to the promises or affirmations of fact made on the container or label if any.

   (3) Unless excluded or modified (§ 2-316) other implied warranties may arise from course of dealing or usage of trade.

   It also should be noted that Section 2-318 extends the warranty of a seller to any natural consumer or user affected thereby.
8. *Id.* § 2-314 (2)(c), (e). *See* Standard Packaging Corp. v. Continental Distilling Corp., 259 F. Supp. 919, 921 (E.D. Pa. 1969), *aff'd*, 378 F.2d 505 (3d Cir. 1967); Sheeskin v. Giant Foods, Inc., 20 Md. App. 611, 629 n.6, 318 A.2d 874, 885 (1974), *aff'd sub nom.*, Giant Food, Inc. v. Washington Coca-Cola Bottling Co., 273 Md. 592, 333 A.2d 27 (1975).

whether the product is fit and proper for the purposes for which it is intended.[9]

Under theories of strict liability, liability is placed upon one who sells a product "in a defective condition, unreasonably dangerous to the user or consumer"[10] even though he may have exercised all possible care in the production of the product; or upon one who makes a public misrepresentation of a material fact relating to the character or quality of the product.[11] Proof that the product was in a defective condition establishes that it was unreasonably dangerous and therefore unfit for ordinary use.[12]

In breach of warranty cases,[13] misrepresentations can be equated with a "dangerous or defective condition"[14] on the theory that if the

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9. *See, e.g.*, Shumard v. General Motors Corp., 270 F. Supp. 311, 314 (S.D. Ohio 1967); Volkswagen of America, Inc. v. Young, 272 Md. 201, 216, 321 A.2d 737, 745 (1974); Myers v. Montgomery Ward & Co., Inc., 253 Md. 282, 295, 252 A.2d 855, 863 (1969).

   Under MD. ANN. CODE, Comm. L. Art., § 2-315, there is an implied warranty of fitness for a particular purpose for which an article is sold when the seller has reason to know of that purpose and that the buyer is relying upon his skill to furnish suitable goods for that purpose. In addition, Section 2-313 provides for the creation of express warranties. While there are variations in the nature of cases arising under Sections 2-315 and 2-313, the singular question as to the proof of defectiveness of the product remains the same.

10. RESTATEMENT (SECOND) OF TORTS § 402A(1) (1965).

11. The RESTATEMENT (SECOND) OF TORTS (1965), provides two basic theories of liability. Section 402A provides:

> (1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if
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> (a) the seller is engaged in the business of selling such a product, and
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> (b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold.
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> (2) The rule stated in Subsection (1) applies although
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> (a) the seller has exercised all possible care in the preparation and sale of his product, and
>
> (b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.

   Section 402B provides that:

> One engaged in the business of selling chattels who, by advertising, labels, or otherwise, makes to the public a misrepresentation of a material fact concerning the character or quality of a chattel sold by him is subject to liability for physical harm to a consumer of the chattel caused by justifiable reliance upon the misrepresentation, even though
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> (a) It is not made fraudulently or negligently, and
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> (b) the consumer has not bought the chattel from or entered into any contractual relation with the seller.

12. *See generally* 1 L. FRUMER & M. FRIEDMAN, PRODUCTS LIABILITY § 8.01 et seq., § 16B (1975).

13. Sylvestri v. Warner & Swasey Co., 398 F.2d 598 (2d Cir. 1968) (although the backhoe was found not defective, there were misrepresentations as to capacity and the type of work for which it was suitable); Hansen v. Firestone Tire & Rubber Co., 276 F.2d 254 (6th Cir. 1960) (involving representations as to the quality of tires and that they would remain airtight); Ford Motor Co. v. Taylor, 60 Tenn. App. 271, 446 S.W.2d 521 (1969) (tractor advertised as dependable broke down repeatedly and failed to provide normal amount of operation).

14. RESTATEMENT (SECOND) OF TORTS § 402A (1965).

product is dangerous in some foreseeable manner and a misrepresentation is made or the manufacturer fails to provide a warning of the danger, then the product is "defective."[15]

It is apparent therefore, that proof of the existence of a "defect" or "defective condition" is essential in all cases to establish that the product was not fit for the purposes intended.

The terms "defect" and "defective condition" are inappropriate and technically meaningless in many instances. Generally speaking, these terms are used loosely to refer to the fact that a product is unsafe or not fit for the purpose for which it is intended when put to proper use.[16] A given product may be unfit for its intended purposes for a number of reasons, including:

1. improper design,[17]
2. improper manufacture or assembly,[18]
3. the presence of chemical, casting, or metallurgical flaws,[19]
4. improper packaging,[20]
5. the lack of a warning or an inadequate or misleading warning when the nature of the product requires a warning.[21]

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15. *See* Moran v. Faberge, Inc., 273 Md. 538, 332 A.2d 11 (1975), involving a lack of warning of flammability on a bottle of cologne.
16. Santor v. A&M Karagheusian, Inc., 44 N.J. 52, 207 A.2d 305 (1965) (carpet). *See also* 2 L. FRUMER & M. FRIEDMAN, PRODUCTS LIABILITY § 16A[4][E] (1975).
17. Babylon v. Scruton, 215 Md. 299, 138 A.2d 375 (1958). However, where by its nature the product is openly and inherently dangerous, there is no liability. In Volkswagen of America, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974), the Maryland Court of Appeals stated:

> We have imposed liability upon manufacturers for injuries caused by unsafe *designs* of their products. *Babylon v. Scruton*, 215 Md. 299, 138 A.2d 375 (1958). *See also Restatement 2d, Torts*, § *398*. The recent cases in Maryland which have held manufacturers and suppliers not liable for allegedly unsafe designs of their products, have not been on the theory that a design defect does not give rise to a cause of action in negligence; instead, the denial of liability in each case was based on the fact that the danger in the design was patent or obvious to the user. *Id.* at 215, 321 A.2d at 744.
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> In essence, the court holds that where the danger is patent and natural to the product, the consumer should be aware of it and there is no need for the manufacturer to issue a special warning.

18. Nevels v. Ford Motor Co., 439 F.2d 251 (5th Cir. 1971) (retaining nut on steering wheel not tightened on assembly); Jarrell v. Ford Motor Co., 327 F.2d 233 (4th Cir. 1964) (compression washer left out).
19. Woolley v. Uebelhor, 239 Md. 318, 211 A.2d 302 (1965) (a metallurgical flaw found in the master cylinder); Zesch v. Abrasive Co., 353 Mo. 558, 183 S.W.2d 140 (1944) (casting or binding flaw in a cutting wheel).
20. Barbeau v. Roody Mfg. Co., 431 F.2d 989 (6th Cir. 1970) (exploding Coca-Cola bottle); Land O' Lakes Creameries, Inc. v. Hungerholt, 319 F.2d 352 (8th Cir. 1963) (defective fertilizer bag); Butler v. L. Sonneborn Sons, Inc., 296 F.2d 623 (2d Cir. 1961) (leaking drum of floor hardening material); Sheeskin v. Giant Food, Inc., 20 Md. App. 611, 318 A.2d 874 (1974), *aff'd sub nom.*, Giant Food, Inc. v. Coca-Cola Bottling Co., 273 Md. 592, 332 A.2d 27 (1975) (exploding Coca-Cola bottle); Maiorino v. Weco Prods. Co., 45 N.J. 570, 214 A.2d 18 (1965) (glass tooth brush container broke causing lacerations); Annot., 81 A.L.R.2d 229 (1962); Annot., 81 A.L.R.2d 350 (1962). *Cf.* Poplar v. Bourjois, Inc., 298 N.Y. 62, 80 N.E.2d 334 (1948) (ornament on cosmetic gift box causing injury).
21. Spruill v. Boyle-Midway, Inc., 308 F.2d 79 (4th Cir. 1962). A warning is required when the product has been found unfit for its intended use. *See* Moran v. Faberge, Inc., 273

These defects usually can be classified under two general categories: (1) those relating to the design or composition of the product; and (2) those relating to the mode of, or the acts or ommissions committed in, the manufacturing, construction, or assembly process, including any requisite packaging, bottling or labeling. There are of course, many cases in which claims of both improper design and manufacture are made. Since proof of a "defect" is ultimately a question of fact, the type of information and data to be developed will depend upon whether the product is claimed to be unfit in design, or because of improper construction, or both.

IMPROPRIETIES OF DESIGN

The terms "defect" and "defectiveness" are particularly inappropriate to cases involving claims that a product is dangerous or unfit by reason of its design. A design is the result of the designer's intentional selection and utilization of available criteria, and standards, his deliberate choices between conflicting considerations and his calculated decisions on the materials or chemicals to be used, the shape and relationships of component parts, and various other factors. If a product that conforms to the design is not fit and proper for the use intended, the design or formula is improper, but the product is not "defective."

