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Defensive Use of State of the Art Evidence in Strict Products Liability

Garey B. Spradley*

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I. INTRODUCTION

The role of the "state of the art"¹ in strict products liability²

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1. This Article uses the term "state of the art" to refer to several discrete concepts. After defining these concepts in the Introduction, the substantive portion of this Article explores the evidentiary value of different versions of the state of the art in the context of strict products liability. This Article does not discuss state of the art in negligence cases, except when it is necessary to cast light on similar problems in strict liability.

2. Section 402A of the *Restatement (Second) of Torts* states that a manufacturer will be held strictly liable if its product is "in a defective condition unreasonably dangerous to the user or consumer or to his property."

is attended by manifold confusion. The term has been imprecisely defined, and has been appropriated to describe a number of disparate concepts. Few courts adequately distinguish between use of state of the art concepts in strict liability and in negligence, or articulate why the state of the art may or may not constitute an affirmative defense to a strict products liability claim. In addition, many courts fail to explain the circumstances in which state of the art evidence is admissible, and generally misconceive the relationship between state of the art evidence and a plaintiff's prima facie case.

An initial cause of confusion is that courts and commentators attach a variety of meanings to the term "state of the art." At least six discrete uses of the term appear in court opinions and critical literature.

One common usage of the state of the art refers to the customary practices in an industry.³ These practices may simply

RESTATEMENT (SECOND) OF TORTS § 402A (1965). Under this standard, the plaintiff is not required to show that the manufacturer's negligence caused the unreasonably dangerous quality or condition. The plaintiff must demonstrate merely that the defect existed. A defective product may result from flaws in manufacture or design, or from the absence or inadequacy of a warning accompanying the product. *Manufacturing defects* result from the faulty production of an individual item. The design of the product is adequate, but failure to follow the adequate design leads to the production of defective samples, so that the finished product does not comport with the manufacturer's own design standards. Typically, the focus of the case is on the manufacturing process, and state of the art arguments concern the potential for improvement of that process. *Design defects* involve a line of articles that are hazardous even when produced exactly as intended. The focus of design defect cases, and of proffered state of the art evidence, is on the ability of the manufacturer to make the product safer. It has sometimes been said that while manufacturing flaws are inadvertent, design defects are intended. See Phillips, *The Standard for Determining Defectiveness in Products Liability*, 46 *CIN. L. REV.* 101, 103 n.6 (1977); Comment, *Foreseeability in Product Design and Duty to Warn Cases*, 1968 *WIS. L. REV.* 228, 231. In an *inadequate warning* case, the plaintiff does not claim that the individual product was flawed or that the entire product line was inadequately designed; rather, the plaintiff maintains that the manufacturer failed to warn consumers of the hazards of the product, or to instruct them adequately so they could use the product without injury. The focus in warning cases, including state of the art evidence, is on whether the manufacturer could have anticipated and avoided the injurious chain of events by providing a warning.

3. See, e.g., *Raney v. Honeywell*, 540 F.2d 932 (8th Cir. 1976); *Wallner v. Kitchens of Sara Lee, Inc.*, 419 F.2d 1028 (7th Cir. 1969); *Olsen v. United States*, 521 F. Supp. 59, 67 (E.D. Pa. 1981); *Horn v. General Motors Corp.*, 17 Cal. 3d 359, 551 P.2d 398, 131 Cal. Rptr. 78 (1976); *Korli v. Ford Motor Co.*, 63 Cal. App. 3d 115, 137 Cal. Rptr. 828 (1977); *Gelsumino v. E.W. Bliss Co.*, 10 Ill. App. 3d 604, 295 N.E.2d 110 (1973); *Moren v. Samuel M. Langston Co.*, 96 Ill. App. 2d 133, 237 N.E.2d 759 (1968); *Williams v. Brown*, 93 Ill. App. 2d 334, 236 N.E.2d 125 (1968); *Day v. Barber-Colman Co.*, 10 Ill. App. 2d 494, 135 N.E.2d 231 (1956); *Thibault v. Sears, Roebuck and Co.*, 118 N.H. 802, 395 A.2d 843 (1978); *Bexiga v. Havir*, 114

be "custom" in its everyday sense, i.e., standard conduct that has developed over the years, or they may be embodied in formal industry standards. In either case, the defendant wishes to show that its conduct conformed to standard practices which it claims constitute the state of the art.

Governmental standards may also reflect the state of the art.⁴ The debate centers upon whether evidence of conformance with governmental standards should be a complete defense,⁵ prima facie evidence that a conforming product is not defective,⁶ or simply evidence which the jury may accept or reject.⁷ If compliance with governmental standards constitutes a complete defense or prima facie evidence of nondefectiveness, it qualifies as a separate usage of the state of the art. On the other hand, if it merely represents evidence which the jury may accept or reject, compliance with governmental regulations merges with other uses of the term.

The state of the art may also refer to the aggregate of product-related technical and scientific knowledge existing at any given time, in the industry itself, and in related fields of inquiry.⁸ The defendant invokes this usage of the state of the art when it argues that it was impossible to make the product safer, given the knowledge or technology available at the time of the product's manufacture. One can distinguish three kinds of developmental limitations relating to this usage of the state of the art: (1) limitations resulting from the undiscoverability

N.J. Super. 397, 276 A.2d 590 (1971), *rev'd*, 60 N.J. 402, 290 A.2d 281 (1972); Caterpillar Tractor Co. v. Gonzales, 562 S.W.2d 573 (Tex. Civ. App. 1978), *rev'd on other grounds*, 571 S.W.2d 867 (Tex. 1978); Turner v. General Motors Corp., 514 S.W.2d 497 (Tex. Civ. App. 1974). See also Collins v. Rich Tool Co., 520 F.2d 591, 596 (7th Cir. 1975); Griggs v. Firestone Tire & Rubber Co., 513 F.2d 851, 862 (8th Cir.), *cert. denied*, 423 U.S. 865 (1975); Ward v. Hobbart Mfg. Co., 450 F.2d 1176, 1185 (5th Cir. 1971); Neville Chem. Co. v. Union Carbide, 422 F.2d 1205, 1216 (3d Cir.), *cert. denied*, 400 U.S. 826 (1970); Hall v. E.I. Du Pont De Nemours & Co., 345 F. Supp. 353 (E.D.N.Y. 1972).

4. See, e.g., Chrysler Corp. v. Department of Transp., 472 F.2d 659, 670 (6th Cir. 1972); Buccery v. General Motors Corp., 60 Cal. App. 3d 533, 540, 132 Cal. Rptr. 605, 609 (1976); Berkebile v. Brantly Helicopter Corp., 219 Pa. Super. Ct. 479, 484, 281 A.2d 707, 710 (1971).

5. See, e.g., *In re "Agent Orange" Product Liability Litigation*, 534 F. Supp. 1046, 1055-57 (E.D.N.Y. 1982). See also Raleigh, *The "State of the Art" in Products Liability: A New Look at an Old Defense*, 4 OHIO N.U.L. REV. 249, 258 (1977).

6. See Jones v. Hittle Service, Inc., 219 Kan. 627, 634, 549 P.2d 1383, 1390 (1976).

7. See Rucker v. Norfolk & W. Ry. Co., 77 Ill. 2d 434, 437, 396 N.E.2d 534, 537 (1979).

8. See L. FRUMER & M. FRIEDMAN, PRODUCTS LIABILITY § 6.05(15), at 104.38 (1980).

in a given product of a generally known product hazard,⁹ (2) limitations resulting from the unknowability of the hazard that produced the plaintiff's injury,¹⁰ and (3) limitations resulting from the technological inability to implement an alternative product design.¹¹ These three developmental limitations tend to arise in different types of products liability cases, and each raises distinct issues of analysis and policy.

9. A defendant who asserts that a risk was undiscoverable concedes that the product carried a known risk of defect, but claims that the scientific or technological capability did not exist to discover which product samples were affected. See James, *The Untoward Effects of Cigarettes and Drugs: Some Reflections on Enterprise Liability*, 54 CALIF. L. REV. 1550, 1557 (1966). See generally Keeton, *Annual Survey of Texas Law: Torts*, 35 SW. L.J. 1, 15 (1981) [hereinafter cited as Keeton, *Torts*]; Keeton, *Products Liability - Drugs and Cosmetics*, 25 VAND. L. REV. 131 (1972); Keeton, *Some Observations about the Strict Liability of the Maker of Prescription Drugs: The Aftermath of MER/29*, 56 CALIF. L. REV. 149 (1968). The paradigm cases involve plaintiffs who have contracted hepatitis following blood transfusions. In these cases, the risk of contaminated blood samples was known to the supplier, but until very recently nothing the supplier could do would protect against it. See *Russell v. Community Blood Bank, Inc.*, 185 So. 2d 749 (Fla. Dist. Ct. App. 1966); *Cunningham v. MacNeal Memorial Hosp.*, 47 Ill. 2d 443, 266 N.E.2d 897 (1970); *Brody v. Overlook Hosp.*, 121 N.J. Super. 299, 296 A.2d 668 (1972).

10. The unknowable risk is one that cannot be anticipated, even statistically. A prime example is the innocent-appearing drug whose harmful effects take years to surface. Unknowable risks can arise in connection with drugs or any other product that must interact with a living organism. It is often impossible to know how a living organism will react to a foreign substance until the product is tested upon plants, animals, and humans. For example, millions of women used the drug DES (diethylstilbestrol) to prevent miscarriages before use of the drug was linked to vaginal and cervical cancer in prenatally exposed daughters of DES users. See Note, *Market Share Liability: An Answer to the DES Causation Problem*, 94 HARV. L. REV. 668, 668-69 (1981). The problem of unknowable risks is particularly acute in the case of humans because of the difficulties in testing the product. The unknowable risk is similar to the undiscoverable risk in that neither may be discovered despite the use of all available scientific and technological knowledge. An unknowable risk differs from an undiscoverable one, however, in that even the existence of an unknowable risk is not known before an injury actually occurs.

11. The defendant may argue that existing technology was not available to improve product design, so that improvement was a technological impossibility. See *Olson v. Arctic Enterprises Inc.*, 349 F. Supp. 761, 763 (D.N.D. 1972); *Lunt v. Brady Mfg. Corp.*, 13 Ariz. App. 305, 475 P.2d 964 (1970); *Badorek v. General Motors Corp.*, 11 Cal. App. 3d 902, 925, 90 Cal. Rptr. 305, 328 (1970); *E.R. Squibb & Sons Inc. v. Stickney*, 274 So.2d 898 (Fla. 1973); *Stanfield v. Medalist Industries, Inc.*, 34 Ill. App. 3d 635, 639, 340 N.E.2d 276, 280 (1975). State of the art evidence of this variety is usually found in defective design cases. The defendant argues that it was technologically impossible to design a safer product or to implement certain safety features; it asserts that everything technologically possible was done to make the product safe. The plaintiff, on the other hand, argues that a safer product was technologically possible, and that the manufacturer had a duty to produce such a product. Neither focuses primarily on what other manufacturers were doing, which distinguishes this concept of state of the art from the "customary practices" type described above.

The final use of the state of the art involves the practicality or feasibility of a design, manufacturing method, or warning.¹² The plaintiff alleges that the design, manufacturing process, or warning is unreasonably dangerous, and offers an alternative that the plaintiff claims the defendant should have adopted. Frequently, the defendant must concede that the plaintiff's alternative design was technically possible, but argues that the alternative is not feasible because it would inordinately increase the product's cost, diminish its utility, or introduce other serious hazards. The defendant seeks to establish what is reasonably possible, technically and economically, to reduce a risk or hazard.¹³

Although each version of the state of the art described above presents distinct evidentiary problems in strict products liability cases, a common problem is each concept's status vis-a-vis negligence doctrine. Prior to the advent of strict liability, state of the art evidence was employed exclusively in negligence cases, commonly for the purpose of determining whether a defendant's conduct was reasonable.¹⁴ In strict products liability, however, the defendant's conduct theoretically is not an issue. The plaintiff need not prove that the defendant was negligent, but only that the product was "defective." Consequently, the defendant cannot avoid liability simply by proving the exercise of due care.¹⁵ Initially, therefore, one might sense that because the state of the art commonly is related to the negligence concept of reasonableness, evidence of the state of the art would be irrelevant in strict products liability cases. Nonetheless, strict liability theory rests upon interpretations of "reasonableness" that sometimes ought to permit admission of

12. See, e.g., *Barker v. Lull Eng. Co. Inc.*, 20 Cal. 3d 413, 431, 573 P.2d 443, 455, 143 Cal. Rptr. 225, 237 (1978); *Scott v. Dreis & Krump Mfg. Co.*, 26 Ill. App. 3d 971, 983, 326 N.E.2d 74, 86 (1975); *Sutkowski v. Universal Marion Corp.*, 5 Ill. App. 3d 313, 315, 281 N.E.2d 749, 752 (1972); *Roach v. Kononen*, 269 Or. 457, 461, 525 P.2d 125, 129 (1974). See also *Amason v. Ford Motor Co.*, 80 F.2d 265 (5th Cir. 1935); *Garst v. General Motors Corp.*, 207 Kan. 2, 484 P.2d 47 (1971); Draft Uniform Product Liability Law § 106(a), 44 Fed. Reg. 2998 (1979). See also Keeton, *Torts*, *supra* note 9, at 14.

13. Feasibility evidence is difficult to rationalize with strict products liability, because it is almost impossible to evaluate feasibility without reference to reasonableness, a concept which attenuates the "strictness" of strict liability and parallels negligence doctrine. See, e.g., *Larsen v. General Motors Corp.*, 391 F.2d 495, 503 (8th Cir. 1968) (defendant must design product as safe as is reasonably possible according to general negligence principles).

14. See 2 L. FRUMER & M. FRIEDMAN, *supra* note 8, § 16A[4][i]; Robb, *A Practical Approach to Use of State of the Art Evidence in Strict Liability Cases*, 77 Nw. U. L. Rev. 1, 6-9 (1982).

15. See *supra* note 2.

state of the art evidence.¹⁶ This tension between negligence and strict liability theories continues to act as a source of confusion and provides difficulties in analytical treatment.

In addition to its relationship to negligence principles, the state of the art raises questions regarding its relationship to a plaintiff's prima facie case. One potential relationship is that evidence of the state of the art may be offered as a general defense such that, if it is established, the plaintiff cannot recover. The other potential relationship between the plaintiff's case and the defendant's reliance on state of the art evidence is that the evidence may be merely relevant to some element of the plaintiff's case.¹⁷ For example, the defendant may proffer evidence on the state of the art to negate the existence of a defect. The problem in this context is to formulate a rationale for admitting state of the art evidence that does not introduce negligence as an issue, or a rationale for excluding the evidence that does not make the manufacturer an insurer of its product.

A court's treatment of a defendant who proffers state of the art evidence will also depend to some extent on the court's view of the policies underlying strict liability theory. Two rationales, loss spreading and accident minimization, are most often adduced for holding the defendant liable for the plaintiff's injury without negligent conduct on the defendant's part.¹⁸ Loss

16. See, e.g., *Phillips v. Kimwood Mach. Co.*, 269 Or. 485, 498, 525 P.2d 1033, 1039 (1974). But see *Cronin v. J.B.E. Olson Corp.*, 8 Cal. 3d 121, 132-34, 501 P.2d 1153, 1162, 104 Cal. Rptr. 433, 442 (1972).

17. Assuming that state of the art evidence is admissible, a court must decide at which point in historical time to assess the state of the art. The issue is usually narrowed to whether state of the art evidence should be viewed as of the date of manufacture, the date of injury, or the date of trial. See, e.g., *Bruce v. Martin-Marietta Corp.*, 544 F.2d 442, 447 (10th Cir. 1976). Compare *Dean v. General Motors*, 301 F. Supp. 187, 192 (E.D. La. 1969) (state of the art assessed at the time of manufacture, focusing on the reasonable conduct of the manufacturer) with *Barker v. Lull Engineering Co.*, 20 Cal. 3d 413, 434, 573 P.2d 443, 457, 143 Cal. Rptr. 225, 239 (1978) (state of the art assessed at the time of trial; trier of fact using hindsight to evaluate safety of design).

18. See Holford, *The Limits of Strict Liability for Product Design and Manufacture*, 52 TEX. L. REV. 81, 82-83 (1973). Two related arguments for strict liability are *enterprise liability* and *implied representation*. *Enterprise liability* originates from the theory that a product's market price ought to include the costs of accidents caused by defects in the product. Because higher prices for riskier products will shift consumer demand to lower cost, safer substitutes, the overall accident costs to society will be reduced. See Klemme, *The Enterprise Liability Theory of Torts*, 47 U. COLO. L. REV. 153, 158 (1976). The *implied representation* rationale for strict liability extends warranty doctrine. It rests upon the assumption that a manufacturer, by placing its goods in commerce, implicitly represents that the product is safe, and that consumers ought to be compensated for the disappointment of their reasonable expectations when they are harmed by unsafe products. See Shapo, *A Representational Theory of*

spreading means that the cost of compensation is dispersed throughout society, reallocating the financial burden that would otherwise be borne by a single accident victim.¹⁹ The defendant manufacturer is said to be in a better position to spread the loss, either throughout the industry, by purchasing insurance, or throughout the marketplace, by increasing its prices. Accident minimization, the other primary rationale for strict liability, means that manufacturers are more able than consumers to identify potential product risks and to confine the risks to acceptable levels.²⁰ The pressure of strict liability is thought to encourage manufacturers to expend the resources necessary to reduce the risk and thus minimize accidents. A court that subscribes to loss spreading as the principal rationale for strict liability will be relatively uncongenial to state of the art evidence in any form, because if such evidence permits the defendant to avoid liability, the rationale is subverted. Accident minimization, on the other hand, justifies the use of some varieties of state of the art evidence in certain kinds of cases, although not all.