The propriety of a design or formula is judged according to the "traditional rules of negligence"[22] in a product liability case, regardless of the theory of the cause of action asserted. Liability ultimately depends on whether the designer exercised due care and caution, commensurate with recognized standards, in compiling and adopting his design or formula.[23] Thus, before liability can be found, the standard of care for the designer must be defined.

It is generally recognized that the duty of the designer is only to design his product so that it will be fit for its intended purpose and the "foreseeable" uses to which it might be put.[24] He must exercise

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Md. 538, 332 A.2d 11 (1975); Twombley v. Fuller Brush Co., 221 Md. 476, 158 A.2d 110 (1960); Katz v. Arundel-Brooks Concrete Corp., 220 Md. 200, 151 A.2d 731 (1959); RESTATEMENT (SECOND) OF TORTS, § 388 (1965); Annot., 53 A.L.R.3d 239 (1973); Annot., 76 A.L.R.2d (1961).

22. Volkswagen of American, Inc., v. Young, 272 Md. 201, 216, 321 A.2d 737, 746 (1974). The court specifically states:

> This principle [strict liability] obviously changes the standard of care with regard to a *construction defect*. But as to a defect in *design*, it has no special meaning. Since the existence of a defective design depends upon the reasonableness of the manufacturer's action and depends upon the degree of care which he has exercised, it is wholly illogical to speak of a defective design even though the manufacturer has "exercised all possible care in the preparation of his product." *Id.* at 221, 321 A.2d at 747.

23. Dreisonstok v. Volkswagenwerk, A.G., 489 F.2d 1066 (4th Cir. 1974); Frericks v. General Motors Corp., 274 Md. 288, 366 A.2d 118 (1975).
24. Dreisonstok v. Volkswagenwerk, A.G., 489 F.2d 1066 (4th Cir. 1974); Volkswagen of America, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974).

reasonable care in formulating his ideas, applying all available criteria, and balancing various factors in producing a design or process. He is not, however, an insurer or guarantor of his product. He is neither required to design it so as to make it accident or fool proof, nor to incorporate into it all possible features representing the ultimate in safety.[25] The duty has been stated as follows:

> [T]here was no obligation resting on the defendant manufacturer to adopt every possible new device which might possibly have been conceived or invented, if there were any; it is not of itself negligence to use a particular design or method in the manufacture or handling of a product or doing a job which is reasonably safe and in customary use in the industry, although other possible designs, whether in use in the industry or not, might be conceived which would be safer, and evidence as to what is thought by some to be a safer design or method or product is not admissible.[26]

These principles make it clear that an allegation that a product has been improperly designed is, in essence, a challenge to the ideas, concepts and decisions of the design engineer. It is a charge that he has deviated from good engineering practice. Thus evidence must be produced to prove what scientific or engineering criteria were applied in designing the product. This requires the production and development of technical data which may or may not be readily available. However, the problem is neither insurmountable nor difficult, if one first considers the aspects of designing a product.

Far too many attorneys and courts, and at times, experts, work backward from the happening of the occurrence in an effort to find a fault in the product as an explanation. This approach runs contrary to legal reason when one considers that the existence of a defect cannot be presumed from the mere happening of an occurrence;[27] and that the designer must be judged according to the standards applicable at the time.[28]

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25. Warner v. Kewanee Machinery & Conveyor Co., 411 F.2d 1060 (6th Cir. 1969); Blohm v. Cardwell Mfg. Co., 380 F.2d 341 (10th Cir. 1967); Gossett v. Chrysler Corp., 359 F.2d 84 (6th Cir. 1966); Frericks v. General Motors Corp., 274 Md. 288, 336 A.2d 118 (1975); Volkswagen of America, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974).
26. Day v. Barber-Coleman Co., 10 Ill. App. 2d 494, 508, 135 N.E.2d 321, 238 (1956) *cited in* Gossett v. Chrysler Corp., 359 F.2d 84, 89 (6th Cir. 1966).
27. *See* Holcomb v. Cessna Aircraft Co., 439 F.2d 1150 (5th Cir. 1971); United States Rubber Co. v. Bauer, 319 F.2d 463 (8th Cir. 1963); Rexall Drug Co. v. Nihill, 276 F.2d 637 (9th Cir. 1960); Caskey v. Olympic Radio & Television, 343 F. Supp. 969 (D.S.C. 1972); Brown v. Ford Motor Co., 287 F. Supp. 906 (D.S.C. 1968).
28. Lashley v. Ford Motor Co., 480 F.2d 158 (5th Cir.), *cert. denied*, 414 U.S. 1072 (1973) (failure to use trench-type axle on automobile not negligence even though safer); Ward v. Hobart Mfg. Co., 450 F.2d 1176 (5th Cir. 1971) (reliance on evidence that subsequent models of meat grinder contained a guard held to be misplaced); Vroman v. Sears, Roebuck & Co., 387 F.2d 732 (6th Cir. 1968) (design standards of lawn mower

A designer or scientist generally intends to invent or design a product or process that will perform a particular function. In doing so, he draws from his education and experience as well as contemporary scientific analyses, studies and reports. In most instances he sets forth to produce the ultimate or perfect product—the absolute cure, the ideal automobile, boat, airplane, lawn mower or steam iron. However, such perfection can rarely be reached, and the law imposes no duty to do so.[29]

During the preparation of the actual design, plans, and specifications or formula, many considerations come into play, including the selection and use of materials or chemicals, designing the shape and size of structural members and determining their interrelationships with other parts and components. Analyses as to the properties and strength of materials are necessary in many instances. In more complex products further decisions must be made as to the possible incorporation of other products into the design as a component.[30]

Of further consideration is the fact that most manufacturers produce a prototype which is then tested. Those tests and additional research and development may bring about revisions or changes before the product is put in production, and in many instances, after production.

In addition to factors of engineering or scientific theory, the designer must consider practical questions of marketability. The costs of production, which ultimately must be borne by the customer, must be commensurate with the function of and anticipated demand for the product. It may well be possible to design a perfect automobile, but if it would cost fifty thousand dollars, it would have no market. Similarly, the product must have an appealing appearance considering its nature and intended use. Otherwise, it will not sell. Consequently, the practical considerations of design play an important role and should not be overlooked in planning proof of an alleged design error or defense of such a claim.[31]

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promulgated after sale inadmissible); Mondshour v. General Motors Corp., 298 F. Supp. 111 (D. Md. 1969) (nine-year-old bus claimed defective because it lacked modern sideview mirror); Maxted v. Pacific Car & Foundry Co., 527 P.2d 832 (Wyo. 1974) (recovery denied where plaintiff claimed tractor trailer should have a device to jettison trailer in emergency although device unknown to industry). Courts have variously spoken in terms of criteria or data available "at the time," "at the time the product was designed," "at the time of sale," etc. The point of time is not easy to delineate since the design process actually carries right through production, with modifications frequently being made during or even after production.

29. Dreisonstok v. Volkswagenwerk, A.G., 489 F.2d 1066 (4th Cir. 1974); Volkswagen of American, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974).

30. Woolley v. Uebelhor, 239 Md. 318, 211 A.2d 302 (1965) (dealing with a master cylinder manufactured by Lockheed that was incorporated in an automobile manufactured by Chrysler).

31. *See* McClung v. Ford Motor Co., 333 F. Supp. 17, 20 (S.D.W. Va. 1971); Dyson v. General Motors Corp., 298 F. Supp. 1064, 1073 (E.D. Pa. 1969); Volkswagen of America, Inc. v. Young, 272 Md. 201, 219, 321 A.2d 737 at 747 (1974).

Design Criteria and Standard of Care

In the final analysis, the design or formula has resulted from numerous considerations and the balancing of many factors. The determination as to the "reasonableness" of a given design must likewise be based on numerous factors which reflect upon the propriety of the engineer or scientist in the decisions he made in the course of the development of his design. Was sufficient consideration given to aspects of safety, structural integrity, appearance, and cost, as well as to other factors?

The Court of Appeals of Maryland in *Volkswagen of America v. Young*,[32] summarized the point as follows:

> [I]n determining "reasonableness," many factors must be considered. There must be "a balancing of the likelihood of harm, and the gravity of harm if it happens against the burden of the precautions which would be effective to avoid the harm." The style and type of vehicle, and its particular purpose, must be taken into consideration. A "convertible could not be made 'as safe in roll-over accidents as a standard four-door sedan with center posts and full-door frames.' " Price must be a pertinent factor, as the cost of a particular design change may in some instances be so great, while adding little to safety, that the vehicle will be taken "out of the price range of the market to which it was intended to appeal." And the price of the vehicle itself should be considered, for "a Cadillac may be expected to include more in the way of . . . 'crashworthiness' than the economy car." The nature of the accident is to be taken into account, as " 'it could not reasonably be argued that a car manufacturer should be held liable because its vehicle collapsed when involved in a head-on collision with a large truck, at high speed.' " There are perhaps many other factors that will be pertinent in particular cases. In order to impose liability, the trier of the facts must be able to conclude that the design was unreasonable in light of all the relevant considerations.[33]

It becomes evident, therefore, that evidence pertaining to the criteria that should have been considered in designing the type of product involved must be produced. Otherwise, neither the court nor the jury will have a sufficient basis to determine the applicable standard of care or whether the designer exercised due care commensurate with his undertaking.[34]

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32. 272 Md. 201, 321 A.2d 737 (1974).
33. *Id.* at 219, 321 A.2d at 746-47 (citations omitted).
34. It has been held that the question as to the standard of care is one for the court, even though it involves a factual determination. *See* Dreisonstok v. Volkswagenwerk, A.G., 489 F.2d 1066 (4th Cir. 1974). *Compare* Larsen v. General Motors Corp., 391 F.2d 495 (8th Cir. 1968) *with* Evans v. General Motors Corp., 359 F.2d 822 (7th Cir. 1966).