This Article establishes a conceptual framework for applying different versions of the state of the art to products liability. The Article does not provide an exhaustive treatment of all the issues implicated in each use of the state of the art. Its task is the more modest one of considering each version of the state of the art in the context of the three categories of products liability claims—manufacturing defect, design defect, and inadequate warning—to determine (1) whether evidence relating to the state of the art should be admissible, and (2) if admissible, whether the state of the art should constitute an affirmative defense. This analysis proceeds from an evaluation of arguments advanced in cases and commentaries and from an assessment of the policies underlying strict products liability. It is hoped that the conceptual framework posited in this Article will suggest solutions to some of the troublesome problems encountered in relating the different definitions of the state of the art to products liability.

Consumer Protection: Doctrine, Function and Legal Liability for Product Disappointment, 60 VA. L. REV. 1109 (1974).

19. See *Price v. Shell Oil Co.*, 2 Cal. 3d 245, 466 P.2d 722, 85 Cal. Rptr. 178 (1970).

20. See *Montgomery & Owen, Reflections of the Theory and Administration of Strict Tort Liability for Defective Products*, 27 S.C.L. REV. 803, 809-10 (1976).

II. CUSTOMARY INDUSTRY PRACTICES

The state of the art is often defined in terms of the prevailing norms within an industry.²¹ This use of the state of the art provides a useful starting point in the analysis of product defect cases, because it establishes a touchstone for comparing expectations for similar products and for evaluating the commercial context in which the product was manufactured.

A. MANUFACTURING DEFECTS

A product containing a manufacturing defect obviously does not meet any industry standard for the completed product. In fact, a flawed product does not meet the manufacturer's own design standard; the product deviates from other products manufactured according to identical specifications. Proving this is precisely the plaintiff's burden.

If its specifications are reasonable, the defendant must somehow relate industry customs and standards to the plaintiff's claim that the defect occurred during production. The evidence usually consists of a demonstration that the defendant's production methods, although not perfect, followed those used in the industry as a whole.

A threshold question in relating the defendant's evidence of compliance with customary industry practices to the plaintiff's claim is whether such evidence should be admissible at all in a strict products liability action. One argument against admissibility focuses on the distinction between the manufacturer's conduct and the defectiveness of the product. While negligence relates to the conduct of the manufacturer, the argument runs, strict liability only examines the product itself.²² For example, Dean Green has stated:

The violation of the seller's duty involves only a specific product—the thing. Its measurement has no similarity to the measurement of the *conduct* of the defendant in a negligence case by the conduct of the ordinary prudent man. In products liability, the measure is the dangerously defective quality of the specific product in the litigation—not the average of products of the same kind.²³

21. See cases cited *supra* note 3. Defining the relevant "industry" for a given manufacturer, of course, may be a source of considerable dispute.

22. See generally W. KIMBLE & R. LESHER, PRODUCTS LIABILITY § 155, at 179 (1979). "The care taken by the supplier of a product in its preparation, manufacture, or sale, is not a consideration in strict liability . . ." *Gonzales v. Cat-erpillar Tractor Co.*, 571 S.W.2d 867, 871 (Tex. 1978).

23. Green, *Strict Liability Under Sections 402A and 402B: A Decade of Litigation*, 54 TEX. L. REV. 1185, 1210 (1976) (emphasis in original).

The argument continues that custom evidence, being evidence of a manufacturer's conduct, is inadmissible.

This approach is not particularly compelling. It suggests an artificial distinction between conduct and the results of conduct. The manufacturer's conduct produces the product; to criticize the product is to criticize the conduct. To judge the resulting product intelligently, one must know how and why the manufacturer designed and produced the product as it did.

A position similar to that of Dean Green's is suggested by the portion of the Restatement²⁴ which states that the rule of strict liability applies although "the seller has exercised all possible care in the preparation and sale of his product . . ."²⁵ Because evidence of compliance with industry standards or customs is essentially evidence of due care, and due care does not relieve a manufacturer of liability, the argument concludes such evidence is irrelevant.²⁶ Moreover, one may argue that admission of due care evidence in the form of industry customs would signal a return to a negligence standard and defeat gains that have been made in the area of strict liability.²⁷ This argument, although preferable to the conduct/product distinction, is also flawed. Although the argument relies upon the Restatement, it is not really supported by the Restatement, which indicates only that the use of due care is not a defense to strict liability.²⁸ The Restatement does not say that evidence of due care is inadmissible. Arguments for and against admissibility must be sought elsewhere.

Negligence would be reintroduced to products liability cases if prevailing industry standards, offered to show due care, constituted an affirmative defense. Due care is not the only issue in a products liability case to which evidence of industry custom is germane, however. Admission of such evidence on certain other issues would not signal a return to negligence. In particular, evidence of compliance with custom and industry standards is relevant and should be admitted in manufacturing

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

25. *Id.*

26. Dean Prosser has stated that "[s]trict liability has eliminated any question of negligence, and in the ordinary case has made evidence of the defendant's due care immaterial." W. PROSSER, *THE LAW OF TORTS* § 103, at 672 (4th ed. 1971).

27. See *Cunningham v. MacNeal Memorial Hosp.*, 47 Ill. 2d 443, 467, 266 N.E.2d 897, 902 (1970). See also Henderson, *Coping with the Time Dimension in Products Liability*, 69 CALIF. L. REV. 919, 930-31 (1981); Robb, *supra* note 14, at 14-15.

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

defects cases on the issue of whether a defect existed at all,²⁹ or the time a defect came into existence.³⁰

An effort to use evidence of standard industry practices to disprove the existence of a defect is illustrated by the seminal case of *Pulley v. Pacific Coca-Cola Bottling Co.*³¹ The plaintiff in *Pulley* brought an action for breach of implied warranty, alleging that she became ill after she noticed a cigarette and floating bits of loose tobacco in a bottle of Coca-Cola she had been drinking. No one else witnessed the opening of the bottle or the discovery of the cigarette. The defendant sought to offer evidence of its standard processing and bottling methods to establish that it was unlikely for a cigarette to find its way into the bottle before the plaintiff opened it. The trial court excluded this testimony. On review, the Washington Supreme Court recognized that one effect of the excluded testimony would be to impeach the plaintiff's testimony that the defect existed, but excluded the proffered evidence on the ground that it was "collateral."³² The court held that because the defendant's proffered testimony was only evidence of due care and "was not directly refutative of the plaintiff's relation of the incident involved,"³³ it was inadmissible.

The *Pulley* court's reasoning is questionable because it characterized the defendant's evidence only as evidence of due care, and failed to recognize that the defendant's proffered evidence of its standard bottling practices, while of admittedly slight probative value, may be relevant to the substantive issue

29. See W. KIMBLE & R. LESHNER, *supra* note 22, § 155, at 179-80; Bernstein, *Evidence of Producer's Care in a Products Liability Action*, 25 VAND. L. REV. 513, 518-19 (1972); Keeton, *Torts*, *supra* note 9, at 10.

30. See Bernstein, *supra* note 29, at 519. Of course, for the evidence to be relevant to the issue whether a defect existed at the time of manufacture, the evidence must relate to the prevailing industry practices at the time the allegedly defective item was manufactured. Ascertaining the precise date of manufacture for some products may be difficult, but it is obvious that evidence of customary industry practices is of no help to the defendant unless it followed the practices at the time it made the offending item.

Problems in ascertaining the date of manufacture are compounded when features of the product are installed by several parties at different times. One court held that evidence of industry standards or trade customs was admissible to determine when a particular feature is generally installed, even though the evidence was inappropriate as a determinant of the reasonableness of defendant's conduct because the action was in strict liability. *Christner v. E.W. Bliss Co.*, 524 F. Supp. 1122, 1125-26 (M.D. Pa. 1981).

31. 68 Wash. 2d 778, 415 P.2d 636 (1966).

32. *Id.* at 784, 415 P.2d at 640.

33. *Id.* The court's holding effectively precludes any showing of indirect or circumstantial evidence to refute a plaintiff's mere assertion of harm from a contaminant in food or drink. See *id.*

of the existence of the defect. Although the general rule is that a party may not contradict previous testimony with evidence of collateral facts,³⁴ evidence is not collateral when it relates to facts "which would have been independently provable regardless of the contradiction" of previous testimony.³⁵ The court apparently assumed that, although the defendant's quality control evidence would tend to undercut the plaintiff's story,³⁶ the evidence did not relate independently to the material issue of defectiveness. Because the evidence was only of "due care,"³⁷ it was "collateral" in the court's view and thus not admissible to impeach the plaintiff's testimony.³⁸

The court's analysis would be correct if the evidence was, in fact, appropriately labeled "collateral." This assumption, however, is mistaken.³⁹ As long as the evidence is not offered to prove a collateral fact, it is admissible, even if the evidence has the dual aspect of reflecting on the plaintiff's credibility. In *Pulley*, evidence of the defendant's standard bottling practices was directly relevant to the substantive issue of "defectiveness," because it tended to reduce the possibility that the plaintiff's bottle was contaminated by a cigarette. Admittedly, the probative value of the evidence is minimal. Nonetheless, under the facts in *Pulley*, one would be hard pressed to argue that a juror who received evidence that Coca-Cola's quality control efficiency was 99.9 percent would be less likely to con-

34. See C. McCORMICK, *THE LAW OF EVIDENCE* § 47, at 98 (2d ed. 1972).

35. *Id.* McCormick suggests two kinds of facts which meet the test for being "noncollateral": (1) "facts that are relevant to the substantive issues in the case," which may have the "dual aspect of relevant proof and of reflecting on the credibility of contrary witnesses"; and (2) facts that are "independently provable by extrinsic evidence, apart from the contradiction, to impeach or disqualify the witness," such as facts showing bias, interest, criminal convictions, or incapacity. *Id.*, § 47, at 99. In *Pulley*, the defendant's evidence of its standard bottling practices would be relevant to a substantive issue in the case, the existence or nonexistence of the foreign object, and thus admissible as noncollateral evidence under McCormick's test. See *infra* text accompanying notes 39-41.

36. 68 Wash. 2d at 783, 415 P.2d at 639.

37. *Id.* at 783, 415 P.2d at 640.

38. *Id.* at 784, 415 P.2d at 640.

39. See *supra* note 35. Professor Bernstein, in his criticism of the *Pulley* case, correctly observes that "whether evidence is collateral is determined by its relation to the issues of the case, and not by its characterization as direct or circumstantial." Bernstein, *supra* note 29, at 515. Bernstein, however, goes on to describe incorrectly the significance of labeling evidence as "collateral." He asserts that "whether due care evidence is characterized as 'collateral' would not affect its admissibility." *Id.* at 515 n.18. Collateral evidence is generally inadmissible. See C. McCORMICK, *supra* note 34, § 47, at 97-100. The mistake in *Pulley*, however, was in characterizing the evidence as "collateral" in the first place.

clude there was a foreign object in the bottle than if the efficiency rating was 80.0 percent.⁴⁰ Although such evidence may not have sufficient probative value to forestall a directed verdict for the plaintiff, this does not mean that the evidence is irrelevant.⁴¹

In addition to the issue of whether a defect existed, evidence of a prevailing practice is relevant to the issue of when the product became defective. A manufacturer may concede the existence of the defect, but maintain that the defect appeared after the product left the manufacturer's control. Contaminated soft drink cases illustrate how evidence of custom might be relevant to the issue of when the defect occurred. The contaminant, a cigarette, roach or mouse, undeniably is present in the bottle. Perhaps, unlike the plaintiff in *Pulley*, the plaintiff opened the bottle at a party, and twenty people will swear the contaminant was in the drink by the time the bottle came into the plaintiff's possession. Nevertheless, the defendant bottler might contend that someone tampered with the container after it left the plant.⁴² Evidence of standard industry practices may support this contention by demonstrating that the contaminant could not have gotten into the bottle at the plant.⁴³ Similarly, in a brake failure case, the defendant manufacturer may want to show that the brakes were damaged as a result of the accident, rather than before the mishap. Evidence of prevailing practices would strengthen this contention by demonstrating the improbability of a defect being introduced in the manufacturing process. This use of evidence of custom is readily distinguishable from its use as due care evidence. Moreover, even if

40. "[T]he most acceptable test of relevancy is the question, does the evidence offered render the desired inference *more probable than it would be without the evidence?*" C. McCORMICK, *supra* note 34, § 185, at 437 (emphasis in original).

41. The test of relevancy, which is to be applied by the trial judge in determining whether a particular item or group of items of evidence is to be admitted is a different and less stringent one than the standard used at a later stage in deciding whether all the evidence of the party on an issue is sufficient to permit the issue to go to the jury.

Id. at 436.

42. See, e.g., *Crystal Coca-Cola Bottling Co. v. Cathey*, 83 Ariz. 163, 317 P.2d 1094 (1957); *Harris v. Coca-Cola Bottling Co. of Chicago*, 35 Ill. App., 2d 406, 183 N.E.2d 56 (1962); *Strawn v. Coca-Cola Bottling Co. of Mo.*, 234 S.W.2d 223 (Mo. Ct. App. 1950).

43. Bernstein observes that the probability that the product became defective after it left the defendant's control will depend on (1) the nature of the product, (2) the manner in which the product was distributed, and (3) the other possible occurrences which may have affected the product in the intermittent period. Bernstein, *supra* note 29, at 520.

evidence offered to establish circumstantially the absence of a defect is characterized as "due care" evidence, such a use is supported by a comment in the Uniform Commercial Code, which states that evidence of due care in manufacturing goods "is relevant to the issue of whether [a] warranty was in fact broken."⁴⁴ This statement means that evidence of due care in the manufacturing process, established by reference to industry custom, is relevant to the issue of whether the product was in fact defective at the time of delivery.⁴⁵

Despite the arguments in favor of admitting evidence of prevailing industry practices on the issue of defectiveness, such evidence can never be conclusive. If evidence of custom was conclusive, there would be a complete return to negligence standards and a complete effacement of strict liability. Evidence of custom has the same quality as any other evidence, and can be given as much or as little weight as a jury desires. The burden of production of the evidence should be on the party who intends to rely on it, so that no inference of compliance or noncompliance with the prevailing practice is made unless a party produces evidence on the issue.

B. DESIGN DEFECTS

Many of the arguments raised against admitting evidence of customary industry practices in design defect cases reflect those advanced in manufacturing defect cases.⁴⁶ The inquiry in a defective design case, however, is somewhat different than in a manufacturing defects case. The plaintiff's main problem in a

44. U.C.C. § 2-314 comment 13 (1978).

45. See Bernstein, *supra* note 29, at 514.

46. See generally *supra* notes 22-27 and accompanying text. One might argue, for example, that since evidence of compliance with prevailing industry design practices is not an affirmative defense because a whole industry may be designing "unreasonably dangerous" products, the evidence must be intended to establish the defendant's standard of care, which supposedly is irrelevant in a strict products liability action. See, e.g., Note, *Restatement (Second) of Torts Section 402A and State of the Art Evidence*, 43 J. AIR. L. & COM. 587, 591 (1977). See also *supra* text accompanying note 23; Scarzafava, *An Analysis of Product Liability Defenses in the Aftermath of Hopkins*, 9 ST. MARY'S L.J. 261, 270-71 (1977). Several courts have refused to admit evidence of standard industry practices in design defect cases. See, e.g., *Rexrode v. American Laundry Press Co.*, 674 F.2d 826, 831 (10th Cir. 1982); *Blohm v. Cardwell Mfg. Co.*, 380 F.2d 341 (10th Cir. 1967); *Matthews v. Stewart-Warner Corp.*, 20 Ill. App. 3d 470, 314 N.E.2d 683 (1974). Other courts have admitted such evidence as persuasive, but not conclusive evidence of reasonable care. See, e.g., *Page v. Barko Hydraulics*, 673 F.2d 134, 138-39 (5th Cir. 1982); *Smith v. Minster Mach. Co.*, 669 F.2d 628, 633-34 (10th Cir. 1982); *Porter v. American Optical Corp.*, 641 F.2d 1128, 1140 (5th Cir. 1981).

manufacturing defects case is to establish the existence of the defect and the time at which it occurred. Frequently, the existence of the defect may be demonstrated rather easily by showing that the product departed dangerously from the design of identical products manufactured by the defendant.⁴⁷ In a design defect case, however, the plaintiff must prove that the design itself is inadequate by referring to some external standard of adequacy.⁴⁸

In setting an external standard, some courts still rely on the concept of the expectations of the ordinary consumer used by the Restatement.⁴⁹ Under this definition, evidence of customary industry practices is relevant to establishing whether a design defect existed as of the date of manufacture. Evidence that the product was designed in the same manner as other products of the same type tends to show that the product involved is similar to other products of the same type, and therefore, that an ordinary consumer familiar with the class of products would know of its dangerous characteristics.⁵⁰ *Aller v. Rodgers Machinery Manufacturing Co., Inc.*⁵¹ contains language and reasoning consistent with this position. In *Aller*, the Iowa Supreme Court stated that if an ordinary consumer expects a product to be in the condition received, the plaintiff cannot recover on a theory of strict liability, because the defect was not dangerous "to an extent beyond that which would be

47. See Henderson, *Renewed Judicial Controversy Over Defective Product Design: Toward the Preservation of an Emerging Consensus*, 63 MINN. L. REV. 773, 773-74 (1979). Of course, there may be some cases in which the manufacturing defect destroys the entire product, thereby making the plaintiff's problems of proof considerably more difficult.

48. *Id.*

49. RESTATEMENT (SECOND) OF TORTS § 402A comment i (1965). This comment states that a product is unreasonably dangerous when it is "dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics." *Id.* One court has stated: "We feel relatively comfortable applying strict liability principles to those cases in which the product falls below the reasonable expectations of the ordinary consumer. The 'defect' is ascertainable by an objective standard, i.e., not within reasonable consumer expectation which is unreasonably dangerous." *Brady v. Melody Homes Mfr.*, 121 Ariz. 253, 257, 599 P.2d 896, 900 (1979). For other cases relying upon this standard, see *Banks v. Koehring Co.*, 538 F.2d 176, 179 (8th Cir. 1976); *Gilbert v. Stone City Constr. Co.*, 171 Ind. App. 418, 420-23, 357 N.E.2d 738, 741-42 (1976); *Kleve v. General Motors Corp.*, 210 N.W.2d 568, 571 (Iowa 1973); *Vincer v. Esther Williams All-Aluminum Swimming Pool Co.*, 69 Wis. 2d 326, 331, 230 N.W.2d 794, 798 (1975).

50. See Murray, *The State of the Art Defense in Strict Products Liability*, 57 MARQ. L. REV. 649, 654 (1974).

51. 268 N.W.2d 830 (Iowa 1978).

contemplated by the ordinary consumer.”⁵² The court upheld the trial court’s instruction that in considering the defendant’s liability, the jury must consider ordinary consumer expectations as of the date of manufacture. A plaintiff’s expectations that differed from those contemplated by ordinary consumers apparently would be an unreasonable consumer expectation. Although *Aller* was not a “customary practices” case, the trial court’s instructions implicitly endorse the relevance of state of the art evidence, because the community’s common knowledge at the time of manufacture could be established circumstantially by a showing that most or all products of the same type, manufactured about the same time, were designed essentially the same as the defendant’s product.⁵³

The “ordinary consumer” definition of product defectiveness, which has been criticized on the ground that consumers often have no expectations whatever as to the dangerous characteristics of a product,⁵⁴ is not the only definition in wide use. Dean Wade and Dean Keeton have provided an alternative definition of defectiveness in strict products liability⁵⁵ that has gained substantial support.⁵⁶ They propose that the strict liability standard is not different from that of negligence, except that the seller is presumed to have knowledge of the actual condition of the product when it leaves its hands.⁵⁷ In design defect cases, the test employed is whether the danger in fact outweighs the utility of the product.⁵⁸ In other words, the court balances the utility of the product and the dangers arising from the product’s use, presuming the seller knows of the danger. Such a balancing test injects the concept of reasonableness into the underlying substantive law. For example, several courts have required a manufacturer to have acted “reasonably” in choosing the selected design,⁵⁹ or to have designed a

52. *Id.* at 834.

53. *Id.* at 837.

54. See Keeton, *Product Liability and the Meaning of Defect*, 5 ST. MARY’S L.J. 30, 37 (1973); Wade, *On the Nature of Strict Tort Liability for Products*, 44 MISS. L.J. 825, 829 (1973).

55. Keeton, *supra* note 54, at 37; Wade, *supra* note 54, at 829.

56. See Henderson, *supra* note 47, at 776-77. Professor Henderson criticizes courts that have added unique twists to the standard. *Id.* at 782-807.

57. See Keeton, *supra* note 54, at 38; Wade, *supra* note 54, at 836-38.

58. See Keeton, *Torts, Annual Survey of Texas Law*, 27 SW. L.J. 1, 3 (1973). In *Aller v. Rodgers Mach. Mfg. Co.*, 268 N.W.2d 830, 835 (Iowa 1978), the court pointed out that this balancing process is the same whether the doctrine of negligence or the doctrine of strict liability is being utilized.

59. See, e.g., *Banks v. Koehring Co.*, 538 F.2d 176, 178 (8th Cir. 1976); *Hoppe v. Midwest Conveyer Co., Inc.*, 485 F.2d 1196, 1199 (8th Cir. 1973); *Nicklaus v. Hughes Tool Co.*, 417 F.2d 983, 986 (8th Cir. 1969); *Cardullo v. General Motors*

"reasonably" safe product.⁶⁰ Other courts have stated the manufacturer's design must obviate "unreasonable" risk of harm⁶¹ or the product being "unreasonably dangerous."⁶²

Under this concept of reasonableness, liability turns on an examination of the defendant's conduct in adopting the product design, given the risk the product creates.⁶³ A subjective examination of this sort requires that the product be related to the circumstances surrounding its use, design, and manufacture.⁶⁴ Evidence of custom logically ought to be admissible on the issue of reasonableness, which is part of the question of design defectiveness for courts using the Wade-Keeton approach. Many courts have admitted evidence of custom for this purpose. For example, in *Raney v. Honeywell, Inc.*,⁶⁵ the court stated that the jury could consider "the knowledge common to those in the industry and the knowledge available to the defendant in deciding whether the design was unreasonably dangerous."⁶⁶ Similarly, in *Price v. Buckingham Manufacturing Co. Inc.*,⁶⁷ the court admitted into evidence safety belt specifications that had been adopted by other large users of equipment similar to that involved in the accident. The court stated that a defect "exists where the article is not reasonably fit for the ordinary purposes for which such articles are sold and used . . . [I]ndustry practices would seem as relevant in relation to that criterion as where the issue is negligence in manufacture."⁶⁸

Corp., 378 F. Supp. 890, 893 (E.D. Pa. 1974) *aff'd mem.*, 511 F.2d 1392 (3d Cir. 1975); *Dean v. General Motors Corp.*, 301 F. Supp. 187, 190 (E.D. La. 1969); *Brady v. Melody Homes Mfr.*, 121 Ariz. 253, 259, 589 P.2d 896, 902 (1978); *Garst v. General Motors Corp.*, 207 Kan. 2, 20, 484 P.2d 47, 60 (1971).

60. *See, e.g.*, *Weakley v. Fischbach & Moore, Inc.*, 515 F.2d 1260, 1267 (5th Cir. 1975); *Gates v. Ford Motor Co.*, 494 F.2d 458, 459 (10th Cir. 1974).

61. *See, e.g.*, *Bexiga v. Havir Mfg. Corp.*, 114 N.J. Super. 397, 405, 276 A.2d 590, 594 (1971), *rev'd*, 60 N.J. 402, 290 A.2d 281 (1972); *Micallef v. Miehle Co.*, 39 N.Y.2d 376, 385, 348 N.E.2d 571, 577, 384 N.Y.S.2d 115, 121 (1976).

62. *See, e.g.*, *Simien v. S.S. Kresge Co.*, 566 F.2d 551, 554 (5th Cir. 1978); *Polk v. Ford Motor Co.*, 529 F.2d 259, 266 (8th Cir.), *cert. denied*, 426 U.S. 907 (1976); *Dorsey v. Yoder Co.*, 331 F. Supp. 753, 758 (E.D. Pa. 1971) *aff'd mem.*, 474 F.2d 1339 (3d Cir. 1973); *Pust v. Union Supply Co.*, 38 Colo. App. 435, 440, 561 P.2d 355, 359 (1976); *Turner v. General Motors Corp.*, 584 S.W.2d 844, 849 (Tex. 1979); *Greiten v. LaDow*, 70 Wis. 2d 589, 595, 235 N.W.2d 677, 681 (1975).

63. *See, e.g.*, *Brady v. Melody Homes Mfr.*, 121 Ariz. 253, 259, 589 P.2d 896, 902 (1978).

64. *See Weinberger, The State of the Art and Products Liability*, 28 DEF. L.J. 303, 310 (1979).

65. 540 F.2d 932 (8th Cir. 1976).

66. *Id.* at 938. *See also Vanskike v. ACF Indus., Inc.*, 665 F.2d 188, 195 (8th Cir. 1981), *cert. denied*, — U.S. —, 102 S.Ct. 1632 (1982).

67. 110 N.J. Super. 462, 266 A.2d 140 (1970).

68. *Id.* at 464, 266 A.2d at 141.

Industry custom and standards thus may have considerable probative value in determining the existence of a design defect, and ought to be admissible without hesitation.⁶⁹ For courts using the ordinary consumer expectations test, industry practices are relevant to establish such expectations. For courts using the Wade-Keeton test, industry standards and customs can establish whether or not the manufacturer acted reasonably in balancing the many factors involved in the design process.⁷⁰ As one court has stated, these standards "are likely to be more probative than a single learned treatise or an expert opinion, as they represent the consensus of an entire industry."⁷¹

In addition to the probative value of evidence of industry customs, other advantages may attend its use in design defect cases.⁷² For example, the use of this evidence will give designers some assurance that the jury will consider the methods employed in the everyday world, and that they will use an ascertainable and comprehensible standard. The importance of such a standard should not be overlooked. The accident minimization rationale⁷³ of products liability depends on designers and businessmen understanding the legal tests on which they are to be judged. If present legal tests are often incomprehensible for lawyers and judges, they are certainly no more understandable for product designers.⁷⁴ Moreover, evidence of custom is provable as a fact, and thus is considerably stronger than an "expert's" assessment of a product's dangerousness.

Of course, conformance to industry standards, standing alone, should not protect a manufacturer from liability. Conformance is simply evidence for the jury to consider as it relates to the issues in the case. Some commentators have argued, however, that custom evidence not only ought to be admissible, but should be given conclusive effect. These commentators assert that without such a conclusive effect, the current

69. Of course, the plaintiff may use the failure of a design to conform with design standards of the industry in order to prove a defect. See, e.g., *Anderson v. Hyster Co.*, 74 Ill. 2d 364, 368, 385 N.E.2d 690, 692 (1979); *Caterpillar Tractor Co. v. Ford*, 406 So. 2d 854, 858-59 (Ala. 1981).

70. See *supra* notes 55-68 and accompanying text.

71. *Union Supply Co. v. Pust*, 196 Colo. 162, 177, 583 P.2d 276, 286 (1978).

72. See generally *Raleigh*, *supra* note 5, at 252-53.

73. See *supra* text accompanying note 20. See also *First Nat'l Bank, Albuquerque v. Nor-Am Agricultural Prods., Inc.*, 88 N.M. 74, 87, 537 P.2d 682, 695 (Ct. App.), cert. denied *sub nom.* *New Mexico Mill & Elevator Co. v. First Nat'l Bank*, 88 N.M. 29, 536 P.2d 1085 (1975); C. GREGORY, H. KALVEN JR. & R. EPSTEIN, *CASES AND MATERIALS ON TORTS* 553 (3d ed. 1977); *Holford*, *supra* note 18, at 82-83.

74. See *Raleigh*, *supra* note 5, at 250-51.

state of the art might be applied retroactively to products manufactured years earlier,⁷⁵ which would effectively render the manufacturer an insurer of its product.⁷⁶ This argument misses the point. Although giving conclusive effect to prevailing industry standards is one way to prevent judgment by hindsight, it is hardly the only solution. Hindsight judgments can be avoided more simply and directly by a rule that declares subsequent industry standards inadmissible.

The argument against giving conclusive effect to evidence of industry standards was presented most convincingly by Judge Learned Hand in *The T. J. Hooper*.⁷⁷ The T. J. Hooper, a tugboat, had departed Norfolk, Virginia for New York City, towing a series of coal-laden barges. As the tow passed the Delaware breakwater about midnight, the weather was fair. In the morning, however, the wind rose to gale force. The tug and the barges were forced to anchor and ride out the storm, and one of the barges was lost. The barge owner claimed that the T. J. Hooper should have been equipped with a radio receiver. If the tug had carried a radio, he argued, its master would have received timely weather warnings and would have been able to put in safely at the Delaware breakwater. The trial court found the T. J. Hooper was not equipped with a radio receiver, that a March gale was not unusual north of Cape Hatteras, and that a prudent master who had received a radio weather warning would not have continued the voyage. The trial court also found that it was not a regular custom of coast line carriers to equip tugs with radio receivers. The defense contended that this custom ought to be conclusive. In reply to this contention, Judge Hand observed, "Is it then a final answer that the business had not yet generally adopted receiving sets? . . . Indeed in most cases reasonable prudence is in fact common prudence; but strictly it is never its measure; a whole calling may have unduly lagged in the adoption of new and available devices."⁷⁸ Although industry custom may be evidence of the proper standard of care, "courts must in the end say what is required; there are precautions so imperative that even their universal disregard will not excuse their omission."⁷⁹

75. See Kircher, *Products Liability - The Defense Position*, 44 INS. COUNS. J. 276, 295-97 (1977).

76. See *id.* at 296; Robb, *supra* note 14, at 16.

77. 60 F.2d 737 (2d Cir.), *cert. denied sub nom.* Eastern Trans. Co. v. Northern Barge Corp., 287 U.S. 662 (1932).

78. *Id.* at 740.

79. *Id.*

Indeed, as Judge Hand observed, an entire industry may be negligent in failing to implement new technology. If the applicable standard of care is conclusively based on custom, the courts will eviscerate one major purpose of strict products liability—providing an incentive for product safety research and rapid adoption of safer practices as they become available. The resulting loss in consumer protection clearly would be out of step with consumer expectations⁸⁰ and present expectations of industry.⁸¹ Despite these arguments, four states have enacted statutes declaring that compliance with the state of the art is a defense to a design defect action. In Arizona⁸² and New Hampshire,⁸³ the statutes make compliance with the state of the art an affirmative defense. The Indiana⁸⁴ and Nebraska⁸⁵ statutes provide that compliance with the state of the art is “a defense” or a “valid defense.” “State of the art” as used in these statutes presumably can be established by evidence of custom.⁸⁶ The statutes also suggest that compliance with the custom precludes recovery.

Other courts may treat evidence of custom as though it is conclusive on the issue of defective design if the plaintiff does not adduce evidence that the custom itself is unsafe. A recent Virginia case, *Turner v. Manning, Maxwell and Moore, Inc.*,⁸⁷ adopted this approach. In that case, a hoist manufacturer marketed its hoists without safety latches on the upper hooks. Plaintiff was injured when one of the hoists became disengaged and struck him on the head. The manufacturer submitted evidence that the prevailing practice of the industry was not to include safety latches on hoists. Although the court acknowledged that evidence of a customary industry practice does not conclusively establish due care, the court held that such evidence may be conclusive of nonliability when “there

80. See *Santor v. A & M Karagheusian, Inc.*, 44 N.J. 52, 64-65, 207 A.2d 305, 311-12 (1965); *Codling v. Paglia*, 32 N.Y.2d 330, 340, 298 N.E.2d 622, 627, 345 N.Y.S.2d 461, 467 (1973). See generally Shapo, *A Representational Theory of Consumer Protection: Doctrine, Function and Legal Liability for Product Disappointment*, 60 VA. L. REV. 1109 (1974).

81. See generally PRACTISING LAW INSTITUTE, *PRODUCT LIABILITY OF MANUFACTURERS: PREVENTION AND DEFENSE* (1980).

82. ARIZ. REV. STAT. ANN. § 12-683 (1982) (effective September 3, 1978).

83. N.H. REV. STAT. ANN. § 507-D:4 (Supp. 1980) (effective August 22, 1979).

84. IND. CODE ANN. § 34-4-20A-4 (Burns Supp. 1980) (effective June 1, 1978).

85. NEB. REV. STAT. § 25-21,182 (1979) (effective July 22, 1978).

86. Cf. *Brady v. Melody Homes Mfr.*, 121 Ariz. 253, 260, 589 P.2d 896, 903 (1978).

87. 216 Va. 245, 217 S.E.2d 863 (1975). See also *Dye v. Kean's*, 412 So.2d 116, 120-21 (La. Ct. App. 1982).

[is] no evidence that the industry custom was not reasonably safe."⁸⁸ Because the plaintiff failed to present evidence that omission of safety hooks was unsafe, the court held as a matter of law that the manufacturer was not liable.

The *Turner* court's approach essentially creates a presumption against defectiveness when the defendant can show compliance with industry practice, so that the defendant should prevail as a matter of law when it has established compliance with a regular industry practice without any substantial countervailing evidence of fault.⁸⁹ Following this approach, the states of Colorado,⁹⁰ Kentucky,⁹¹ and Utah⁹² have passed statutes declaring that compliance with the state of the art gives rise to a rebuttable presumption that the product was not defectively designed, and evidence of custom apparently is appropriate to establish the state of the art.