Development of Proof of the Applicable Standards

Of particular importance in proving whether a design is reasonable is evidence that the design conforms to the ordinary and customary engineering standards within the applicable industry at the time.[35] Evidence of what is thought by some to be a safer design or method, without more, is inadmissible to prove lack of reasonable care.[36] A design is not improper if reasonable care was taken in adopting it, even if the design is not perfect in light of later circumstances.[37]

If the design or plan is one which is used throughout the industry, evidence establishing this fact assists in establishing reasonableness of design,[38] although this evidence is not conclusive.[39] The entire industry may have utilized an improper or inadequate standard.[40] Newer and better materials and devices may have been available or alternate designs might have produced a safer or more fit product but the industry, nevertheless, lagged behind. The designer, charged with a duty to exercise due care commensurate with available knowledge and products of the time, cannot ignore developments and simply rely on the fact that "it has always been done this way."[41]

Conversely, while evidence showing that the design did not conform to existing industry standards is strong evidence of an improper or unreasonable design, it too is not conclusive.[42] The designer may have applied more advanced technology, forerunning the industry.

Proof of industry standards, customs and practices can be developed

35. Gossett v. Chrysler Corp., 359 F.2d 84 (6th Cir. 1966).
36. Blohm v. Cardwell Mfg. Co., 380 F.2d 341 (10th Cir. 1967) (evidence of alternative designs for an oil well drilling rig was admissible, but solely to show existence of competitive design options, not as evidence of negligence, nor to establish the standard of care); Marker v. Universal Oil Prods. Co., 250 F.2d 603 (10th Cir. 1957); Farr v. Wheeler Mfg. Corp., 24 Mich. App. 379, 180 N.W.2d 311 (1970). *See* Annot., 76 A.L.R.2d 91, 99 (1961) wherein it is stated:

> Proof of nothing more than that a particular injury would not have occurred had the product which caused the injury been designed differently is insufficient to establish a breach of the manufacturer's [or seller's] duty as to the design of the product.

See also Maxted v. Pacific Car & Foundry Co., 527 P.2d 832 (Wyo. 1974) where the plaintiff asserted design negligence for failure to incorporate a "jettison device" to jettison the trailer from a tractor in time of emergency. The court granted defendant summary judgment since no manufacturers were using such a device and none of the experts had heard of such until suggested by counsel.
37. Dean v. General Motors Corp., 301 F. Supp. 187 (E.D. La. 1969) (manufacturer held not negligent in design of ignition lock).
38. Lashley v. Ford Motor Co., 480 F.2d 158 (5th Cir.), *cert. denied*, 414 U.S. 1072 (1973); Garst v. General Motors Corp., 207 Kan. 2, 484 P.2d 47 (1971); Jones v. Hutchinson Mfg. Inc., 502 S.W.2d 66 (Ky. 1973); Lopez v. Heesen, 69 N.M. 206, 365 P.2d 448 (1961).
39. Turner v. General Motors Corp., 514 S.W.2d 497, 506 (Tex. 1974) (evidence of industry custom admissible, but the custom itself may be shown to be negligent).
40. Ford Motor Co. v. Thomas, 285 Ala. 214, 231 So. 2d 88 (1970) (case remanded for determination of whether wheel locking assembly was inherently dangerous although in general use). *See also* LaGorga v. Kroger Co., 275 F. Supp. 373 (W.D. Pa. 1967); MacDougall v. Pennsylvania Power & Light Co., 311 Pa. 387, 116 A. 539 (1933).
41. C.D. Herme, Inc. v. R.C. Tway Co., 294 S.W.2d 534 (Ky. 1956).
42. De Pree v. Nutone, Inc., 422 F.2d 534 n.1 (6th Cir. 1970).

in a number of ways. In most instances, expert testimony will be necessary.[43] The expert must have a sufficient background in and knowledge of industry practices and developments.[44] Published articles, treatises, trade manuals, shop manuals, engineering codes, government standards and reports are valuable tools in developing expert testimony and in some cases may be entered into evidence, either in conjunction with an expert's direct testimony to fortify his opinion, or in the course of cross-examining an opposing expert to discredit his testimony.[45] Much of an expert's education stems from his study of treatises, periodicals and pamphlets. Proof that this published material, available when the product was designed, does not support an opinion therefore becomes especially pertinent upon cross-examination of an opposing expert. Generally, however, such writings are not admissible to provide the opinions of the author.[46] In any event, such publications will always provide valuable information on the development and results of current research that may reflect on the reasonableness of the design, and no case should be tried on "design" without first reviewing all the available published material.

Industry standards also may be reflected in various statutes, safety regulations and industry codes. Congress has enacted numerous safety codes dictating minimum standards.[47] In addition there are non-governmental standards issued by various engineering and scientific societies and associations.[48] These usually can be offered as evidence of prevailing industry practices and standards.[49] They are not conclusive as to the applicable standard but constitute strong evidence on the standard of care.[50] Such publications are best used in fortification of an expert's opinion, and the expert should be prepared to testify that

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43. Cardullo v. General Motors Corp., 378 F. Supp. 890, 893-94 (E.D. Pa. 1974), *aff'd mem.*, 511 F.2d 1392 (1975), which states: "The question of safety of design of automobile braking systems is not a matter within the knowledge of ordinary laymen. It is a subject on which answers require expert testimony for guidance.
44. Ward v. Hobart Mfg. Co., 450 F.2d 1176 (5th Cir. 1971). *Cf.* Spence v. Wiles, 255 Md. 98, 257 A.2d 164 (1969).
45. C. J. Tower & Sons, Inc. v. United States, 351 F. Supp. 604 (Cust. Ct. 1972), *aff'd*, 496 F.2d 1219 (1974) (drawings of machines from repair manual admissible to show accurate representations of the machines in question).
46. Isley v. Little, 219 Ga. 23, 131 S.E.2d 623 (1963).
47. *See, e.g.*, Federal Hazardous Substance Act, 15 U.S.C. § 1261 (1960); Flammable Fabrics Act, 15 U.S.C. § 1191 (1953); National Traffic and Motor Vehicle Safety Act of 1966, 15 U.S.C. § 1381 (1972); Fair Packaging and Labeling Act, 15 U.S.C. § 1451 (1966).
48. Many of these standards are adopted as part of the National Traffic and Motor Vehicle Safety Act. *See* 49 C.F.R. § 571.5 (1974).
49. *See* DePree v. Nutone, Inc., 422 F.2d 534 (6th Cir. 1970) (safety standards of Underwriter's Laboratories offered to show departure from industry standards).
50. Raymond v. Riegel Textile Corp., 484 F.2d 1025 (1st Cir. 1973) (compliance with Flammable Fabrics Act did not prevent recovery); Wallner v. Kitchens of Sara Lee, Inc., 419 F.2d 1028 (7th Cir. 1966); Swearngin v. Sears, Roebuck & Co., 376 F.2d 637 (10th Cir. 1967); Banko v. Continental Motors Corp., 373 F.2d 314 (4th Cir. 1966) (evidence of compliance with regulations of Federal Aviation Agency relevant on issue of standard of care).

the standard in question is authoritative and has been adopted by the industry.[51]

In some instances governmental regulations require manufacturers to incorporate approved devices or components into their product.[52] If a required component should prove to be so inadequate that the product is rendered unfit or unsafe for its intended purpose, is the manufacturer insulated from liability by the government's requirement? Is the government liable to the consumer or, by way of indemnity, to the manufacturer? These questions will arise and must be resolved in the foreseeable future.

Development of Proof of the Standard Utilized

Once the available background data and standards are established, the central inquiry is to determine what criteria the designer of the product actually considered.[53] The defendant manufacturer generally has a distinct advantage in marshalling this evidence, since the necessary information should be readily available to him and he has actual knowledge as to what was considered. However, in many instances, an examination or inspection of the product following an occurrence will yield sufficient information to enable an opposing expert to determine what deliberate choices were made by the designer and to conclude whether the choice made was the proper one. For instance, by simple inspection an electrician can analyze the basic wiring of a hair dryer, radio, drill or similar device and determine that the insulation was not proper.