*McClung v. Ford Motor Co.*⁹³ offered another rationale for treating custom evidence as conclusive. The plaintiff in *McClung* claimed that the steering wheel of his automobile was defectively designed. In granting Ford's motion for summary judgment, the court held:

To be actionable, in the Court's opinion, the vehicle, alleged to have been of a design that makes it unfit for its intended use, must have been of such design and structure as was at variance with, or contrary to, the accepted body of scientific knowledge possessed by the average mechanical or structural engineering personnel in the profession having to do with the manufacture of subject vehicle. The design must have been such as in the application of prevailing engineering and scientific knowledge, it could have been reasonably foreseen that in the course of normal and accepted use of the product so designed . . . , the alleged result here could be reasonably expected.⁹⁴

One writer has suggested that *McClung* appears to be based on the idea that legal standards should reflect the standards that guide the work of design engineers, since design engineers do not find much guidance in such vague and conflicting concepts as "intended use," "foreseeability," "reasonable care," and "de-

88. *Id.* at 251, 217 S.E.2d at 868.

89. At least one commentator has favored this approach. See Raleigh, *supra* note 5, at 261-64.

90. COLO. REV. STAT. § 13-21-403 (Supp. 1981) (effective July 1, 1977).

91. KY. REV. STAT. ANN. § 411.310 (Baldwin Supp. 1982) (effective June 17, 1978).

92. UTAH CODE ANN. § 78-15-6 (1977) (effective May 10, 1977).

93. 333 F. Supp. 17, 21 (S.D.W. Va. 1971), *aff'd*, 472 F.2d 240 (4th Cir.), *cert. denied*, 412 U.S. 940 (1973).

94. *Id.* See also *Olson v. Artic Enterprises, Inc.*, 349 F. Supp. 761, 764-65 (D.N.D. 1972).

sign duties."⁹⁵ If industrial standards were the legal test, then the legal test apparently would be in accord with the way the real world works,⁹⁶ and would further the accident minimization rationale of products liability.⁹⁷

Although present legal standards may not provide an incentive to design safer products because they are vague or meaningless to a designer,⁹⁸ neither a conclusive test based on custom nor a custom-based rebuttable presumption of nondefectiveness is a satisfactory solution. A conclusive test based upon custom creates no incentive at all for development of safer products; therefore, it is hardly a preferable alternative. Moreover, retaining the present legal tests along with a custom-based presumption of nondefectiveness would not afford much enlightenment to designers.⁹⁹ As noted earlier, such a presumption is a small departure, if any, from existing law in design cases.¹⁰⁰ The plaintiff still has the burden of showing that "alternative designs for the product could reasonably have been developed . . ." ¹⁰¹ In other words, the plaintiff still must prove the existence of a defect. It is difficult to see how such a presumption would provide better guidance to a designer than if no presumption existed.

In summary, evidence of prevailing industry practice should be admissible on the issue of the existence of a design defect. Courts and commentators, however, have offered no persuasive reason why such evidence should be conclusive against the plaintiff or raise a presumption of nonliability. It is sufficient that the jury hear and evaluate custom evidence along with other evidence relating to the existence or nonexistence of a defective design.

95. See Raleigh, *supra* note 5, at 263.

96. *Id.* at 264.

97. Cf. O'Donnell, *Design Litigation and the State of the Art: Terminology, Practice and Reform*, 11 AKRON L. REV. 627, 644 (1978) (disallowing state of the art evidence provides a disincentive for accident minimization by deeming even substantial efforts to improve design irrelevant).

98. See Raleigh, *supra* note 5, at 264. The argument is less than precisely stated.

99. "If the [industry custom] is that of cutting costs, augmenting profits, ignoring viable safety standards, and complying with other marketing imperatives that call for putting safety considerations last, an industry yardstick has little to do with whether a product was defective." J. BEASLEY, *PRODUCTS LIABILITY AND THE UNREASONABLY DANGEROUS REQUIREMENT* 393 (1981).

100. See *supra* notes 87-89 and accompanying text.

101. *Baker v. Chrysler Corp.*, 55 Cal. App. 3d 710, 716, 127 Cal. Rptr. 745, 749 (1976).

C. INADEQUATE WARNINGS

The arguments for and against admitting evidence of industry custom in a case involving an inadequate warning are similar to those raised in the contest of manufacturing and design defect cases. An additional consideration, however, is the scope of the manufacturer's duty to warn.

Some courts hold that a manufacturer must warn only against those dangers of which it knew or should have known.¹⁰² For example, the court stated in *Oakes v. E.I. DuPont de Nemours & Co.*¹⁰³ that "[a] manufacturer or supplier of a product must give warning of any dangerous propensity of an article produced or sold by him inherent in the product or in its use of which *he knows or should know*, and which the user of the product would not ordinarily discover."¹⁰⁴ In line with this holding, many courts state candidly that duty to warn cases are governed by a reasonableness standard.¹⁰⁵ The requirement that the danger be reasonably foreseeable or scientifically discoverable¹⁰⁶ is an important limitation upon the seller's liability as well as on the reach of strict liability.¹⁰⁷ If reasonable foreseeability is adopted as a limitation upon the duty to warn, evidence of custom plainly is relevant to establish what the manufacturer reasonably was able to foresee.¹⁰⁸ Although courts have admitted custom evidence in strict liability warning

102. See, e.g., *Hardy v. Johns-Manville Sales Corp.*, 681 F.2d 334, 344 (5th Cir. 1982); *Ross v. Phillip Morris & Co.*, 328 F.2d 3, 12-14 (8th Cir. 1964); *Cudmore v. Richardson-Merrel, Inc.*, 398 S.W.2d 640, 644 (Tex. Civ. App. 1965), *cert. denied*, 385 U.S. 1003 (1967), *disapproved*, *Crocker v. Winthrop Labs.*, 514 S.W.2d 429, 432 (Tex. 1974).

103. 272 Cal. App. 2d 645, 77 Cal. Rptr. 709 (1969).

104. *Id.* at 650, 77 Cal. Rptr. at 713 (quoting *Crane v. Sears, Roebuck & Co.*, 218 Cal. App. 2d 855, 860, 32 Cal. Rptr. 754, 757 (1963)) (emphasis added by the court in *Oakes*).

105. See, e.g., *Griggs v. Firestone Tire and Rubber Co.*, 513 F.2d 851, 856 (8th Cir.), *cert. denied*, 423 U.S. 865 (1975); *Borel v. Fibreboard Paper Products Corp.*, 493 F.2d 1076, 1090 (5th Cir. 1973) *cert. denied*, 419 U.S. 869 (1974); *Blasing v. P.R.L. Hardenbergh Co.*, 303 Minn. 41, 47, 226 N.W.2d 110, 114 (1975); *Bituminous Casualty Corp. v. Black & Decker Mfg. Co.*, 518 S.W.2d 868, 872-73 (Tex. Civ. App. 1974). See also *Crocker v. Winthrop Labs.*, 514 S.W.2d 429 (Tex. 1974), in which the court seems to adopt this rule by stating: "If the manufacturer knows or should know of potential harm to a user because of the nature of its product, the manufacturer must give adequate warning." *Id.* at 433.

106. See *supra* notes 9-11 and accompanying text.

107. *Borel v. Fibreboard Paper Prods. Corp.*, 493 F.2d 1076, 1088 (5th Cir. 1973), *cert. denied*, 419 U.S. 869 (1974).

108. See *Webb v. Fuller Brush Co.*, 378 F.2d 500, 502 (3d Cir. 1967); *United States v. Two Cases Of Chloro-Naphtholeum Disinfectant*, 217 F. 477, 479-80 (D. Md. 1914); *Braun v. Roux Distrib. Co.*, 312 S.W.2d 758, 763 (Mo. 1958).

defect cases, most have failed to offer an express rationale.¹⁰⁹ Because the warning duty in a strict liability case approaches the concept of the standard of care in negligence cases, however, the rationale for admitting evidence of prevailing industry practices in negligence actions provides a predicate for admitting it in strict liability actions.

Other courts,¹¹⁰ and some commentators,¹¹¹ have argued that foreseeability should not be a limitation on the duty to warn. The leading case adopting this view is *Jackson v. Coast Paint & Lacquer Co.*¹¹² In *Jackson*, the court rejected foreseeability in a warning defect case and stated that “[i]n strict liability it is of no moment what defendant ‘had reason to believe.’ . . . It is the unreasonableness of the condition of the product, not of the conduct of the defendant, that creates liability.”¹¹³ Custom evidence is unlikely to be admitted under this view. For example, in *Holloway v. J.B. Systems Ltd.*,¹¹⁴ the plaintiff charged the defendant with failing to warn that a vacuum tank could not be subjected to internal pressurization, and asserted that this lack of warning rendered the tank defective. The defendant attempted to show that, in not providing a warning with the tank, it had merely conformed to the standards of the industry in the year that the tank was manufactured. The court held that such evidence was erroneously admitted.

It was inappropriate to admit testimony regarding trade custom, because the jury might have inferred that if virtually no other tank manufacturer in 1969 included a warning about pressurization it could hold [a defendant] not liable. This use of trade customs as evidence of the reasonableness of [defendant's] inaction would be permissible if the case were tried under negligence principles, but is inconsistent with the doctrine of strict liability.¹¹⁵

The court went on to emphasize that “negligence concepts such as ‘trade custom’ or ‘reasonable care’ have no place in suits

109. See, e.g., *Johnson v. Husky Industries Inc.*, 536 F.2d 645, 648 (6th Cir. 1976); *Griggs v. Firestone Tire & Rubber Co.*, 513 F.2d 851, 858 (8th Cir.), cert. denied, 423 U.S. 865 (1975).

110. See *Little v. PPG Industries*, 19 Wash. App. 812, 820-22, 579 P.2d 940, 945-47 (1978), modified, 92 Wash. 2d 118, 594 P.2d 911 (1979). The court reasoned that to base the duty to warn on the manufacturer's knowledge or imputation of knowledge would shift the emphasis away from the condition of the product and back to the reasonableness of the manufacturer's conduct. See also *Hamilton v. Hardy*, 37 Colo. App. 375, 384-85, 549 P.2d 1099, 1107 (1976); *Haugen v. Minnesota Mining & Mfg. Co.*, 15 Wash. App. 379, 386-88, 550 P.2d 71, 76-77 (1976).

111. *Keeton, Products Liability-Inadequacy of Information*, 48 TEX. L. REV. 398, 404-09 (1970).

112. 499 F.2d 809 (9th Cir. 1974).

113. *Id.* at 812.

114. 609 F.2d 1069 (3d Cir. 1979).

115. *Id.* at 1073.

brought under § 402A as that section has been interpreted by the Pennsylvania courts.”¹¹⁶ The *Holloway* court apparently would make the scope of the manufacturer’s duty to warn as broad as the jury might decide, knowing of the plaintiff’s injury.¹¹⁷ The preferable approach, however, would be to admit customary practices evidence as bearing on the manufacturer’s potential to predict mishaps.

Admission of custom evidence is more difficult to justify when reasonable foreseeability is not a limitation on the duty to warn, and courts adopting this standard would have to exclude the evidence to be consistent.¹¹⁸ Courts that require manufacturers to warn even of unforeseeable hazards clearly have taken a very strict view of strict liability. Nevertheless, even in jurisdictions using the strict approach, it is possible to argue that custom evidence is relevant to the issue of adequacy of a particular warning. A case involving the oral contraceptive Enovid suggests how a defendant might advance this argument.¹¹⁹ In that case, the court stated that for a warning to be legally adequate, it must meet the following criteria: (1) its form must be such that it could reasonably be expected to catch the attention of the reasonably prudent man in the circumstances of its use [members of the medical profession]; (2) the content of the warning must be of such a nature as to be comprehensible to the average physician; (3) it must indicate the nature and extent of the danger to the mind of the reasonably prudent user; (4) it must warn with the degree of intensity that would cause the reasonably prudent user to exercise caution commensurate with the potential danger.¹²⁰ These elements are tied to the “reasonably prudent user” and the “average physician.” If it is the industry custom to warn in a particular way, and there is a relatively low incidence of injuries similar to those suffered by the plaintiff, then the customary warning must be adequate for the great majority of users and physicians. A majority of users and physicians presumably defines the class of “reasonably prudent” users and “average” physicians. Consequently, in jurisdictions that require a legally adequate warning and do not permit foreseeability to

116. *Id.*

117. *See id.*

118. The same is true in jurisdictions where foreseeability is a limitation on the duty to warn, when the issue at trial is the adequacy of the warning, rather than foreseeability.

119. *Mahr v. G.D. Searle & Co.*, 72 Ill. App. 3d 540, 390 N.E.2d 1214 (1979).

120. *Id.* at 562, 390 N.E.2d at 1230. *See also* *Bituminous Casualty Corp. v. Black & Decker Mfg. Co.*, 518 S.W.2d 868, 872-73 (Tex. Civ. App. 1974).

limit the scope of the manufacturer's duty to warn, evidence of custom may yet be admissible on the issue of the adequacy of the warning.¹²¹ Again, however, the jury should be carefully instructed as to the issue to which such evidence is relevant.

III. GOVERNMENTAL STANDARDS

When the state of the art is defined in terms of governmental standards, such standards relate only to product design and distribution and do not apply to manufacturing defects.¹²² In design defect and warning cases, the general rule is that governmental standards define only minimum product design quality and conditions of distribution. Nevertheless, a few cases hold that evidence of compliance with governmental standards will preclude a manufacturer's or seller's liability, and several states have enacted statutes that provide that compliance constitutes a general defense.

A. DESIGN DEFECTS

The almost universal rule is that compliance with governmental design standards, rules, and regulations constitutes some evidence of the adequacy of the product's design, but is not conclusive.¹²³ On the other hand, noncompliance with the same governmental standards, rules, and regulations is usually held to be negligence per se.¹²⁴ Generally, governmental regulations set forth minimum safety standards, and compliance indicates no more than that the manufacturer performed the minimum effort required to make a product safe.¹²⁵ The general rule is illustrated by *Lubbock Manufacturing Co. v. Perez*.¹²⁶ In *Lubbock Manufacturing*, a case involving both negligence and strict liability claims, a liquified petroleum gas tank truck overturned, resulting in an explosion and fire which caused several deaths. The defendant, which had designed and manufactured the tank truck, argued that Texas courts were without jurisdiction to decide the adequacy of the design be-

121. See *supra* note 118.

122. Obviously, a product with a manufacturing flaw will never meet applicable governmental standards.

123. See authorities cited *supra* notes 4-7.

124. See, e.g., *Berkebile v. Brantly Helicopter Corp.*, 219 Pa. Super. 479, 484, 281 A.2d 707, 710 (1971).

125. See RESTATEMENT (SECOND) OF TORTS § 288C (1965); Weinberger, *supra* note 64, at 318; Comment, *The State of the Art Defense in Products Liability: "Unreasonably Dangerous" to the Injured Consumer*, 18 DUQ. L. REV. 915, 922 (1980).

126. 591 S.W.2d 907 (Tex. Civ. App. 1979).

cause the design was approved by the Texas Railroad Commission pursuant to its legislatively delegated authority. The court held that although "violation of a statute (or in this case, action of the Railroad Commission which consists of delegated legislative action) usually is negligence per se, it does not follow that compliance with a statute (or action of the Railroad Commission) establishes the defendant's due care as a matter of law."¹²⁷

The Illinois Supreme Court ratified this approach in *Rucker v. Norfolk & Western Railway*.¹²⁸ In one of the clearest judicial statements of the general rule, the court explained:

[E]vidence of compliance with Federal standards is relevant to the issue of whether a product is defective . . . , as well as the issue of whether a defective condition is unreasonably dangerous If the product is in compliance with Federal standards, the finder of fact may well conclude that the product is not defective, thus ending the inquiry into strict liability. If a finding is entered that the product is defective, evidence of compliance becomes additionally relevant to the issue of whether the defective condition is unreasonably dangerous.¹²⁹

The *Rucker* court also discussed the weight to be accorded evidence of compliance with federal standards. The defendant urged that it could not be strictly or otherwise liable for the manufacture of a defective product when the product is in compliance with federal regulations. The court disagreed, stating that a product may be defective "notwithstanding its conformity to Federal standards."¹³⁰ Moreover, the court noted that a state is not precluded from imposing more stringent standards on products than those imposed by federal regulations. As the court observed, to hold otherwise would be to control and limit state common law tort liability through the use of federal standards.¹³¹ This would usurp the power of a state court jury to determine independently whether a product is unreasonably dangerous or defective,

The general rule was also affirmed in *Wilson v. Piper Aircraft Corp.*¹³² *Wilson* was an aircraft design defect case in which the defendant manufacturer asserted that the airplane in question could not have been defective because it met all appli-

127. *Id.* at 914 (emphasis in original).

128. 77 Ill. 2d 434, 396 N.E.2d 534 (1979).

129. *Id.* at 439, 396 N.E.2d at 536-37.