In every case, data reflecting upon all the criteria considered and standards applied in the design of the product should be obtained through discovery procedures. Blue prints, wiring diagrams, test results or the like may well be available. The acquisition of such data and an analysis thereof by a qualified expert will provide the raw material from which the adequacy of a design can be determined. Thus, even in instances where the product itself has been totally destroyed, documentary evidence may reveal the existence of a design impropriety. For example, where it is believed that an electronic product, such as a television set, started a fire but itself was consumed, an examination of the wiring diagrams for that set may establish that the set possessed the necessary potential, thus permitting a finding that the set was the probable cause of the occurrence.[54] On the other hand, the contrary

51. Wallner v. Kitchens of Sara Lee, Inc., 419 F.2d 1028 (7th Cir. 1966). *See also* Blohm v. Cardwell Mfg. Co., 380 F.2d 341 (10th Cir. 1967).
52. Chrysler Corp. v. Department of Transportation, 472 F.2d 659 (6th Cir. 1972) (upholding regulations requiring passive restraint devices); Boating Industry Ass'n v. Boyd. 409 F.2d 408 (7th Cir. 1969) (upholding regulation of identification, clearance and front sidemarker lamps on trailers); Automotive Parts & Accessories Ass'n v. Boyd, 407 F.2d 330 (D.C. Cir. 1968) (upholding regulation requiring mandatory head restraints).
53. Dean v. General Motors Corp., 301 F. Supp. 187, 191 (E.D. La. 1969) (discusses considerations in designing an automotive lock).
54. Caskey v. Olympic Radio and Television, 343 F. Supp. 969 (D.S.C. 1972).

may well be proved, saving considerable time and expense that might be expended in pursuing futile litigation.

In any event, if relevant design documents are obtained through discovery a proper study can be made to determine alternate design feasibility. It is often highly relevant that an alternate design might have produced a safer or more fit product.[55] A justiciable issue for the jury usually is produced when there is evidence that other manufacturers, in adopting different designs to accomplish the same purposes, have incorporated safety features that the product in question lacked.[56] Although evidence of changes in design made subsequent to an occurrence is generally inadmissible, especially where offered to prove negligence, this evidence may be admissible to prove the feasibility of an alternate design which would not have produced a like result.[57] A foundation for this evidence requires proof that the design criteria resulting in the change was available when the original design was developed. If it was, then the change does reflect upon existing alternatives available at the time of manufacture and raises a factual issue as to whether the designer made a reasonable choice.[58] On the other hand, if evidence shows that the change was brought about by the development of a new process or material, or a new discovery, then that data was not available and constitutes proof that the designer could not have taken it into consideration.[59]

Summary

Ultimately, cases involving "design" defects will be resolved by the finder of facts, who must analyze the relative criteria that was considered by the designer in formulating the product and determine whether he effectively utilized currently existing knowledge to make the product safe. The resolution of this issue most often favors the party whose counsel has effectively used available evidence to prove whether, in the final analysis, the designer made a conscientious effort to prevent the consumer from being exposed to injury that reasonably could have been prevented if the designer had been more diligent in incorporating into the design those safety features that were available at the time of manufacture.

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55. Hoppe v. Midwest Conveyor Co., Inc., 485 F.2d 1196 (8th Cir. 1973); Blohm v. Cardwell Mfg. Co., 380 F.2d 341 (10th Cir. 1967) (evidence of competitive design offered to show what might have been done cheaply to make a derrick more safe); Roach v. Kononen, 525 P.2d 125 (Ore. 1974).
56. Blohm v. Cardwell Mfg. Co., 380 F.2d 341 (10th Cir. 1967); Wallner v. Kitchens of Sara Lee, Inc., 419 F.2d 1028 (7th Cir. 1966); Sutkowski v. Universal Marion Corp., 5 Ill. App. 3d 313, 281 N.E.2d 749 (1974).
57. *See* cases cited note 56 *supra*.
58. Sutkowski v. Universal Marion Corp., 5 Ill. App. 3d 313, 281 N.E.2d 749 (1974).
59. Ward v. Hobart Mfg. Co., 450 F.2d 1176 (5th Cir. 1971); Maxted v. Pacific Car & Foundry Co., 527 P.2d 832 (Wyo. 1974).

DEFECTS IN MANUFACTURE ASSEMBLY, PACKAGING, ETC.

The more common product liability cases arise from the manner in which the product was manufactured, fabricated, assembled or formulated, rather than from the nature of its design. By inadvertance, mistake or otherwise, there has been a deviation from the design plans and specifications. A structural member may be fabricated in a manner different than that called for in the plans.[60] A part may be left out or improperly installed.[61] There may be a metallurgical flaw in a casting or an air hole or a void in a ferrous material.[62] A foreign body may be introduced into the product.[63] The result is that the product is rendered dangerous or unfit for the purposes for which it is intended.

In cases of this nature, the form and quantum of proof necessary to establish a "defect" will depend on a number of factors, including the type of product involved, the nature of the claimed defect, the complexity of the product, the nature of the occurrence, the facts surrounding the happening of the occurrence and the history of the product.

Nature of the Product

A myriad of products on the market today, if improperly made, can and do produce personal injury or damages. While the mere happening of an occurrence is insufficient to prove that the product involved was defective,[64] the nature of the product may strongly infer, in many instances, that the occurrence would not have happened in absence of a "defect".[65] Properly manufactured bottles don't explode in the absence of improper handling.[66] Cylinders containing propane gas

60. Babylon v. Scruton, 215 Md. 299, 138 A.2d 375 (1958) (roof slab was fabricated with reinforcing rods which did not conform to those used in most slabs).
61. Nevels v. Ford Motor Co., 439 F.2d 251 (5th Cir. 1971) (steering wheel retaining nut not tightened sufficiently nor secured with sealer or epoxy); Jarrell v. Ford Motor Co., 327 F.2d 233 (4th Cir. 1964) (compression washer left out of retaining pin assembly); Goodrich v. Ford Motor Co., 525 P.2d 130 (Ore. 1974) (automobile dealer failed to tighten a clamp on the steering shaft).
62. Woolley v. Uebelhor, 239 Md. 318, 211 A.2d 302 (1965) (metallurgical flaw in secondary cylinder of master cylinder); Taylor v. Carborundum Co., 107 Ill. App. 2d 12, 246 N.E.2d 898 (1969); Zesch v. Abrasive Co., 353 Mo. 558, 183 S.W.2d 140 (1944) (abrasive cutting-off wheel exploded due to metallurgical defect).
63. Salisbury Coca-Cola Bottling Co. v. Lowe, 176 Md. 230, 4 A.2d 440 (1939) (coal oil in a bottle of carbonated beverage).
64. Caskey v. Olympic Radio and Television, 343 F. Supp. 969 (D.S.C. 1972) (evidence insufficient to show that defect in television set caused fire); Hacker v. Shofer, 251 Md. 672, 248 A.2d 351 (1968) (no proof of defect where evidence only showed that front fender of bicycle engaged and locked and not that defect was present at time of sale).
65. Elmore v. American Motors Corp., 70 Cal. 2d 578, 451 P.2d 84, 75 Cal. Rptr. 652 (1969); Macdougall v. Ford Motor Co., 214 Pa. Super. 384, 257 A.2d 676 (1969).
66. Sheeskin v. Giant Food, Inc., 20 Md. App. 611, 318 A.2d 874 (1974), *aff'd sub nom.*, Giant Food, Inc. v. Washington Coca-Cola Bottling Co., 273 Md. 592, 332 A.2d 1 (1975).

don't usually rupture.[67] Steering mechanisms don't fail in properly manufactured new automobiles.[68] Television sets don't explode or catch fire in the ordinary course of events.[69] Cockroaches, worms, dead mice or foreign bodies are not generally found in canned or bottled foods.[70]

In cases of this type, proof of the nature, properties and characteristics of the product combined with evidence as to the happening of the occurrence may suffice to prove a "defect". They present situations in which courts and jurors generally have some knowledge or experience, and proof that the product failed in the manner that it did strongly infers that the probable cause of the failure was a defect in the product,[71] as in *Henningsen v. Bloomfield Motors, Inc.*[72] There, evidence that the steering of an automobile failed after ten days of use was held to be sufficient to establish that the vehicle was defectively manufactured.[73]

On the other hand, when the product is more complex or the happening of the occurrence does not necessarily indicate a failure, proving a defect will be more difficult. For example, after an automobile accident it is often found that a particular part is broken. This raises the question of whether the part failed as a result of an accident impact, or whether it failed because of a product defect. [74] Cases of this nature require extensive proof and development of factual evidence upon which expert witnesses can base logical opinions.[75] For instance, where a vehicle has been in a collision and following the collision an engine mount is found to be broken, it becomes necessary to establish the function of the motor mount, its relationship to other parts, and how its failure produced the claimed result.[76]

67. Harts v. Tennessee Liquified Gas Corp., CCH Prod. Liab. Rptr. [Transfer Binder 1970-73] ¶ 6724 (Tenn. 1971).
68. Henningsen v. Bloomfield Motors, Inc., 32 N.J. 358, 161 A.2d 69 (1960); MacDougall v. Ford Motor Co., 214 Pa. Super. 384, 257 A.2d 676 (1969).
69. Caskey v. Olympic Radio and Television, 343 F. Supp. 969 (D.S.C. 1972).
70. Coca-Cola Bottling Works, Inc. v. Catron, 186 Md. 156, 46 A.2d 303 (1946); Norkold Coca-Cola Bottling Works, Inc. v. Land, 189 Va. 35, 52 S.E.2d 85 (1949).
71. Greco v. Buccicioni Eng'r Co., 407 F.2d 87 (3d Cir. 1969), *aff'g* 283 F. Supp. 978 (W.D. Pa. 1967) ("fingers" of a piler opened under circumstances in which they should have remained closed).
72. 32 N.J. 358, 161 A.2d 69 (1960).
73. *Id.* at 410-11, 161 A.2d at 98.
74. Ford Motor Co. v. Kuhbacher, 518 P.2d 1255 (Wyo. 1975) (expert testimony admitted on question of whether an axle broke before or after the vehicle left the road). *See also* McDonald v. Ford Motor Co., 42 Ohio St. 2d 8, 326 N.E.2d 252 (1974) (steering column failed on impact, evidence held insufficient to submit issues to jury).

    It is also noted that in some cases, the issue may be raised that the failure of part of a vehicle to withstand the impact enhanced the injuries of the plaintiff. These cases, known as "second collision cases," more often involve questions of design. *See* Volkswagen of American, Inc. v. Young, 272 Md. 201, 321 A.2d 737 (1974) (front seat assembly collapsed on impact); Frericks v. General Motors Corp., 274 Md. 288, 336 A.2d 118 (1975) (roof supports collapsed when vehicle overturned).
75. *See* American Honda Motor Co., Inc. v. Smith, 110 Ariz. 593, 521 P.2d 1139 (1974).
76. General Motors Corp. v. Tate, 516 S.W.2d 602 (Ark. 1974) (plaintiff alleged defective motor mounts caused acceleration or an inability to slow down, resulting in a collision; court held engine mount failure was not proximate cause of injury).

While the extent of the evidence necessary to prove a defect will vary considerably, depending on the type of product involved, the nature of the claimed defect and the nature of the occurrence, evidence should be produced to establish the properties, characteristics and propensities of the product in any case. It must be shown that the product had properties or characteristics that made it capable of causing the occurrence.[77] When it is claimed that an illness has resulted from exposure to an allegedly ill rabbit sold by the defendant, it is necessary to prove that the rabbit had a communicable disease and thus had the capacity to produce the result.[78] Similarly, where it is claimed that a component part of an automobile caused it to suddenly accelerate, it must be demonstrated that the component could affect the vehicle's acceleration.[79] A product cannot be said to cause a fire or explosion if it did not contain a flammable material or a source of ignition.[80]

A relatively common defense raised by manufacturers and suppliers is that the product is incapable of producing the claimed result.[81] The contention may be that the product could not behave in the manner contended; that even if it failed it is physically impossible for the failure to have caused the occurrence. While the burden of proof of a defect rests upon the plaintiff,[82] from a practical standpoint, the manufacturer realistically carries the burden of persuading the jury that the product could not have caused the occurrence or lacked capacity to cause the injury. This requires the proof of a negative proposition to an often skeptical jury, and in many cases, testimony from a witness that "I have seen it happen" will not only rebut the testimony of the defendants' experts, but will damage their credibility.

Proof of the nature of the product is generally given by direct evidence. The product itself is by far the best evidence, especially where its properties and characteristics are demonstrated and explained by an expert witness.[83] The expert is then in a position of being able to show the actual product to the jury and demonstrate why he feels it is or is not defective. It is also valuable to secure and produce a duplicate product. This is especially true if an expert intends to render an opinion that the subject product was manufactured, assembled or fabricated

77. Montgomery Ward & Co., Inc. v. McFarland, 21 Md. App. 501, 319 A.2d 824 (1974) (lack of proof to show that buyer's illness resulted from physical contact with ill rabbits).
78. *Id.*
79. Williams v. Steuart Motor Co., 494 F.2d 1074 (D.C. Cir. 1974) (accelerator return spring); General Motors Corp. v. Tate, 516 S.W.2d 602 (Ark. 1974) (defective motor mount).
80. C. F. Church Div. of American Radiator & Standard Sanitary Corp. v. Golden, 429 P.2d 771 (Okla. 1967).
81. McCann v. Atlas Supply Co., 325 F. Supp. 701 (W.D. Pa. 1971) (manufacturer asserted that its tire could not burn up as contended by plaintiff).
82. Caskey v. Olympic Radio and Television, 343 F. Supp. 969 (D.S.C. 1972); Brown v. Ford Motor Co., 287 F. Supp. 906 (D.S.C. 1968); Courtois v. General Motors Corp., 37 N.J. 525, 182 A.2d 545 (1962).
83. MacDonald v. Ford Motor Co., 42 Ohio St. 2d 8, 326 N.E.2d 252 (1975) (steering column and mounting brackets introduced as well as expert testimony).

incorrectly, by demonstrating, with the manufacturer's own product, the manner in which it should have been manufactured. He might be able to show that the subject product lacked a safety guard,[84] a nut or bolt,[85] or some other essential part which is present on the duplicate. In any event the ability of the item to produce the intended result can be made readily apparent.

Consideration should be given to producing mock-ups, drawings, diagrams or photographs.[86] Motion pictures may be of value, but can present difficult evidentiary problems and frequently are not well received by juries.[87] They are generally recordations of experiments or attempts to recreate the circumstances surrounding an occurrence. As such they will be scrutinized for any editing that may have been done or questioned becaused they were conducted under controlled conditions.[88]

The development and production of demonstrative evidence is of even greater importance to the defense, especially when it is claimed that the product could not produce the claimed result. The defendant must instill in the jury a clear understanding of the product and how it functions. This can rarely be done without good exhibits and effective explanations. The jury must be taught how and why the product works as designed. Otherwise it cannot intelligently determine whether the product was in fact defective and whether the claimed defect proximately caused the occurrence.

Nature of the Occurrence and the Happening of the Accident

It is insufficient to prove merely that a product has properties which could explain the happening of an occurrence.[89] Further evidence must be produced to show that the asserted defective condition of the product was the proximate cause of the injury.[90] The additional proof required may come from facts concerning the manner in which the accident happened,[91] facts concerning the past history and perform-

84. Phillips v. Kimwood Machine Co., 525 P.2d 1033 (Ore. 1974).
85. McDonald v. Ford Motor Co., 42 Ohio St. 2d 8, 326 N.E.2d 252 (1975).
86. Williams v. Steuart Motor Co., 494 F.2d 1074 (D.C. Cir. 1974) (model); Vergott v. Deseret Pharmaceutical Co., 463 F.2d 12 (5th Cir. 1972) (drawings); Van Winkle v. Firestone Tire & Rubber Co., 117 Ill. App. 2d 324, 253 N.E.2d 588 (1969) (photographs).
87. Frankel v. Lull Eng'r Co., 334 F. Supp. 913 (E.D. Pa. 1971), *aff'd*, 470 F.2d 995 (3d Cir. 1973).
88. Pritchard v. Downie, 326 F.2d 323 (8th Cir. 1964). The question of editing usually goes to the weight of the evidence, not admissibility. *Id.* at 326.
89. Shramek v. General Motors Corp., 69 Ill. App. 2d 72, 216 N.E.2d 244 (1966); Patrick v. Perfect Parts Co., 515 S.W.2d 554 (Mo. 1974).
90. Caskey v. Olympic Radio and Television, 343 F. Supp. 969 (D.S.C. 1972); American Trailer & Equip. Co., v. Medellin, 517 S.W.2d 27 (Tex. 1974).
91. Greco v. Buccicioni Eng'r Co., 407 F.2d 87 (3d Cir. 1969); Anderson v. J. C. Penney Co., 149 Ind. App. 325, 272 N.E.2d 621 (1971); Sheeskin v. Giant Foods, Inc., 20 Md. App. 611, 318 A.2d 874 (1974), *aff'd*, Giant Food, Inc. v. Washington Coca-Cola Bottling Co., 273 Md. 592, 332 A.2d 1 (1975).

ance of the product[92] or, at times, comparison with the performance of like products.[93]