130. *Id.* at 440, 396 N.E.2d at 537.

131. *Id.* See also *Olsen v. United States*, 521 F.2d 59, 67-68 (E.D. Pa. 1981) (government regulations admissible as evidence of trade custom or usage but plaintiff nevertheless can show a reasonable manufacturer would believe the regulations to be inadequate and conduct additional tests).

132. 282 Or. 61, 577 P.2d 1322 (1978).

cable Federal Aviation Administration (FAA) safety standards and had been issued a certificate of airworthiness by the FAA. The Oregon Supreme Court held that compliance with the FAA safety standards was not a complete defense in a defective design case.¹³³ In support of its holding, the court cited the FAA enabling statute,¹³⁴ which expressly provides that any safety standards set by the FAA are only minimum standards.¹³⁵ The court allowed that such safety standards should be considered, but stated that compliance should not be conclusive of nonliability in the absence of legislative intent indicating otherwise.¹³⁶ It concluded that if a statute or regulation expressly states that the standards are minimal, or is silent on the subject, then compliance with the statute or regulation only constitutes some evidence of nonliability. On the other hand, if the enacting or promulgating body declares the standards to be more than minimal, then they should be given more weight, although the court did not specify how much. The court presumably meant that compliance with such a standard should be conclusive if the enacting or promulgating body so stated. If that were the court's intention, however, the same federal-state conflict discussed in *Rucker* could arise. For example, a federal standard containing a "conclusive as to nonliability" clause would preclude a state jury from evaluating defectiveness on its own accord or with reference to a more restricted state standard.

In another case involving aircraft and the Federal Aviation Administration,¹³⁷ the Superior Court of Pennsylvania analogized to negligence cases in holding that compliance with FAA standards or regulations is not conclusive on the issue of dangerousness in strict products liability. The court noted that in a negligence case, evidence of compliance does not establish the exercise of due care as a matter of law; it is evidence of due care, but it is not conclusive. Compliance does not bar a finding of negligence when a reasonable person would have taken additional precautions to those set out in the regulation. The court applied this reasoning to strict liability theory:

133. *Id.* at 64, 577 P.2d at 1324-25.

134. 49 U.S.C. § 1421(a)(1) (1976).

135. "The Administrator is empowered and it shall be his duty to promote safety of flight of civil aircraft in air commerce by prescribing . . . [s]uch minimum standards . . . as may be required in the interest of safety . . ." *Id.*

136. 282 Or. at 70-71, 577 P.2d at 1328.

137. *Berkebile v. Brantly Helicopter Corp.*, 219 Pa. Super. 479, 281 A.2d 707 (1971).

Since the seller's care is immaterial, compliance with the FAA regulations was offered to show that the helicopter was not unreasonably dangerous It was certainly evidence to be considered by the jury but, by analogy to the negligence cases, we hold that it was not conclusive and the issue was entitled to go to the jury.¹³⁸

The court below had maintained that if a jury can reach its own conclusions concerning standards of defectiveness, then governmental regulations defining such standards are meaningless.¹³⁹ Such an argument is at best shortsighted, because it ignores the fact that governmental standards almost universally set up minimum requirements. These requirements do not pretend to represent the most advanced state of the art or the greatest safety that is technologically possible. To the contrary, governmental regulations define the lower limits of the standards of safety. The specifications contained in regulations, rules, and standards merely represent standards below which no product should fall. For a jury to find defective a product that complies with governmental standards in no way undermines the purpose and meaning of the standards. Such a finding would only reflect the jury's opinion, after hearing extensive testimony from both sides, that the product was unreasonably dangerous or defective, regardless of compliance with minimum standards.¹⁴⁰

Defendants, of course, would prefer that governmental regulations constitute a complete affirmative defense. In *Hurt v. General Motors Corp.*,¹⁴¹ the court accepted this view and held that a seat belt complying with "multifaceted regulations adopted by the federal government regulating the standards and installation of seat belts in motor vehicles" was not unreasonably dangerous as a matter of law.¹⁴² The plaintiffs' case

138. *Id.* at 485, 281 A.2d at 710.

139. *Id.* at 484, 281 A.2d at 710.

140. *Bruce v. Martin-Marietta Corp.*, 544 F.2d 442 (10th Cir. 1976), stands for the same proposition. *Bruce* involved a suit against an airplane manufacturer and an intermedidate seller arising out of an airplane crash. The court of appeals stated that compliance with governmental air safety regulations is some evidence of nondefectiveness, but is not conclusive. *Id.* at 446.

Similarly, in *Raymond v. Riegel Textile Corp.*, 484 F.2d 1025 (1st Cir. 1973), a clothing manufacturer sought to have an adverse award set aside on the ground that its product, a girl's nightgown, met the standards of flammability set by the federal government under the Flammable Fabrics Act, 15 U.S.C. §§ 1191 *et seq.* (1976), and therefore, as a matter of law, the product was not unreasonably dangerous. The First Circuit held that although compliance with federal standards is relevant, such standards are not to be used as the measure of defectiveness or unreasonable danger under New Hampshire state law. 484 F.2d at 1027.

141. 553 F.2d 1181 (8th Cir. 1977).

142. *Id.* at 1184.

had been dismissed pursuant to a take-nothing judgment, and the plaintiffs appealed on the ground of improper jury instructions. The Eighth Circuit affirmed the dismissal without regard to possible errors, because it found no evidence of any product defect. The court stated that General Motors should have been granted a directed verdict at the close of the evidence, because the seat belt angle was within the upper and lower limits prescribed by the federal standard.¹⁴³ In the court's view, a plaintiff's expert witnesses should not be allowed to second-guess the federal regulations, and no further duty should be imposed on the manufacturer.¹⁴⁴

Proponents of this complete defense argument believe that the safety of a particular product's design should not be left to the lay judgment of each individual jury. For example, in *Self v. General Motors Corp.*,¹⁴⁵ the California Court of Appeals observed that the "prosecution of a lawsuit is a poor way to design a motor vehicle."¹⁴⁶ Such courts decry the case-by-case determination of design safety by individual juries, which can ignore national or state standards, statutes, and regulations and rely instead on one expert's testimony that the product is unsafe. This concern was expressed by a defendant auto manufacturer in *Arbet v. Gussarson*:¹⁴⁷

[T]he national character of the automobile industry dictates that automobile design not be subject to piecemeal regulation by different juries in different states [T]he problem of designing safe cars is for Congress, not state courts, and . . . federal safety regulations established by the National Highway Traffic Safety Administration, pursuant to the National Traffic and Motor Vehicle Safety Act of 1966, pre-empt the field of automobile safety regulation thus rendering state courts powerless to act in this area.¹⁴⁸

This argument, however, was not received sympathetically by the court. It noted that the National Traffic and Motor Vehicle Safety Act of 1966 states that compliance with any federal motor vehicle safety standard promulgated under the Act does not relieve a manufacturer of common law liability.¹⁴⁹ In other words, the federal regulations were not conclusive, but were only supplementary to the law of products liability.

The *Arbet* court's position results in less uniformity than defendants would prefer. Although uniformity, in general, is a

143. *Id.* at 1182.

144. *Id.* at 1184.

145. 42 Cal. App. 3d 1, 116 Cal. Rptr. 575 (1974).

146. *Id.* at 7, 116 Cal. Rptr. at 579.

147. 66 Wis. 2d 551, 225 N.W.2d 431 (1975).

148. *Id.* at 562, 225 N.W.2d at 438 (footnote omitted).

149. *Id.*

desirable characteristic, unique circumstances and conditions dictate flexibility in the law. For example, specifications that are safe in one area of the country may not be in another. In addition, technology may improve between the time a standard is promulgated and the product is manufactured, and a jury should not be bound by an outmoded regulation. Moreover, not only are governmental standards seldom more than minimal, setting the lowest acceptable limits of safety, but they are often broad and general and incapable of accomodating every situation in which a product might be defective. Another problem with relying on governmental standards is that the decision as to what the standard should be is often influenced by political considerations. Large corporate manufacturers have the organization and financial resources to lobby government agencies and legislative bodies to adopt minimum safety standards. As a result, governmental standards often do not reflect the state of the art when they are promulgated, and they are even less representative after several years of technological advance. This lag is particularly evident in new industries in which improvements occur rapidly. Technological improvement, coupled with the phlegmatic nature of legislative and administrative bodies, results in outdated and inadequate safety standards that afford the consumer a relatively low level of protection. Allowing each jury to decide which products are unreasonably dangerous without being bound by federal regulations may sacrifice uniformity, but the sacrifice is worth the additional protection to the consumer.

At the other end of the spectrum, one could argue that a manufacturer's compliance or noncompliance with a governmental standard is irrelevant to any issue in a strict liability case, and any evidence relating to compliance ought to be excluded. This theory derives from the rationale of *Rourke v. Garza*,¹⁵⁰ which held that a manufacturer's conduct is irrelevant in a products liability case, because the focus is more properly placed on the product. The *Rourke* position suggests that evidence of compliance with governmental standards has no place in a products liability suit, because the evidence relates to the manufacturer's conduct. This argument, while superficially appealing, is flawed. The Illinois Supreme Court pointed out the flaw in *Rucker v. Norfolk & Western Railway*,¹⁵¹ in which the court considered whether evidence of governmen-

150. 530 S.W.2d 794 (Tex. 1975).

151. 77 Ill. 2d 434, 396 N.E.2d 534 (1979).

tal standards "improperly direct[s] the fact finder's attention to the manufacturer's conduct rather than the product and replace[s] strict liability standards with those of traditional negligence."¹⁵² The court noted that it is easy to turn the argument around and say that the focus is not on whether the manufacturer's conduct conforms to the governmental standard, but whether the product itself conforms.¹⁵³ When viewed this way, the product/conduct argument against admitting evidence of governmental standards simply disappears.

An alternative argument is that compliance with governmental standards in a product design case should be a complete defense, but only when the standards reflect the state of the art.¹⁵⁴ Industry custom would define the state of the art in this context. The Kansas Supreme Court appears to have taken this approach in *Jones v. Hittle Service, Inc.*¹⁵⁵ In *Jones*, a regulation promulgated by the state fire marshal required that all liquefied petroleum gas be odorized, so that in the event of a leak everyone in the affected area would be alerted. Defendants, the wholesale manufacturer and retail distributor of some liquefied petroleum gas that escaped and killed three persons, contended that the gas could not have been defective, because the requirements of the state regulation were met. The Kansas Supreme Court disagreed, stating that the same rule that applies to industry standards ought to apply to legislative standards and regulations, and compliance with these standards is only one kind of evidence that the product is not defective.¹⁵⁶ The court went on to place a heavy burden on a plaintiff in this situation, however. It stated that compliance may be conclusive of nondefectiveness in the absence of a showing of special circumstances. In other words, a manufacturer may rely on governmental standards as long as it does not have actual or constructive notice that the standards are inadequate.¹⁵⁷

By allowing the defendant to rely on governmental standards to the extent that the plaintiff cannot show that the standards have not become inadequate due to advances in technologies feasibility, the Kansas Supreme Court's position appears to strike a middle ground between mere admissibility

152. *Id.* at 439, 396 N.E.2d at 537.

153. *Id.*

154. See *Raleigh*, *supra* note 5, at 258.

155. 219 Kan. 627, 549 P.2d 1383 (1976).

156. *Id.* at 632, 549 P.2d at 1390.

157. *Id.*

and an affirmative defense. It leaves certain questions unanswered, however. Once compliance with governmental standards has been established, the issue shifts to the relationship between those standards and the state of the art. Because governmental standards are not definitive of the state of the art, the question of what remains. Although the various approaches described throughout this Article all reflect efforts to answer that question, the *Jones* approach provides no answers. Moreover, the approach taken in *Jones* burdens the plaintiff with proving, independent of the governmental standards, what the relevant state of the art is, a task which is considerably more difficult for the plaintiff than the defendant. In light of the frequent obsolescence of governmental standards and regulations, transferring the burden of proof on this issue hardly appears warranted.

Although the current general rule, that noncompliance with governmental standards is conclusive of defective design, while compliance is merely probative of the adequacy of the design, appears to offer the best solution, defendant manufacturers express discomfort with it. They suggest that if compliance with governmental regulations is merely probative and not conclusive, a jury could still find a defendant liable for not adopting the plaintiff's alternative, even though the plaintiff's preferred alternative might not meet governmental standards. This concern is real. That compliance with governmental regulations is not conclusive does not mean that it is unpersuasive. The kind of jury response that troubles defendants is likely to be rare, and the threat that it may occur does not appear to be sufficiently serious to justify a significant departure from the present general rule.

B. WARNING DEFECTS

Few warning defect cases based on strict liability involve admissibility of governmental standards,¹⁵⁸ although at least one case has held that evidence of noncompliance with governmental warning standards is admissible to show that a drug manufacturer is strictly liable in tort. In *Hoffman v. Sterling Drug, Inc.*,¹⁵⁹ the plaintiff was allowed to introduce sections of the Federal Food, Drug and Cosmetic Act¹⁶⁰ pertaining to warn-

158. See, e.g., *Basko v. Sterling Drug, Inc.*, 416 F.2d 417 (2nd Cir. 1969); *Sterling Drug, Inc., v. Yarrow*, 408 F.2d 978 (8th Cir. 1969).

159. 485 F.2d 132 (3rd Cir. 1973).

160. 21 U.S.C. §§ 321(p)(1), 355 (1976).

ings and to show that the defendant failed to comply with their provisions. Violation of the Act did not establish the defendant's liability as a matter of law, but constituted evidence of the defendant's failure to give adequate warning.

Because there are few strict liability cases in this area, any trend or rule concerning use of governmental standards in warning defects cases must be gleaned by analogy from the cases based on negligence. Strict liability design defect cases involving governmental standards have followed the pattern of negligent design cases, and it thus seems probable that the same pattern will occur in the warning cases.

Generally, the rule appears to be that governmental warning standards set only minimum requirements, and a manufacturer is charged with the duty to provide a better warning if necessary.¹⁶¹ This duty is often predicated on the manufacturer's knowledge that the warning approved or recommended by the government is inadequate.¹⁶² In addition, because any individual coming into contact with a product is within the class of persons to be protected, a defendant's duty extends to anyone who is harmed by its product.¹⁶³

In negligence cases, compliance with a governmental warning standard does not conclusively establish a manufacturer's nonliability. For example, the Supreme Court of Minnesota has held that compliance with federal regulations and city ordinances concerning labeling and warnings on flammable substances is not conclusive that the seller or manufacturer exercised due care, because such regulations and ordinances only constitute minimum standards.¹⁶⁴ Similarly, the California Supreme Court has stated that Food and Drug Administration regulations or directives as to warnings on drug packages may be only minimal.¹⁶⁵ Therefore, the manufacturer and supplier have a greater duty to warn, because they usually have greater knowledge than the FDA.

161. See Weinberger, *supra* note 64, at 318.

162. See *infra* note 165.

163. Cf. Comment, 29 OHIO ST. L.J. 177, 214-15 (1968) (design, construction, and performance standards for motor vehicles intended to protect owners, drivers, vehicle occupants, and pedestrians coming into contact with vehicles).

164. Blasing v. Hardenbergh Co., 303 Minn. 41, 49, 226 N.W.2d 110, 115 (1975).

165. Stevens v. Parke Davis & Co., 9 Cal. 3d 51, 65, 107 Cal. Rptr. 45, 53, 507 P.2d 653, 661 (1973). See also McEwen v. Ortho Pharmaceutical Corp., 270 Or. 375, 398, 528 P.2d 522, 534 (1974) (holding that FDA regulations are only minimal and that drug warnings may be inadequate even though in full compliance with governmental regulations and requirements).

Similarly, in a Texas Supreme Court case,¹⁶⁶ a defendant drug manufacturer contended that it had been relieved of any further obligation to warn of the dangers of its drug because the package insert warning had been approved by the Food and Drug Administration. The court held that a manufacturer has a duty to provide a better warning when, as in the case before it, the proper officials of the drug company know that the government approved warning is inadequate.¹⁶⁷ Although the court's opinion might be read to say that if the governmental agency that sets the standards for a particular warning knows that these standards are inadequate, the manufacturer is relieved of the duty of improving them, it is doubtful that the court meant to create such a rule. To predicate a manufacturer's duty to warn on the lack of knowledge of the regulatory body charged with promulgating warning standards would be a drastic modification of the general rule. Once a manufacturer notified the government that a particular statutory or regulatory warning was inadequate, the manufacturer would be relieved of any duty to incorporate its knowledge in a new warning until the government promulgated a revised standard. Manufacturers would be encouraged to pass on new information, but not to act on it until the bureaucratic process incorporated this new information into regulatory warning standards. Such a result would be clearly undesirable.

Courts also widely hold that violation of a regulation or statute dealing with product warnings is negligence per se,¹⁶⁸ because such regulations and statutes are promulgated to protect individuals from an unreasonable risk of injury or death. Compliance with a governmental warning standard, however, is usually considered to be only some evidence of due care. In *Hubbard-Hall Chemical Co. v. Silverman*,¹⁶⁹ the First Circuit held a poison manufacturer liable in negligence even though it had complied with all applicable governmental standards concerning labeling and warning. The court observed that governmental standards may not be adequate if foreseeable circumstances, such as illiterate consumers, dictate some other type of warning.¹⁷⁰ Other federal courts are of substantially the

166. *Bristol-Myers v. Gonzales*, 561 S.W.2d 801 (Tex. 1978).

167. *Id.* at 804.

168. *See, e.g., Steagall v. Dot Mfg. Corp.*, 223 Tenn. 428, 436, 446 S.W.2d 515, 518 (1969) (dicta); *Muncy v. Magnolia Chemical Co.*, 437 S.W.2d 15, 19 (Tex. Civ. App. 1968).

169. 340 F.2d 402, 405 (1st Cir. 1965).

170. *Id.*

same opinion.¹⁷¹

Some jurisdictions, however, find compliance with governmental warning standards very nearly conclusive evidence that the manufacturer or seller is not liable. In *McDaniel v. McNeil Laboratories, Inc.*,¹⁷² the Nebraska Supreme Court held that an FDA determination of the sufficiency of drug warning, while not necessarily conclusive of nonliability, should be given great weight. The court stated that approval by the FDA

should not be subject to challenge in a product liability case simply because some other experts may differ in their opinions as to whether a particular drug is reasonably safe, unless there is some proof of fraud or nondisclosure of relevant information by the manufacturer at the time of obtaining or retaining such federal approval.¹⁷³

By "relevant information," the court apparently meant a manufacturer's independent knowledge that the FDA's information is inaccurate, incomplete, or misleading. If this is a correct interpretation, the Nebraska court has developed a very harsh test. When carried to its logical extreme, *McDaniel* stands for the proposition that a government-approved warning on a product is adequate as a matter of law unless the manufacturer has committed some form of fraud by submitting inaccurate, incomplete, or misleading information to the agency. The Pennsylvania Superior Court took a similar position in *Leibowitz v. Ortho Pharmaceutical Corp.*¹⁷⁴ The court held that an FDA-approved warning conclusively determines that a drug is reasonably safe in the absence of "impurity or inadequacy of labeling."¹⁷⁵ The court did not specify, however, how a plaintiff might show "inadequate labeling" when the defendant shows that its warning was FDA-approved. If "adequate labeling" means compliance with the FDA warning standard, of course, no such occasion could arise.¹⁷⁶

C. STATUTES AND PRESUMPTIONS RELYING ON GOVERNMENTAL STANDARDS

A growing number of states have enacted legislation that

171. *Robbins v. Farmers Union Grain Terminal*, 552 F.2d 788, 791 n.26 (8th Cir. 1977); *Burch v. Amsterdam Corp.*, 366 A.2d 1079, 1086-88 (D.C. Cir. 1976).

172. 196 Neb. 190, 241 N.W.2d 822 (1976).

173. *Id.* at 200, 241 N.W.2d at 828.

174. 224 Pa. Super. 418, 307 A.2d 449 (1973).

175. *Id.* at 434, 307 A.2d at 458.

176. The court cited *Lewis v. Barker*, 243 Or. 317, 413 P.2d 400 (1966), which was overruled by the Oregon Supreme Court the year after *Leibowitz* was decided. See *McEwen v. Ortho Pharmaceutical Corp.*, 270 Or. 375, 398, 528 P.2d 522, 534 (1974).

extends the preceding argument and sets up a rebuttable presumption whereby compliance with governmental standards precludes liability.¹⁷⁷ The presumption exists in both negligence and strict liability cases, and applies to design and warning defects. The Tennessee statute,¹⁷⁸ which is typical, sets up a rebuttable presumption that a product is not unreasonably dangerous if it meets state or federal standards. Such an approach, however, is undesirable. The presumption places an unfair burden on the products liability plaintiff. Because regulatory standards establish minimum requirements, are susceptible to political partiality and abuse, and are unable to keep up with changing technology, a products liability plaintiff should not have to overcome an incorrect presumption that such standards are adequate.

At least one commentator, however, takes the state statutory reasoning a step further. He proposes that a defendant's compliance with mandatory federal or state standards ought to result in an irrebuttable presumption of nondefectiveness "in any respect in which the product complies."¹⁷⁹ This proposal has at least some supporting logic. If a regulatory body has made certain standards mandatory, so that it is a violation of the law to deviate from those standards, then perhaps those standards establish more than just a floor for consumer safety. The main reason to place little weight upon compliance with governmental standards is that most of these standards are in fact only minimal. If it could be demonstrated that the standards in question are much more than minimal, it would make sense to give the standards greater weight when assessing product defectiveness. Unfortunately, the political factors influencing regulatory agencies and legislatures may undercut the force of this logic. Manufacturers are likely to resist all but the most relaxed mandatory standards, and if their influence determines a standard's final form, even mandatory standards are not apt to protect the public adequately. Moreover, this approach would tend to promote technological stagnation, because a manufacturer who knows that compliance with a governmental standard is an absolute defense would not spend money upon research and development and would be discouraged from doing so, lest the government be tipped off to newly

177. See, e.g., COLO. REV. STAT. § 13-21-403(2) (Supp. 1980); TENN. CODE ANN. § 29-28-104 (1980); UTAH CODE ANN. § 78-15-6(3) (1977).

178. TENN. CODE ANN. § 29-28-104 (1980).

179. Kircher, *supra* note 75, at 298.

developed safety techniques and raise its standards accordingly.

A variation of the mandatory standards argument is that a manufacturer that has no choice but to construct its product according to the specifications of a mandatory standard should not be held liable for a finished product over which it had no control. This argument makes sense, however, only if the mandatory standard requires the defect. For example, if a safer seat belt design is inconsistent with mandatory standards, the manufacturer should not be liable for failing to adopt the safer design, since it is unlawful to do so. Under these conditions, an irrebuttable presumption of nondefectiveness makes sense. There are other situations, however, in which the presumption is less sensible. For example, if mandatory standards control many properties of seat belts, but fail to specify a minimum width, there is no compelling reason to allow a manufacturer to enjoy a conclusive presumption that its belt is nondefective because it complies with the standards in all other respects.¹⁸⁰

IV. LIMITS OF SCIENTIFIC OR TECHNOLOGICAL KNOWLEDGE

A major variant of the state of the art defense is a claim that the product was designed, manufactured and distributed according to the most advanced known scientific and technological methods, and thus it was impossible for the manufacturer to do anything to avert the injury. In other words, the relevant knowledge or technology simply did not support a change in design or in the manufacturing process, nor did it permit the manufacturer to warn of a given defect or risk.

As described earlier, there are three general types of limitations on scientific and technological knowledge.¹⁸¹ The first of these is the undiscoverable risk: a hazard is known to be present in some samples of a product, but it is impossible at the time of manufacture to know which samples are affected. Defendants usually introduce evidence that a risk was undiscoverable in manufacturing defect cases. A second limitation is

180. Dictum in a recent Missouri design defect case supports this position: "[C]ompliance with the minimum federal standards does not mitigate a manufacturer's responsibility under the theory of strict liability any more than does compliance with the state of the art unless such standards require the defective condition to exist." *Cryts v. Ford Motor Co.*, 571 S.W.2d 683, 689 (Mo. Ct. App. 1978).

181. See *supra* notes 8-11 and accompanying text.

the unknowable risk, in which the hazard that injured the plaintiff was not known, and could not be known, at the time the product was manufactured. Evidence that a risk was unknowable is usually submitted in an inadequate warning case. The third kind of limitation is that no one knew how to implement needed changes. This claim, which this Article has labeled technological impossibility, commonly appears in design defect cases.

Constraints imposed by limitations on scientific knowledge and its technological application raise different issues from those addressed in industry custom state of the art cases. Custom, industry standards and governmental regulations, once established, make conceptual sense as ordinary evidence or as affirmative defenses, although this Article has argued that policy considerations favor the former treatment. If evidence of scientific or technological limitations is admissible at all, however, it almost certainly will have the status of an affirmative defense. A defendant's showing that nothing it conceivably could have done would have prevented the injury, could hardly be just one of several factors for the jury to consider in determining liability. Thus, the issue in this area focuses on whether a hazard that is demonstrably impossible to avert will still result in the manufacturer's liability.

A. UNDISCOVERABLE RISKS

In manufacturing defect cases, the plaintiff's essential claim is that the manufacturing process has introduced defective items into the stream of commerce and for this reason, the manufacturer should be liable. The defendant's response that no manufacturing process will always result in 100 percent of the products being nondefective hardly constitutes a persuasive defense, for it is still possible to prevent injury if the manufacturer identifies the defective units and removes them from the stream of commerce. Indeed, the plaintiff may assert that it is the duty of a manufacturer to conduct inspections and tests to insure that the product will be reasonably fit and safe for its intended use, or for a use that is reasonably foreseeable. The Restatement conceives this duty as requiring such inspections and tests during the course of manufacture and after the article is completed as the manufacturer should recognize as reasonably necessary to secure the production of a safe article."¹⁸²

182. RESTATEMENT (SECOND) OF TORTS § 395 comment g (1965). A manufacturer may be required to test and inspect not only his own product, but the raw

In some cases, however, no tests exist that will reliably identify the hazardous units. If hazardous products are distributed despite the use of the very best testing and inspection procedures, a manufacturer may reasonably assert that the risks are undiscoverable, and that it should not be held liable.¹⁸³

One of the leading cases involving undiscoverable risks is *Cunningham v. MacNeal Memorial Hospital*,¹⁸⁴ in which the plaintiff alleged that while she was a patient in the defendant's hospital, she received a transfusion of defective blood and contracted serum hepatitis. In response, the defendant argued that "the state of medical science is such that there are absolutely no means by which the existence of serum hepatitis virus can be detected in whole blood, and that it should thus not be held strictly liable for injury caused thereby."¹⁸⁵ The appellate court held that the defendant was entitled to assert as an affirmative defense that the state of medical science precluded it from detecting hepatitis in blood. In recognizing the possibility of the "state of the medical science" defense, the appellate court stated that "[t]he defendant hospital may choose to defend its position at trial on the ground that blood is incapable of being made safe"¹⁸⁶

On appeal, however, the Illinois Supreme Court held as a matter of law that such a defense was not available to the defendant.¹⁸⁷ In the court's view, the same public policy considerations that required strict liability for defective products also barred the proposed defense:

Whatever be the state of the medical sciences in this regard, we disa-

materials or component parts from which the finished product is made. Manufacturers are presumed to possess sufficient technical knowledge to form a reasonably accurate judgment as to whether the raw material or component is reasonably suitable and safe after its incorporation into the finished product. See *Tromza v. Tecumseh Prods. Co.*, 378 F.2d 601, 604 (3rd Cir. 1967); *Nelson v. Coleman Co.*, 155 S.E.2d 917, 920 (S.C. 1967); *Standard Motor Co. v. Blood*, 380 S.W.2d 651, 656 (Tex. Civ. App. 1964). The amount of care that the manufacturer must exercise is proportionate to the extent of risk involved in using the article; the greater the risk, the greater the need for testing and inspections, and the greater the care that must be exercised in making the product. See *Pabon v. Hackensack Auto Sales, Inc.*, 63 N.J. Super. 476, 492, 164 A.2d 773, 781 (1960); *Markel v. Spencer*, 5 A.D.2d 408, 409, 171 N.Y.S.2d 770, 779, *aff'd*, 5 N.Y.2d 958, 157 N.E.2d 713 (1959).

183. See *supra* note 9 and accompanying text.

184. 113 Ill. App. 2d 74, 251 N.E.2d 733 (1969), *modified*, 47 Ill. 2d 443, 266 N.E.2d 897 (1970).

185. 47 Ill. 2d at 453, 266 N.E.2d at 902.

186. 113 Ill. App. 2d at 86, 251 N.E.2d at 739.

187. 47 Ill. 2d at 455, 266 N.E.2d at 903.

gree with defendant's conclusion. The Restatement provides in section 402A(2)(a) that "[t]he rule stated in subsection (1) applies although (a) the seller has exercised all possible care in the preparation and sale of his product." To allow a defense to strict liability on the ground that there is no way, either practical or theoretical, for a defendant to ascertain the existence of impurities in his product would be to emasculate the doctrine and in a very real sense would signal a return to a negligence theory.¹⁸⁸

The court's inflexible view of strict liability requires that the state of medical science be inadmissible, at least when the risk involved is known but not discoverable.¹⁸⁹

The *Cunningham* court also rejected the defendant's argument that, in view of the impossibility of discovering hepatitis in blood, the defendant should not be held strictly liable because of a recognized exception to the rule of strict liability found in comment k to section 402A of the Restatement.¹⁹⁰ This comment recognizes that certain beneficial products may also inherently present potential hazards to human health and safety, and that they cannot be made entirely safe for their in-

188. 47 Ill. 2d at 488, 266 N.E.2d at 902.

189. The court went on to state that: "[W]e believe that whether or not defendant can, even theoretically, ascertain the existence of serum hepatitis virus in whole blood employed by it for transfusion purposes is of absolutely no moment. Any other ruling would be entirely inconsistent with the concept of strict tort liability." *Id.* at 455, 266 N.E.2d at 903.

190. *See id.* at 455-56, 266 N.E.2d at 903-04. RESTATEMENT (SECOND) OF TORTS § 402A comment k (1965) provides:

(k). *Unavoidably unsafe products.*

There are some products which, in the present state of human knowledge, are quite incapable of being made safe for their intended and ordinary use. These are especially common in the field of drugs. An outstanding example is the vaccine for the Pasteur treatment of rabies, which not uncommonly leads to very serious and damaging consequences when it is injected. Since the disease itself invariably leads to a dreadful death, both the marketing and the use of the vaccine are fully justified, notwithstanding the unavoidable high degree of risk which they involve. Such a product properly prepared, and accompanied by proper directions and warning, is not defective, nor is it unreasonably dangerous. The same is true of many other drugs, vaccines, and the like, many of which for this very reason cannot be legally sold except to physicians, or under the prescription of a physician. It is also true in particular of many new or experimental drugs as to which, because of lack of time and opportunity for sufficient medical experience, there can be no assurance of safety, or perhaps even of purity of ingredients, but such experience as there is justifies the marketing and use of the drug notwithstanding a medically recognizable risk. The seller of such products, again with the qualification that they are properly prepared and marketed, and proper warning is given, where the situation calls for it, is not to be held to strict liability for unfortunate consequences attending their use, merely because he has undertaken to supply the public with an apparently useful and desirable product, attended with a known but apparently reasonable risk." (emphasis in original).

tended and ordinary use.¹⁹¹ Suppliers of these products will not be held strictly liable when proper warnings describing the risks accompany the product. In response to the defendant's argument that contaminated blood was such a product, the Illinois court stated:

We believe it clear that the exception set forth in the quoted comment relates only to products which are not impure and which, even if properly prepared, inherently involve substantial risk of injury to the user. Such exception cannot avail where, as here, the product is alleged to be impure.¹⁹²

Thus, in the view of the Illinois Supreme Court, comment k does not apply to a manufacturing defect case involving an undiscoverable but known risk.¹⁹³

Another court has firmly rejected the position adopted in *Cunningham* regarding the effect of comment k. In *Hines v. St. Joseph's Hospital*,¹⁹⁴ the court applied comment k on facts identical to those in *Cunningham*, noting that blood is an apparently useful and desirable product, and that the risk of hepatitis was outweighed by the public benefit derived from blood transfusions. The court concluded that blood fell squarely within the ambit of comment k, because blood is "an apparently useful and desirable product, attended with a known but apparently reasonable risk,"¹⁹⁵ and that the defendant's warning, as required by comment k, was sufficient under the facts of the case.

The *Hines* plaintiffs attempted to avoid application of comment k by reliance on *Cunningham*. The *Hines* court, however, severely criticized the *Cunningham*¹⁹⁶ holding with respect to comment k, pointing out that the *Cunningham* court "conve-

191. Comment k applies to known risks as opposed to unknowable risks. The question considered here is whether comment k applies when a risk is known but undiscoverable. The unknowable risk is discussed later in this Article. See *infra* notes 220-62 and accompanying text.

192. 47 Ill. 2d at 456, 266 N.E.2d at 904.

193. See S. Karasik, "State of the Art or Science": Is It a Defense to a Products Liability?, 60 ILL. B.J. 348, 356 (1972). The author notes that the Illinois Supreme Court abolished the state of the art defense in all products liability cases. The Illinois legislature, however, recently enacted legislation which precludes the kind of liability for blood transfusions that occurred in *Cunningham*. ILL. REV. STAT. ch. 111½, §§ 5101-5103 (1979).

194. 86 N.M. 763, 527 P.2d 1075 (1974).