Evidence as to the happening of the occurrence frequently will produce sufficient proof that the product was defective and the probable cause of the occurrence,[94] or conversely to dispel the likelihood that the product caused the occurrence.[95] The nature of the event itself may suffice, as in the case of an electric blanket catching fire,[96] or the contraction of polio following the taking of a viral vaccine,[97] or an exploding or bursting tire rim.[98]

In most instances, however, additional development of the circumstances surrounding the happening of the occurrence will be necessary. Even when the doctrine of *res ipsa loquitur* is applied there must be evidence to show that the product was under the control of the defendant.[99] Nevertheless, many courts, have hypothesized, in the absence of evidence of an alteration, misuse or rough handling of the product, that the defect must have been created when it was under the exclusive control of the defendant.[100]

In *Leikach v. Royal Crown Bottling Co. of Baltimore*,[101] involving an exploding bottle, the Court of Appeals of Maryland, applying the doctrine of *res ipsa loquitur*, held that an actionable case had been made out, upon a showing of the happening of the occurrence and the facts relating to the handling of the bottles, all of which had been done by the defendant's employees. The requisite proof is that there is a greater likelihood that the injury was caused by the defendant's

92. Summers v. Interstate Tractor and Equip. Co., 466 F.2d 42 (9th Cir. 1972); C.R. Bard, Inc. v. Mason, 247 So. 2d 471 (Fla. App. 1971).
93. Bair v. American Motors Corp., 473 F.2d 740 (3d Cir. 1973); Summers v. Interstate Tractor and Equip. Co., 466 F. 2d 42 (9th Cir. 1972).
94. Lindsay v. McDonnell-Douglas Aircraft Corp., 460 F.2d 631 (8th Cir. 1972); Franks v. National Dairy Prods. Corp., 414 F.2d 682, 687 (5th Cir. 1969); North American Aviation, Inc. v. Hughes, 247 F.2d 517 (9th Cir. 1957); Brownell v. White Motor Corp., 251 Ore. 260, 490 P.2d 184 (1972).
95. Lovas v. General Motors Corp., 212 F.2d 805 (6th Cir. 1954); McDonald v. Ford Motor Co., 42 Ohio St. 2d 8, 326 N.E.2d 252 (1975).
96. Anderson v. J. C. Penney Co., 149 Ind. App. 325, 272 N.E.2d 621 (1971). *But see* Rogers v. W. T. Grant Co., 132 Vt. 458, 321 A.2d 54 (1974).
97. Reyes v. Wyeth Laboratories, 498 F.2d 1264 (5th Cir. 1974), *cert. denied*, 419 U.S. 1096 (1975).
98. Spillers v. Montgomery Ward & Co., Inc., 282 So. 2d 546 (La. App. 1973), *modified*, 294 So. 2d 803 (La. 1974).
99. Giant Food, Inc. v. Washington Coca-Cola Bottling Co., 273 Md. 592, 332 A.2d 1 (1975), *aff'g* Sheeskin v. Giant Food, Inc., 20 Md. App. 611, 318 A.2d 874 (1974). It would be more correct simply to state or hold that there was sufficient circumstantial evidence to infer that the occurrence was caused by a defect in the product. Greco v. Buccicioni Eng'r Co., 407 F.2d 87 (3d Cir. 1969), *aff'g* 283 F. Supp. 978 (W.D. Pa. 1967) ("fingers" of a piler opened under circumstances in which they should have remained closed). *Res ipsa loquitur* is not infrequently referred to in warranty cases, although it is a rule of evidence property applied to raise an inference of negligence.
100. Leikach v. Royal Crown Bottling Co. of Baltimore, 261 Md. 541, 276 A.2d 81 (1971); MacPherson v. Canada Dry Ginger Ale, Inc., 129 N.J.L. 365, 29 A.2d 868 (1943). *Cf.* Joffre v. Canada Dry Ginger Ale, Inc., 222 Md. 1, 158 A.2d 631 (1960).
101. 261 Md. 541, 276 A.2d 81 (1971).

negligence or breach of warranty than some other cause.[102]

Applying similar criteria, the court in *Giant Food, Inc., v. Washington Coca-Cola Bottling Co., Inc.*,[103] held that the evidence surrounding the handling of a Coca-Cola bottle which exploded showed that the greater likelihood was that the resulting injury was caused by the retailer's negligence rather than that of the bottler. There the bottle had received extensive handling by the retailer after delivery by the bottler.

In neither of the above cases was the plaintiff required to dispel all other possible causes of the occurrence.[104] In cases of this nature the trend seems to be that the plaintiff need only establish that the greater likelihood was that the injuries were the result of negligence on the part of the bottler, canner, manufacturer or retailer. An even lesser burden is placed upon plaintiffs in cases in which foreign or deleterious substances are found in canned food or baked products. In these cases it is generally only necessary to show that the foreign or deleterious substance was not introduced in the process of opening the can or package or during cooking.[105]

Theories related to "sealed containers" are frequently applied to products which are contained in a unit. Some products are completely encased as a result of which the reason for their malfunction cannot be readily proved.[106] However, their nature raises the improbability that mishandling or the intervention of some outside force caused the malfunction. The most probable inference is that there was a defect inside the unit where the integral parts were protected and that the defect must have resulted from the manufacture of the product.[107] The requisite proof can be developed by showing that the surrounding circumstances create a strong inference that the injury was caused by the defendant's negligence.

Recovery in cases involving more complex products, such as airplanes, automobiles, boats and motorcycles, frequently depends upon a thorough analysis of all available physical facts. In an automobile case, for example, it is important to develop all available evidence as to the happening of the occurrence including the manner in which the vehicle was being driven when the accident happened, the nature of the road, the existence of skid or gouge marks in the highway, the weather, the movement of the vehicle, the kinematics of the driver and passengers, the sobriety of the driver, the location or position of the vehicle and related parts following impact, and the existence of any

102. *Id.* at 550, 276 A.2d at 85-86.
103. 273 Md. 592, 332 A.2d 1 (1975).
104. *Id.* at 597-98, 332 A.2d at 4-5; Leikach v. Royal Crown Bottling Co. of Baltimore, 261 Md. 541, 548-50, 276 A.2d 81, 85-86 (1971).
105. Quinn v. Swift & Co., 20 F. Supp. 234 (M.D. Pa. 1937); Dickens v. Horn & Hardart Baking Co., 209 A.2d 169 (Del. Sup. Ct. 1965). *Cf.* Great Atlantic & Pacific Tea Co. v. Adams, 213 Md. 521, 132 A.2d 484 (1956) (evidence showed that human fecal matter could have been deposited on lettuce after being taken from the store or during cooking.)
106. Bustamante v. Carborundum Co., 375 F.2d 688 (7th Cir. 1967).
107. *Id.*

defective or claimed defective condition of the vehicle. Such circumstantial evidence will frequently raise inferences that will either establish or dispel the existence of a claimed defect.[108] In *Langford v. Chrysler Motors Corp.*,[109] it was held *inter alia* that the plaintiff's testimony concerning the circumstances of the accident was sufficient, when combined with expert testimony, to establish that the occurrence was caused by a defective tie rod assembly. He had testified that he heard a "loud snapping sound in the right front section of the automobile" just before the vehicle veered off the road.[110] In contrast, in *Belleville National Savings Bank v. General Motors Corp.*,[111] the testimony of the plaintiff as to the movements of the vehicle tended to dispel the existence of the claimed defect.

The inferences drawn from marks on the highway and the location of parts of the vehicle frequently are helpful if not determinative. In *Ford Motor Co. v. Kuhbacker*,[112] one question was whether the accident was caused by a defective rear axle or whether the rear axle was broken in the course of the accident. Expert witnesses produced by the plaintiff based their opinions largely upon the fact that the right rear wheel was found twenty-five to thirty feet prior to the point where the vehicle left the highway.[113] However, in *Polly Chin Sugai v. General Motors Corp.*,[114] it was held that the evidence relating to certain skid marks found in the highway and a flat mark in the left rear tire was insufficient to show that the left rear wheel and brake assembly had failed.

Of even greater importance is evidence of the condition of the product itself or of that component which is claimed to be defective. Evidence of the findings of the investigating police officer, or some other witness, upon testing the brakes or steering of a vehicle at the scene of the occurrence is very significant.[115] Likewise, any examinations or tests performed by persons involved in the towing of a vehicle or in repairing a product is essential.[116] The claimed defective product or component should be secured, if at all possible.[117] In automobile or motorcycle cases, it may even be wise to store the entire wreckage as well as retain the claimed defective component.