195. RESTATEMENT (SECOND) OF TORTS § 402A comment k (1965). See 86 N.M. at 764-65, 527 P.2d at 1076-77.

196. For other criticisms of *Cunningham*, see Brody v. Overlook Hospital, 127 N.J. Super 331, 317 A.2d 392 (1974); Note, 69 MICH. L. REV. 1172 (1971); Note, 66 NW. U.L. REV. 80 (1971); Note, 32 OHIO ST. L.J. 585 (1971); Note, 24 VAND. L. REV. 645 (1971); Note, 16 VILL. L. REV. 983 (1971).

niently ignored"¹⁹⁷ the statement in comment k that it applies even when the product lacks "purity of ingredients."¹⁹⁸ In other words, comment k on its face quite clearly covers manufacturing defects involving impurity of product ingredients. The *Hines* court also argued that limiting applicability of comment k to "pure" products stultified the flexible policy behind the exception. "Instead of a balancing of the dangers of a particular product against its benefits, *Cunningham* would categorize a large segment of products as vulnerable to strict liability without regard to social benefits."¹⁹⁹

The scope of comment k actually is not as clear as the *Hines* court suggests. Comment k's discussion is limited to undiscoverable risks in the case of new or experimental drugs when, because of insufficient medical experience, there is no assurance that the drug's ingredients are pure. Comment k cannot be applied confidently beyond this limited situation; it cannot and should not be dispositive in the treatment of the undiscoverable but known risk.²⁰⁰ Nevertheless, it is appropriate to ask whether the underlying policy of comment k, which is meant to encourage the marketing of unquestionably beneficial products,²⁰¹ would be furthered or frustrated by the imposition of strict liability in such cases.

Although the *Hines* opinion sharply criticized the *Cunningham* court's failure to apply the balancing of risks and benefits manifest in the policy behind comment k, it is unclear how far the *Hines* court would extend the protection under a balancing test. Present case law does not support a balancing of utility and harm in all manufacturing defect cases.²⁰² Typically, if it is shown that the product does not meet its design specifications and that this flaw has caused harm, then liability automatically follows.²⁰³ No balancing test is used; the social benefits of the

197. 86 N.M. at 765, 527 P.2d at 1077.

198. RESTATEMENT (SECOND) OF TORTS § 402A comment k (1965).

199. 86 N.M. at 765, 527 P.2d at 1077.

200. It appears that the application of comment k to the blood transfusion-hepatitis cases is questionable. The *Hines* court thought that blood was analogous to the "new or experimental drugs" of comment k. Blood does not seem to be analogous to these types of drugs, however, because presumably there has been adequate time and opportunity for sufficient medical experiments to assure the purity of blood. The problem is that even though there has been sufficient time and opportunity for medical experiments, there was no way, at least before the date of *Hines*, to discover any impurities.

201. See *Needham v. White Laboratories, Inc.*, 639 F.2d 394, 401 (7th Cir. 1981); *Brochu v. Ortho Pharmaceutical Corp.*, 642 F.2d 652, 656-57 (1st Cir. 1981).

202. See *supra* text accompanying notes 22-45.

203. See *Henderson*, *supra* note 47, at 773-74.

product are irrelevant. Alternatively, the *Hines* court could mean that the balancing test ought to apply in all cases involving an undiscoverable but known risk. It is often difficult, however, to distinguish between the undiscoverable risk and any other manufacturing defect case. The undiscoverable but known risk cases are similar to those in which the risk is discoverable, but only at the expense of the destruction of the product. For example, in cases involving pork trichinosis, the trichinae "can be detected only by microscopic inspection of the entire carcass of the animal,"²⁰⁴ which would involve destruction of the product. Another example is found in *Pabon v. Hackensack Auto Sales, Inc.*,²⁰⁵ in which Ford Motor Company was held liable for breach of implied warranty as a result of a defective ball-bearing assembly supplied to Ford by a reputable ball-bearing manufacturer. The evidence indicated that Ford would have been able to detect the defect only by destructive testing of the ball bearing. No obvious reason exists why these cases should involve a different theory of liability from those in which the hazard cannot be detected at all. It should make no difference that the defect was undiscoverable by any testing or inspection or that it was discoverable only by destructive testing. But this fact, together with the approach of the *Hines* court, would require the balancing test in many cases in which the test has been squarely rejected. Numerous manufacturers could argue that it was "impossible" to discover defects in their products: a tin of canned meat,²⁰⁶ a candy sealed in a paper wrapper,²⁰⁷ or a bottled drink.²⁰⁸ In each of these cases, the presence of the adulterating substance could not have been discovered without destroying the product.²⁰⁹ Thus, if undiscoverability were to relieve a manufacturer of liability, consumers would be deprived of protection in cases involving a host of products that may find their way into the body.²¹⁰

204. *Cheli v. Cudahy Bros. Co.*, 267 Mich. 690, 693, 255 N.W. 414, 415 (1934).

205. 63 N.J. Super. 476, 491, 164 A.2d 773, 781 (1960).

206. *Blanton v. Cudahy Packing Co.*, 154 Fla. 872, 19 So. 2d 313 (1944).

207. *Wagner v. Mars, Inc.*, 166 So. 2d 673 (Fla. Dist. Ct. App. 1964).

208. *Florida Coca-Cola Bottling Co. v. Jordan*, 62 So. 2d 910 (Fla. 1953).

209. See *Community Blood Bank Inc. v. Russell*, 196 So. 2d 115, 119-20 (Fla. 1967) (Roberts, J. concurring), in which Judge Roberts stated:

These decisions stand for the proposition that the seller of a product intended for human consumption is liable for injurious consequences resulting from the consumption of a defective or adulterated product, even though it was at the time of the sale and consumption of such product practically or scientifically impossible to discover the defect in or adulteration of such product.

210. *Besheda v. Johns-Manville Products Corp.*, 90 N.J. 191, 198-99, 447 A.2d 539, 546-47 (1982).

Another basis to refuse to treat undiscoverable risk cases differently than discoverable risk cases is found in the policies underlying strict liability. In either case, the manufacturer is in the best position to spread the cost of unavoidable losses. Generally speaking, insurance against such losses is more effectively and economically procured by the manufacturer than by the average consumer, because the cost of insurance can be added to the product price.²¹¹ Alternatively, the manufacturer can insure itself and price the product to cover the cost of injuries. It seems more equitable to distribute the financial burden of the injuries resulting from product hazards among all who benefit from the use of the product, rather than to require innocent victims to shoulder such losses alone. This rationale applies with equal force to discoverable and undiscoverable defects. The other major policy rationale, accident minimization, might at first appear to cut the other way. After all, if discovery of the risk is impossible under known methods, a manufacturer cannot reduce the hazard even if it is highly motivated to do so by the threat of strict liability. The answer to this argument is that a motivated industry may allocate a greater share of resources to developing new technologies than it otherwise would have, if strict liability is a part of industry cost/benefit formulas.

These arguments suggest that the comment k exception should not be broadened, even in the context of undiscoverable risks, beyond the kinds of products it expressly discusses. From the manufacturers' viewpoint, however, such a narrow application might result in the withdrawal from the market of high risk, but beneficial, products. It is easier to express this concern, however, than to document it. Products containing undiscoverable but known risks are currently marketed, and it is not obvious that profitable products will be withheld because of a theory of strict liability, especially in view of the possibility of insurance. The burden should be on manufacturers to demonstrate empirically that a theory of strict liability has such an untoward effect. Assuming *arguendo* that it does, that effect would have to be balanced against the incentive for improvement that liability may entail. Finally, even when improvement appears impractical, a policy of allocating unpreventable losses weighs in favor of imposing liability.²¹²

211. See generally D. NOEL & J. PHILLIPS, *PRODUCTS LIABILITY IN A NUTSHELL* 136 (1st ed. 1974).

212. It has been suggested that comment k has as a theoretical base voluntary assumption of the risk. *Id.* at 138. Voluntary assumption of the risk, how-

The cumulative force of these arguments suggests that the policy behind comment k does not require its extension generally to manufacturing defect cases involving undiscoverable, but known, risks.

If comment k is not to be broadened beyond the class of cases it explicitly mentions, one must still determine the limits of that class. One approach is that taken by the court in *Cunningham*, which held that comment k does not apply when the product is allegedly "impure." The pure/impure distinction corresponds to the distinction between alleged defects in design and in manufacture. A product that is hazardous when pure is like a defective design, whereas hazards due to product impurities resemble defective manufacture. The *Cunningham* interpretation of comment k, however, has been criticized on the ground that the pure/impure distinction is insignificant.²¹³ The argument is based on the belief that, when a "product is needed and the user is made aware of the risk involved, then technical niceties as to whether the risk involves a manufacturing defect or a design defect should not be determinative" of liability.²¹⁴

An argument that the distinction between design and manufacturing defects may be irrelevant to determining when the product has sufficient utility to be encompassed by comment k does not help to delineate an appropriate scope for comment k. If the argument is intended to mean that the distinction between design and manufacturing defects is irrelevant to needed products generally, and by implication to those covered by comment k, it is simply wrong. A warning may discharge a manufacturer's duty in certain design cases,²¹⁵ but however beneficial the product, a warning does not generally discharge a manufacturer's duty with respect to a manufacturing defect. A similar argument put forward by one commentator notes that a "pure" product involving an undiscoverable risk may cause harm because the product is known to cause adverse reactions in some users and it is unpredictable which ones.²¹⁶ The Pasteur vaccine for rabies, explicitly mentioned in comment k, is a pro-

ever, appears to be a weak theoretical support. If comment k is intended to be limited primarily to drugs, then a consumer has little choice between a high risk drug and death or a debilitating disease.

213. Murray, *supra* note 50, at 657 n.37.

214. *Id.*

215. See *Needham v. White Laboratories, Inc.*, 639 F.2d 394 (7th Cir. 1981); *Rawlings Sporting Goods Co., Inc. v. Daniels*, 619 S.W.2d 435 (Tex. Civ. App. 1981).

216. See O'Donnell, *supra* note 97, at 641 n.49.

totypical example. An "impure" product involving an undiscoverable risk causes harm because of the undetectable presence in some product samples of a disease-causing organism, such as blood hepatitis. The commentator argues that a distinction between these situations is highly artificial, and should not have dictated the result in *Cunningham*.²¹⁷

The argument has merit. It is difficult to distinguish the Pasteur vaccine from blood plasma on any cogent ground. As noted earlier, however, it may also be difficult to distinguish blood plasma from impure packaged food. Obviously, lines must be drawn somewhere. Considerations already mentioned militate for limiting comment k to the products explicitly mentioned therein. The comment explicitly mentions "drugs and vaccines" of the type represented by the rabies vaccine. By implication, such products are "pure," in the sense that an adverse reaction reflects an unusual characteristic of the user rather than an unusual condition of the product. The comment also suggests that impurities might not amount to defects, or unreasonable dangers, in the case of "new or experimental drugs" for which there has been an insufficient accumulation of medical experience to assure their safety. A rule that applied comment k only to drugs and vaccines which are either pure, or if not pure then "new or experimental," would have the advantage of predictability and clarity. It would also foster one of the policies underlying § 402A, for if strict liability is applied to all undiscoverable but known risks except those mentioned in comment k, the increased pressure of liability might encourage efforts to discover the affected products.²¹⁸

One final argument has been made against the *Cunningham* interpretation of comment k. If liability is imposed when no available technology could have been employed to make the product safer, the argument runs, there is nothing a manufacturer or seller can do to avoid it. This is, in effect, absolute liability.²¹⁹ The shibboleth is that absolute liability makes a manufacturer an "insurer of its product," which predictably elicits judicial protest. The fact is that many manufacturing defect cases do approach absolute liability. While design cases require a balancing of risk and utility, manufacturing defect cases do not. As long as insurance is available and prices can

217. *Id.*

218. Blood transfusion-hepatitis and pork-trichinosis cases are leading examples of cases in which liability is frequently denied on grounds of the undiscoverability of the defect. See D. NOEL & J. PHILLIPS, *supra* note 211, at 130-34.

219. See O'Donnell, *supra* note 97, at 641 n.49; Robb, *supra* note 14, at 16.

be raised, however, manufacturers can share the burden of insuring product safety with users of the product.

B. UNKNOWABLE RISKS

When a plaintiff asserts that an inadequate warning resulted in an unreasonably dangerous product, the defendant may wish to respond that the risk which gave rise to the plaintiff's injury was unknowable prior to the injury.²²⁰ The defense is that the risk itself, rather than the failure of the risk detection method to discover all the defects, is unknowable.²²¹ While the consumer can be warned of an undiscoverable risk, and a supplier would seldom argue that it was not technologically possible to warn of a risk of danger in the case of such products, when the supplier is not and could not be aware of the danger, it is impossible to give a warning.²²² Of course, in those states which predicate the supplier's duty to warn on foreseeability of the risk,²²³ there is an easy solution to the problem this situation poses. By definition, an unknowable risk is not foreseeable, and thus the supplier has no duty to warn of it.

While every unknowable risk is unforeseeable, the reverse is not always true. Some risks may be knowable but unforeseeable. Consider a patient who obtains from two different physicians prescriptions for drugs having opposite physiological effects. Assume further that a patient who needs one of these drugs would never need the other. The risk that the mutually inhibiting action of these drugs would harm a patient who needed one of them is knowable. The hazard is unforeseeable, however, because it would be unlikely for anyone to be taking both drugs simultaneously.

Just as some courts and commentators assert that unforeseeability of the risk is irrelevant in determining liability, some courts have held that unknowability of the risk is irrelevant. The primary basis for this view is that strict liability is supposed to be strict. It is imposed without consideration of fault.

220. It has been argued that the only practical difference between the unknowable risk and the undiscoverable risk is the possible inability of the seller to insure against the unknowable risk. See D. NOEL & J. PHILLIPS, *supra* note 211, at 136.

221. See Byrne, *Strict Liability and the Scientifically Unknowable Risk*, 57 MARQ. L. REV. 660, 661 (1974).

222. Woodill v. Parke Davis & Co., 79 Ill. 2d 26, 33-34, 402 N.E.2d 194, 198 (1980).

223. See Byrne, *supra* note 221, at 663.

If the product is defective, then the fact that the "manufacturer was unaware of the existence of the defect does not alter the fact that it was defective."²²⁴ The seminal case in support of this view is *Green v. American Tobacco Co.*,²²⁵ in which the Florida Supreme Court held that a manufacturer and distributor of cigarettes could be found liable for breach of implied warranty resulting in death caused by smoking cigarettes. Liability could attach even though, prior to such injury, the manufacturer could not "by the reasonable application of human skill and foresight, have known that users of such cigarettes would be endangered"²²⁶ thereby. After tracing the history of Florida warranty law, the court concluded that "our decisions conclusively establish the principle that a manufacturer's or seller's actual knowledge or opportunity for knowledge of a defective or unwholesome condition is wholly irrelevant to his liability on the theory of implied warranty . . ."²²⁷

An alternative view is that strict liability should be imposed even when the risk was unknowable, unless the benefits of the product outweigh the ultimate harm to its users. Dean Keeton has adopted this position, arguing that the manufacturer of a "good" product, such as a drug designed to save lives, should not be held liable for side effects which were unknowable at the time of the product's distribution.²²⁸ If the utility of the product is insignificant, however, Keeton would favor placing the burden of absorbing the costs resulting from unknowable risks on the manufacturer.²²⁹

224. Keeton, *Products Liability—Liability Without Fault and the Requirement of a Defect*, 41 TEX. L. REV. 855, 861 (1963).

225. 304 F.2d 70 (5th Cir. 1962), *certified question answered*, 154 So. 2d 169 (Fla. 1963), *answer conformed to*, 325 F.2d 673 (5th Cir. 1963), *cert. denied*, 377 U.S. 943 (1964).

226. 154 So. 2d at 171.

227. *Id.* at 170. Apparently, the Florida courts have continued to apply this reasoning under § 402A of the Restatement. See *Rostocki v. Southwest Florida Blood Bank, Inc.*, 276 So. 2d 475 (Fla. 1973); *Community Blood Bank, Inc. v. Russell*, 196 So. 2d 115 (Fla. 1967).

228. See Keeton, *Products Liability—Some Observations About Allocation of Risks*, 64 MICH. L. REV. 1329, 1347 (1966) (using "undiscoverable risks" in the sense of unknowable risks); Keeton, *Manufacturer's Liability: The Meaning of "Defect" in the Manufacture and Design of Products*, 20 SYRACUSE L. REV. 559, 570-71 (1969).

229. Keeton uses cosmetics as an example of a nonessential product. His approach appears to be consistent with a market representation rationale for products liability. See Shapo, *supra* note 18, at 1258-64. Even with pervasive advertising, which distorts the free flow of relevant product information, consumers' access to information about nonessential products appears to be greater than for "experimental" products.