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108. Elmore v. American Motors Corp., 70 Cal. 2d 578, 451 P.2d 84, 75 Cal. Rptr. 652 (1969). *Cf.* Bitton v. International Transport, Inc., 437 F.2d 817 (9th Cir. 1970) (expert not allowed to assume that certain gouge marks in the roadway were made at time of accident).
109. 373 F. Supp. 1251 (E.D.N.Y. 1974), *aff'd*, 513 F.2d 1121 (1975).
110. *Id.* at 1253.
111. 20 Ill. App. 3d 707, 313 N.E.2d 631 (1974).
112. 518 P.2d 1255 (Wyo. 1974).
113. *Id.* at 1258-59.
114. 137 F. Supp. 696 (S.D. Idaho 1956).
115. Simpson v. Logan Motor Co., 192 A.2d 122 (D.C. App. 1963) (policemen and tow truck operator were able to corroborate the fact that the brake pedal went to the floor).
116. *Id.*
117. *See* Brown v. Ford Motor Co., 287 F. Supp. 906 (D.S.C. 1968) (remains of the vehicle had been destroyed and plaintiff was totally unprepared to prove a steering defect).

In most instances it will be necessary to retain an expert who, from an examination of the product or available parts, can make a determination as to the existence of a defect or the reason for a failure. As an example, a metallurgist may be able to determine that a tie rod broke by reason of fatigue or that there was a forging flaw in the mastercylinder.[118] Witness marks, scratches, gouges, dents, may constitute strong evidence of the manner in which a product or component part failed, raising an inference as to the existence or nonexistence of a defect.[119]

Particular care should be taken to maintain a proper chain of custody of any parts. If they are to be introduced into evidence, it must be shown that they are still in the condition they were in at the time of the accident and have not been significantly altered.[120] Furthermore, there are cases that have held that the destruction or loss of parts by the plaintiff raises an inference that the product was not defective.[121] Conversely, when the manufacturer or dealer has secured the alleged defective product or parts and subsequently lost or destroyed them, courts may well allow the jury to infer that there was a defect. In either event the party who lost or destroyed the evidence must carry the burden of rebutting such inference.[122]

There are instances where the product or parts are unavailable, as in the case where one is injured from an exploding bottle and the remains were thrown away[123] or the wrecked vehicle was sold for junk.[124] In such instances, proof of a defect must come from other circumstantial evidence generally combined with expert testimony based upon a hypothetical question.

Additionally, evidence of the existence or nonexistence of a defect can be developed by the production of evidence as to the history of the

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118. Langford v. Chrysler Motors Corp., 373 F. Supp. 1251 (E.D.N.Y. 1974), *aff'd*, 513 F.2d 1121 (1975); Woolley v. Uebelhor, 239 Md. 318, 211 A.2d 302 (1965).

119. McDonald v. Ford Motor Co., 42 Ohio St. 2d 8, 326 N.E.2d 252 (1975) (witness marks, dents, etc. on steering column established accident impact as cause of failure). *Cf.* Bitton v. International Transport, Inc., 437 F.2d 818 (9th Cir. 1970).

120. Giant Food, Inc. v. Washington Coca-Cola Bottling Co., Inc., 273 Md. 592, 332 A.2d 1 (1975), *aff'g* Sheeskin v. Giant Food, Inc., 20 Md. App. 611, 318 A.2d 874 (1974).

121. Cardullo v. General Motors Corp., 378 F. Supp. 890 (E.D. Pa.), *aff'd*, 511 F.2d 1392 (1974); Brown v. Ford Motor Co., 287 F. Supp. 906 (D.S.C. 1968).

122. Bitton v. International Transport, Inc., 437 F.2d 817 (9th Cir. 1970) (before items or objects can be deemed to have probative value, one must consider the circumstances surrounding their preservation and custody and the likelihood that tampering occurred); Walker v. Firestone Tire & Rubber Co., 412 F.2d 60 (2d Cir. 1969); Weisinger v. Rockwell Mfg. Co., 377 F.2d 37 (1st Cir. 1967); Sears, Roebuck and Co. v. Daniels, 299 F.2d 154 (8th Cir. 1962); State v. Parker, 3 Conn. Cir. 598, 222 A.2d 582 (1966).

123. Cardullo v. General Motors Corp., 378 F. Supp. 890 (E.D. Pa.), *aff'd*, 511 F.2d 1392 (1974); Courtois v. General Motors Corp., 37 N.J. 525, 182 A.2d 545 (1962); Brownell v. White Motor Corp., 260 Ore. 251, 490 P.2d 184 (1972).

In essence, the inference raised is that the missing evidence would have been unfavorable to the party who failed to produce it.

124. Cardullo v. General Motors Corp., 378 F. Supp. 890, 892 (E.D. Pa.), *aff'd*, 511 F.2d 1392 (1974).

product and sometimes as to the history and performance of similar products. Especially in cases involving complex products, evidence of the service history of the product assists in establishing or defeating a claimed defect.[125] Such evidence may come from testimony as to the past performance of the product,[126] or from service or repair records.[127] In many instances there may have been a recall campaign to correct the claimed defective condition[128] or evidence of prior similar claims may be available.[129] Care must be taken, however, that the evidence presented which relates to the service history of a vehicle or to any recall campaign addresses itself to the very type of defect claimed.[130] The fact that a vehicle had numerous problems with respect to chipping paint or nonfunctioning turn indicators would contribute nothing to explain a claimed brake failure.

While evidence that the product has a history of a repeated problem may be helpful in establishing a defect, it is not conclusive.[131] On the other hand, the fact that a product has been on the market or in use for a long time without any problem, is strong evidence that it was fit and proper for its intended purposes. However, such evidence is not conclusive, but is only a factor for consideration.[132]

Proof of the service history of a product does not always act to establish a defect on the part of the manufacturer. The evidence may show that the defect causing the occurrence arose, or most likely arose, as a result of servicing or repairs performed by a dealer or serviceman disassociated from the manufacturer.[133] It might also show that the product was materially altered, abused, or misused establishing a valid

125. Hansen v. Firestone Tire and Rubber Co., 276 F.2d 254 (6th Cir. 1960) (service history of vibrations in wheels, inability to balance new tires and replacement of diaphragm in one tire was established).

126. Bair v. American Motors Corp., 473 F.2d 740 (3d Cir. 1973) (evidence of studies performed by technical laboratory); Summers v. Interstate Tractor & Equip. Co., 466 F.2d 42 (9th Cir. 1972) (evidence of repeated difficulty with the model truck involved).

127. Tiger Motor Co. v. McMurtry, 284 Ala. 283, 224 So. 2d 638 (1969).

128. Glynn Plymouth, Inc. v. Davis, 120 Ga. 475, 170 S.E.2d 848 (1969). *See also* Nevels v. Ford Motor Co., 439 F.2d 251 (5th Cir. 1971).

129. Nelson v. Union Wire Rope Corp., 39 Ill. App. 2d 73, 187 N.E.2d 425 (1963).

130. Glynn Plymouth, Inc. v. Davis, 120 Ga. 475, 170 S.E.2d 848 (1969) (recall involving loose nuts in suspension system held insufficient to prove defect in absence of some additional evidence to show that plaintiff's vehicle had such a defect); *but see* Nevels v. Ford Motor Co., 439 F.2d 251 (5th Cir. 1971) (recall campaign to correct defect in steering held relevant to establish negligence). It is noted that in most cases, a recall campaign serves mainly to fortify other evidence that the particular defect existed in the product, or to establish knowledge on the part of the manufacturer.

131. Hansen v. Firestone Tire & Rubber Co., 276 F.2d 254 (6th Cir. 1960) (trouble between purchase and accident); Duckworth v. Ford Motor Co., 211 F. Supp. 888, *modified*, 320 F.2d 130 (3d Cir. 1962).

132. Arrow Transportation Co. v. Fruehauf Corp., 289 F. Supp. 170 (D. Ore. 1968); J. I. Case Co. v. Sandefur, 245 Ind. 213, 197 N.E.2d 519 (1964).

133. Ford Motor Co. v. McDavid, 259 F.2d 261 (4th Cir.), *cert. denied*, 358 U.S. 908 (1958); Goodrich v. Ford Motor Co., 525 P.2d 130 (Ore. 1974).

defense for the manufacturer.[134] In some instances, evidence of the service history might establish that the plaintiff assumed the risk through his continued use of the product or that his own negligence was an intervening cause of the occurrence.[135]

Frequently, evidence as to the performance of identical products is helpful. Where it can be shown that all or a number of items in a batch, or from the same run on an assembly line, contained particular flaws, strong circumstantial evidence of a defect is established.[136] Such evidence may come from a recall campaign notice, a publication or through discovery. Even then, however, it must be shown that the product in question contained the same flaw which caused the accident.[137] To establish the necessary causal connection, it may be necessary to produce evidence as to the similarity between the accident in question and ones involving like or similar products. This type of evidence need not be restricted to preceeding accidents but may include subsequent ones provided the similarity of the product and occurrence is established.[138]

Conversely, proof that the product in question differed from similar or purportedly identical products may establish a defect.[139] If it can be shown that a representative lot was manufactured containing a certain component and that the component was lacking or missing from the subject product,[140] or that it contained a foreign material, a defect may be established.[141] Similarly, evidence that other manufacturers in

134. Texas Metal Fabricating Co. v. Northern Gas Prods. Corp., 404 F.2d 921 (10th Cir. 1968) (installer of heat exchanger modified unit, causing explosion); Brown v. General Motors Corp., 355 F.2d 814 (4th Cir.), *cert. denied* 386 U.S. 1036 (1966) (misuse of bulldozer starter button by mechanic); Marker v. Universal Oil Prods. Co., 250 F.2d 603 (10th Cir. 1957) (improper use of hot catalyst); Young v. Aeroil Prods. Co., 248 F.2d 185 (9th Cir. 1957) (misuse of elevator). *Cf.* Mazzi v. Greenlee Tool Co., 320 F.2d 821 (2d Cir. 1963); Smith v. Hobart Mfg. Co., 302 F.2d 570 (3d Cir. 1962) (guard removed from meat grinder).

135. Erdman v. Johnson Bros. Radio & T.V. Co., 260 Md. 190, 271 A.2d 744 (1970) (continued to use television knowing it to be defective and short circuiting); State Stove Mfg. Co. v. Hodges, 189 So. 2d 113 (Miss. 1966), *cert. denied*, 386 U.S. 912 (1967) (contractor failed to install water heater according to directions).

136. Becker v. American Airlines, Inc., 200 F. Supp. 243 (S.D.N.Y. 1961) (proof that other like altimeters had failed); Davis v. Van Camp Packing Co., 189 Iowa 775, 176 N.W. 382 (1920) (involving canned food); Daniels v. Swift & Co., 209 N.C. 540, 183 S.E. 748 (1936) (evidence of grit in similar sausage purchases). *But see* Post v. Manitowoc Eng'r Corp., 88 N.J. Super. 199, 211 A.2d 386 (1965) (evidence as to collapse of another of defendant's cranes excluded).

137. Nevels v. Ford Motor Co., 439 F.2d 251 (5th Cir. 1971); Glynn Plymouth, Inc. v. Davis, 120 Ga. App. 475, 170 S.E.2d 848 (1969), *aff'd*, 226 Ga. 221, 173 S.E.2d 691 (1970).

138. Simpson v. General Motors Corp., 24 Utah 2d 305, 470 P.2d 399 (1970).

139. LaGorga v. Kroger Co., 275 F. Supp. 373 (W.D. Pa. 1967), *aff'd per curiam*, 407 F.2d 671 (1969); Glynn Plymouth, Inc. v. Davis, 120 Ga. App. 475, 170 S.E.2d 848 (1969).

140. Kuzma v. United States Rubber Co., 323 F.2d 657 (3d Cir. 1963) (steel ring missing from grinding wheel and replaced by plastic). *Cf.* Trowbridge v. Abrasive Co., 190 F.2d 825 (3d Cir. 1951) (testimony as to the manner in which flaws formed in some cast grinding wheels).

141. Shamrock Fuel & Oil Sales Co. v. Tunks, 416 S.W.2d 779 (Tex. 1967) (kerosene adulterated with gasoline); Meditz v. Liggett & Meyers Tobacco Co., 167 Misc. 176, 3 N.Y.S.2d 357 (N.Y. City Ct.), *aff'd mem.*, 25 N.Y.S.2d 315 (1938) (foreign substance in cigarette).

making like products incorporate a certain component or device, which was not incorporated in the product in question, may establish evidence of a defect if such component or device would have prevented the injury.[142] A comparison between the modes of manufacture or processing may likewise show that the method utilized by the manufacturer could have introduced a defect or flaw into the product.[143]

Counsel for both sides should seek all available evidence as to the past performance of the product generally and in particular the one that is claimed to have been defective. Much of this information can be developed through well drawn interrogatories or by means of depositions or motions to produce. Before indulging in discovery, however, especially if the number of interrogatories allowed are limited, careful consideration must be given to the type of record sought. As an example, plaintiffs frequently request from manufacturers the number, dates and nature of prior claims and the identities of persons making such claims. Many, if not most, manufacturers deal with claims or complaints on a personal basis through quality control offices, and their filing is done according to the name of the complainant without reference to the particular product or component. Consequently, the manufacturer is unable to respond to that interrogatory.

In any case, it must be established that there was a defect in the product and that the defect was the proximate cause of the occurrence. Discovery, therefore, should be directed at obtaining as much technical data as possible so that sufficient evidence can be produced at trial to establish a firm foundation to support the opinions of any experts, or in the appropriate case to support an inference that the most probable likelihood was the existence of a defect. An expert opinion only derives its probative force from the facts upon which it is predicated, and has no probative value unless a sufficient factual basis is shown to support a rational conclusion.[144]

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142. *See* Blohm v. Cardwell Mfg. Co., 380 F.2d 341 (10th Cir. 1967) (evidence admissible as to how derrick was manufactured by others more safely and cheaply); LaGorga v. Kroger Co., 275 F. Supp. 373 (W.D. Pa. 1967), *aff'd per curiam*, 407 F.2d 671 (1969) (testimony that 80% to 90% of cotton fabric was treated with flame resistant substances at low cost held highly relevant). *See also* Hoppe v. Midwest Conveyor Co., Inc., 485 F.2d 1196 (8th Cir. 1973). It is noted that most cases of this nature fall within the realm of "design defect." However, where a change is made or part of the manufacturing in assembly process, or results from the process itself, the problem is one of manufacture. *See* Kuzma v. United States Rubber Co., 323 F.2d 657 (3d Cir. 1963).

143. *See* Kuzma v. United States Rubber Co., 323 F.2d 657 (3d Cir. 1963) (manner in which grinding wheel was removed from mold resulted in breaking of wheel). *Cf.* Lashley v. Ford Motor Co., 359 F. Supp. 363 (D. Ga. 1972), *aff'd*, 480 F.2d 158 (5th Cir.), *cert. denied*, 414 U.S. 1072 (1973) (unsupported opinion that overall processing of an axle was improper, was insufficient).

144. Ward v. Hobart Mfg. Co., 450 F.2d 1176 (5th Cir. 1971); J. Gerber & Co. v. S.S. Sabine Howaldt, 437 F.2d 580 (2d Cir. 1971); Moore v. Worthington Construction Corp., 266 Md. 19, 291 A.2d 466 (1972); Spence v. Wiles, 255 Md. 98, 257 A.2d 164 (1969); State Health Dept. v. Walker, 238 Md. 512, 209 A.2d 555 (1965); State v. Critzer, 230 Md. 286, 186 A.2d 586 (1962); Fink v. Steele, 166 Md. 354, 171 A. 49 (1934).

Discovery should follow in line with the indicated requisites of proof. The subjects of inquiry should include: development of the characteristics of the product and its capacity to produce the injury; the facts upon which the opposing party bases its contention as to the manner in which the occurrence happened; factual data as to the design, mode of manufacture and condition of the product and any opinions of experts relating thereto; and any available information reflecting upon the past performance and history of the particular product and like products. After securing this information, counsel should be in a position to properly assess his case and the proof that will be necessary to establish a defect or to dispel the existence of a defect.

CONCLUSION

Proof of a "defect" or "defectiveness" depends upon a number of factors. Initially, a differentiation must be made as to the nature of the claimed defect or the manner in which a product is alleged to be defective. If the contention is that the product was unsafe or unfit for its intended purposes, even though it was carefully constructed or manufactured in compliance with its design, the claim is one of improper design. On the other hand, if the assertion is that there were improprieties or dangerous conditions arising from physical acts or omissions during manufacture, the claim is one of defective manufacture. The requisites of proof differ as to each.

Regardless of whether the claim is asserted under theories of negligence, warranty or strict liability, the existence or nonexistence of a design defect is, in the final analysis, determined under traditional rules of negligence. The question is whether the designer exercised a degree of care and caution commensurate with his undertaking. It is thus necessary to establish the design criteria used by the designer and the applicable standard of care, considering the nature and function of the product. The factors given consideration and the manner in which they were balanced in developing the final design must be proved. Otherwise, it is impossible to ascertain whether the designer's determinations were reasonable.

Claims asserting defects in manufacture or assembly require evidence of a specific flaw or mistake arising from the manufacturing process which renders that particular product unsafe or unfit. In such cases, evidence of the characteristics of the item and its ability to produce the claimed result is paramount. Direct testimony or circumstantial evidence is also necessary to show that the defect was the probable cause of the occurrence and that it existed when the product left the hands of the manufacturer. Such evidence may come from physical findings at the scene of the occurrence, physical findings from an examination of the product, evidence of the past performance or

history of the product, or comparisons with supposedly identical or similar products.

Many hours of conscientious effort are required to assemble and plan the effective use of all available evidence concerning the product involved. The spoils of victory most often go to the lawyer who has excelled in his preparation of the case and who presents the evidence in a manner that convinces the jury of the simple logic of his position that the product was or was not produced with the care which a juror would have used with the luxury of hindsight afforded by knowledge of how the product was involved in the happening of an accident.