One commentator has applied the risk/benefit rationale to oral contracep-

The third approach is to impose no liability for injuries resulting from unknowable hazards. One writer has suggested that the basic issue is whether a product containing such a risk is in fact "defective,"²³⁰ and indeed, nondefectiveness would be one theory on which to relieve a manufacturer of liability. The more common argument, however, is that it is simply impossible for a manufacturer to give a warning of a risk if the manufacturer has no knowledge of the risk.²³¹ This theory was alluded to in *Borel v. Fibreboard Paper Products Corp.*,²³² in which the plaintiff developed asbestosis after handling asbestos insulation for a number of years. Although the particular risk was known, the court's opinion discussed the problem of unknowable risk. "A seller has a responsibility to inform users and consumers of dangers which the seller knows or should know at the time the product is sold. The requirement that the danger be reasonably foreseeable, or scientifically discoverable, is an important limitation of the seller's liability."²³³ The court's language does not distinguish undiscoverable and unknowable risks in terms of the availability of this limitation. The court also ignored these distinctions in considering the application of strict liability. In a footnote appended to the above quotation, the court noted that under a strict liability standard with no "foreseeability" limitation, "the fact that the maker was excusably unaware of the extent of the danger would be irrelevant."²³⁴

Unknowable developmental risks also were recognized as a

tives, concluding that because oral contraceptives are nonmedicinal and are only one method of preventing pregnancy, their overall utility is insufficient to remove sellers from strict liability when weighed against the risks inherent in their use. Comment, *Liability of Birth Control Pill Manufacturers*, 23 HASTINGS L.J. 1526 (1972). These arguments are supported in D. NOEL & J. PHILLIPS, *supra* note 211, at 136. For a criticism of the risk/benefit test as applied to products containing unknowable hazards, see Byrne, *supra* note 221, at 674-75.

230. Byrne, *supra* note 221, at 663.

231. See RESTATEMENT (SECOND) OF TORTS § 402A comment j (1965), which takes this position when it states that a seller is required to give a warning against a danger, "if he has knowledge, or by the application of reasonable, developed human skill and foresight should have knowledge, of the presence of the ingredient and the danger." *Id.*

232. 493 F.2d 1076 (5th Cir. 1973), *cert. denied*, 419 U.S. 869 (1974).

233. *Id.* at 1088.

234. *Id.* at 1088 n.22. The court proceeded to state the obvious conclusion: "The requirement of foreseeability coincides with the standard of due care in negligence cases in that a seller must exercise reasonable care and foresight to discover a danger in his product and to warn users and consumers of that danger." (emphasis in original). *Id.* See also *Beshada v. Johns-Manville Products Corp.*, 90 N.J. 191, 447 A.2d 539 (1982).

basis for restricting liability in *Basko v. Sterling Drug, Inc.*²³⁵ The plaintiff in *Basko* was treated with three different drugs to counteract a skin disease. After using these drugs for several years, the plaintiff suffered a reaction to two of the drugs, both of which contained chloroquine, and her vision deteriorated to the point of near-blindness. The risk of ocular complications was unknown prior to the marketing of the drugs. The court applied comment k of the Restatement, treating the drugs as the kind of products to be characterized as "unavoidably unsafe."²³⁶ Comment k provides that a manufacturer will not be held strictly liable if it gives an adequate warning of the risks involved. The court pointed out, however, that comment k adopts the ordinary negligence concept of the duty to warn,²³⁷ and under ordinary negligence standards, a defendant is not required to warn of unknown dangers. The *Basko* court thus maintained that for products covered by comment k, a duty to warn attaches when the risk becomes apparent.²³⁸

A California court²³⁹ reached a similar result but grounded its reasoning in comment j of the Restatement,²⁴⁰ rather than comment k. In denying recovery to the plaintiff, who suffered a

235. 416 F.2d 417 (2d Cir. 1969).

236. The court's reliance upon comment k is misplaced. Comment k applies only to known risks and does not apply to unknowable risks. See *supra* notes 190-93 and accompanying text.

237. It would be more accurate to say that comment j, not k, adopts the ordinary negligence concept of a duty to warn. See *infra* note 240.

238. 416 F.2d at 426. In another case involving a chloroquine drug, *Christofferson v. Kaiser Foundation Hosps.*, 15 Cal. App. 3d 75, 92 Cal. Rptr. 825 (1971), the court advanced the unknowable developmental risks rationale to preclude the manufacturer's liability:

To require [defendant] to compose a warning of side effects not suggested by careful laboratory procedures such as a preceded distribution of [the drug] would seem to require either a semantically impossible sort of warning or one which would effectively bar the very experience which alone could give early hint of side effects of a new product extremely valuable in many cases of specific illnesses.

Id. at 79-80, 92 Cal. Rptr. at 827.

239. *Oakes v. E.I. DuPont de Nemours*, 272 Cal. App. 2d 645, 77 Cal. Rptr. 709 (1969).

240. RESTATEMENT (SECOND) OF TORTS § 402A comment j (1965) provides:

In order to prevent the product from being unreasonably dangerous, the seller may be required to give directions or warning, on the container, as to its use . . . [When] . . . the product contains an ingredient to which a substantial number of the population are allergic, and the ingredient is one whose danger is not generally known, or if known is one which the consumer would reasonably not expect to find in the product, the seller is required to give warning against it, *if he has knowledge, or by the application of reasonable, developed human skill and foresight, should have knowledge*, of the presence of the ingredient and the danger.

(Emphasis added).

severe allergic skin reaction to an ingredient in the defendant's weed killer, the court observed that comment j merely expresses well-settled rules that are already part of negligence law.²⁴¹ Under negligence principles, a manufacturer has no duty to warn of an unknowable hazard. The court reasoned that "[t]o exact an obligation to warn the user of unknown and unknowable allergies, sensitivities and idiosyncrasies would be for the courts to recast the manufacturer in the role of an insurer beyond any reasonable application of the rationale expressed above."²⁴²

The *Oakes* opinion raises the argument mentioned previously in this Article,²⁴³ that the imposition of liability in the case of unknowable risks would impose absolute liability, casting the manufacturer in the role of an insurer. Courts have stated time and again that a manufacturer is not an insurer of its product.²⁴⁴ If this assertion means anything, a manufacturer should be excused from liability in this situation. Furthermore, comment j of the Restatement supports a conclusion of nonliability.²⁴⁵ Nonetheless, one can argue that the rationales behind section 402A of the Restatement should also apply to the unknowable risk.

Several commentators have argued that, despite the unknowability of a risk, the policies underlying strict liability support its application. Professor Rheingold has argued that imposition of liability will achieve desirable loss minimization because it will motivate manufacturers to proceed with more care. For example, imposition of liability might encourage the use of more tests for early detection of potential risks.²⁴⁶ Alternatively, manufacturers might keep new products off the market for further testing, which would result in safer products. In addition, many commentators believe that the imposition of liability, even when a risk is unknowable, will produce desirable loss spreading. They argue that competition within the industry will induce companies to research, develop, and market new products, and that mass marketing will spread the cost of liability. They reject the claim that product prices will rise intolerably.

241. 272 Cal. App. 2d at 649 n.4, 77 Cal. Rptr. at 713 n.4.

242. *Id.* at 649, 77 Cal. Rptr. at 713.

243. *See supra* text accompanying note 219.

244. *See, e.g.,* *Borel v. Fibreboard Paper Products Corp.*, 493 F.2d 1076, 1087 (5th Cir. 1973) *cert. denied*, 419 U.S. 869 (1974).

245. *See supra* note 240.

246. *See, e.g.,* Rheingold, *Products Liability—The Ethical Drug Manufacturer's Liability*, 18 RUTGERS L. REV. 947, 1015-17 (1964).

bly or manufacturers will be driven into bankruptcy.²⁴⁷

These policy-based arguments for imposing liability for injuries from unknowable risks have been challenged. Professor Connolly has attempted to show that the loss-spreading rationale does not apply to an unknowable risk,²⁴⁸ by arguing that a manufacturer cannot spread the loss from an unknown risk because the manufacturer has no way of estimating the amount of loss or how often it may occur.²⁴⁹ For example, the hazard may cause a mild cosmetic problem in a small proportion of users, or it may cause severe disability in a relatively large proportion of users. Professor Byrne adds that such a risk cannot be considered a cost of production to be passed on to the public, because there is no way to anticipate the unknowable and assign it a monetary value that can be added to the sales price.²⁵⁰ He observes that the manufacturer or seller is in no better position than the user or consumer to protect against an unknowable risk, because the manufacturer was incapable of detecting it. Imposing liability under these circumstances would have little impact on improving research and testing procedures, as the manufacturer already has done everything possible to eliminate possible hazards.²⁵¹

To claim that the two primary rationales of strict liability are completely inapposite to the unknowable risk, however, is an overstatement. Although the unknowable risk may not be an easily computed cost of production, this does not mean that losses incurred from unknowable risks cannot be spread throughout society. Difficulty in assessing speculative risks means only that, until a hazard surfaces, the manufacturer may overestimate or underestimate the cost of the risk in setting prices. Once risks become known, they can be considered costs of production in the usual manner. At best, therefore, the argument against loss spreading in this situation applies only to the first few injuries that occur before a company can treat a risk as a cost of production. There appears to be no reason why a manufacturer cannot insure against these initial injuries or in-

247. See, e.g., *id.*

248. Connolly, *The Liability of a Manufacturer for Unknowable Hazards Inherent in His Product*, 32 INS. COUNCIL J. 303 (1965).

249. "Where the manufacturer cannot spread the risk, he should not, it would seem, be liable for the defect, because there would be no justification for making him liable. The only difference between him and the consumer in this case is that he has the deeper pocket." *Id.* at 307.

250. Byrne, *supra* note 221, at 674. A case which supports this position is *Lartigue v. R.J. Reynolds Tobacco Co.*, 317 F.2d 19, 36-37 (5th Cir. 1963).

251. Byrne, *supra* note 221, at 674.

crease the price of its product after the losses from these injuries have been calculated.

Similarly, although the manufacturer may be in no better position than the consumer to minimize accidents by protecting against a risk, it is equally true that the manufacturer is in no worse a position to protect against the risk. More important, however, liability may provide an incentive to develop new techniques for discovering such risks.²⁵² It may also provide a disincentive to premature marketing of potentially hazardous products.

An affirmative reason sometimes advanced for limiting liability is that it might effectively reduce the accumulation of sufficient user experience indispensable to research.²⁵³ For some products, such as drugs, use by human beings is the only way tests can be thoroughly conducted and risks discovered. Imposition of strict liability allegedly would be a deterrent to such experience.²⁵⁴ The argument does not withstand critical scrutiny, however. If a given amount of user experience is essential to testing and risk detection, it is not obvious how liability would deter accumulation of that experience without minimizing accidents. If a hazard will only appear, for example, after a million people have used a drug, it is unclear how liability for injury to the millionth person would influence the behavior of the manufacturer. Strict liability *aut non* gives the manufacturer no special interest in stretching the first million sales over a longer or shorter time. On the other hand, "detering sufficient user experience" may actually mean "withholding the product from the market for the purpose of doing more testing than would otherwise be done."²⁵⁵ This promotes accident reduction, which is perceived by many as a benefit of strict liability in the case of unknowable risks.²⁵⁶

Between strict liability and no liability, therefore, it appears that the weight of the arguments favor strict liability

252. It is questionable whether a risk is really ever "unknowable." It may be unknowable at a certain point in time, but sometime in the evolution of science the "unknowable" becomes known.

253. See, e.g., *Christofferson v. Kaiser Foundation Hosps.*, 15 Cal. App. 3d 75, 80, 92 Cal. Rptr. 825, 827 (1971); Byrne, *supra* note 221, at 673. One commentator would make knowledge-based state of the art a complete defense. See Note, *Product Liability Reform Proposals: The State of the Art Defense*, 43 ALB. L. REV. 941, 959 (1979).

254. Keeton, *supra* note 224, at 861.

255. *But see* Rheingold, *supra* note 246, at 1015-17 (arguing that manufacturers' insurance is usually sufficient to cover liability for prematurely released drugs).

256. See Shapo, *supra* note 18, at 1261-62.

when the risk associated with the product is unknowable. The choice would be much easier, of course, if empirical data existed concerning how manufacturers would respond to imposition of strict liability when a risk is unknowable a priori. The imposition of strict liability over the last two decades, however, does not appear to have abated the number of new products entering the marketplace. Moreover, the major policies underlying section 402A of the Restatement, loss spreading and accident minimization, appear better served by the imposition of liability, at least until there is affirmative evidence that such a practice defeats a competing social policy.

The intermediate approach, balancing utility against risk when a previously unknowable hazard has surfaced, is also subject to policy-based objections. Manufacturers will be discouraged from marketing new products if their products are judged as of the time of trial, after a risk is known. Of course the liability, not the time perspective, affects manufacturer behavior. Because the only alternative to viewing the product as of the time of trial is viewing it before the risk is known, the argument becomes that liability for unknowable risks will discourage the marketing of new products. If this claim is true, the burden of producing empirical evidence to support it should fall on those who assert it. Meanwhile, the empirical evidence that has been collected fails to substantiate this assertion.²⁵⁷ While many manufacturers believe that liability for unknowable risks will discourage the introduction of new products,²⁵⁸ and some have claimed that products liability has forced them to abandon some new products,²⁵⁹ it is impossible to know whether there has been a positive or negative impact.²⁶⁰

Another objection to balancing utility and risk is that quantifying utility and risk is difficult, and a court is probably not the best agency to make this judgment.²⁶¹ A detailed discussion of this argument is beyond the scope of this Article. Courts are regularly called upon to quantify utility and risk, however, in all design defect cases and in the economic ap-

257. See U.S. DEPT OF COMMERCE, FINAL REPORT OF THE INTERAGENCY TASK FORCE ON PRODUCT LIABILITY, at VI-29 (1978) [hereinafter cited as REPORT].

258. *Id.* at IV-30.

259. *Id.* at IV-29 to IV-30.

260. *Id.* at IV-30.

261. Henderson, *Judicial Review of Manufacturer's Conscious Design Choices: The Limits of Adjudication*, 73 COLUM. L. REV. 1531, 1552-62 (1973).

proach to negligence,²⁶² and will doubtless continue to struggle with the issue. A stronger argument is that because the analysis takes place after the fact, a risk-benefit analysis promotes the underlying policies of strict liability no better than absolute liability. In other words, the problems raised by courtroom balancing do nothing to advance the policies behind section 402A of the Restatement. As an illustration, consider the manufacturer of a new and effective backache reliever. If the manufacturer were subject to absolute liability for any unknowable risks, one could argue that the manufacturer would automatically tend to delay marketing of the product in an attempt to minimize the likelihood that the product contains any defect. If risk/utility balancing were used, the manufacturer would be held liable only for risks that outweigh product utility. These liability producing risks, however, are the most significant in the context of loss spreading. The less expensive risks will not result in liability at all. Thus, the balancing approach gives the manufacturer very little more basis for mathematically calculating losses as production costs than does absolute liability, because the only difference between them is the less expensive risks.

One might also argue that balancing achieves the goal of accident minimization no better than does absolute liability. Although manufacturers might devote research efforts to improving their premarketing hazard detection techniques, it is unlikely that they can focus their research selectively on the hazards for which they will have to pay under a balancing approach, because the risks are unknown. Thus, the accident reduction resulting from use of a balancing test may not be much greater than that resulting from the imposition of absolute liability.

The only advantage the balancing of risks and benefits may offer over absolute liability is that, knowing that liability varies with product utility, manufacturers may adjust the caution with which they market a product to the value of the product. Thus, the public may receive the benefits of a needed product earlier than a less necessary one, because the manufacturer takes relatively less risk in marketing the product without exhaustive testing. If manufacturers did this, premarket test intensity would tend to correspond to product usefulness or need. This

262. See Twerski, Weinstein, Donaher & Piehler, *The Use and Abuse of Warnings in Products Liability—Design Defect Litigation Comes of Age*, 61 CORNELL L. REV. 495 (1976).

potential salutary effect of balancing, however, probably does not offset the problems associated with it.

In the other two types of scientific impossibility, scientifically undiscoverable and technologically impossible, the writer, believing that the weight of the arguments favors imposing some liability, has opted for a middle ground by employing a balancing test. As previously demonstrated, the balancing approach is not as suitable for the unknowable risk. Therefore, one is left with an unhappy choice between no liability and absolute liability. The choice turns primarily on the effect absolute liability would have on the manufacturer. For want of empirical evidence, the effect is problematic. In one sense we are left to choose the best among highly speculative arguments. This writer believes that the best arguments favor liability. In another sense, because the arguments are so highly speculative, we have come face to face with a bare axiological choice between an innocent, injured plaintiff and an innocent seller. This writer opts for the plaintiff on humanitarian grounds. On the scale of competing human values, relieving the plaintiff of involuntary penury must rank very high.

C. TECHNOLOGICAL IMPOSSIBILITY

In any design defect case, the plaintiff must convince the court that the defendant's product design was flawed or inadequate in such a way as to create an inherently dangerous product.²⁶³ To do this, the plaintiff normally must present an alternative design that he or she claims the manufacturer should have adopted. The defendant might respond by contending that this design change would have been "impossible" to implement at the time of the product's manufacture. Of course, if the suggested design change could have been implemented, then the defendant's failure to conceive of the alternative design does not amount to a showing of impossibility.²⁶⁴ Rather, in a case in which impossibility is maintained, the defendant must demonstrate that the design change could not have been implemented even if someone had thought of it. The issue in such a case will center on technological implementability. Similarly, the issue will arise when the defendant asserts that while the need for a design change was known, neither the defendant nor anyone else knew how such a change

263. Henderson, *supra* note 261, at 1543.

264. See Note, *supra* note 253, at 959.

could be implemented technologically.²⁶⁵

A central problem in any case in which technological impossibility is raised as a defense is determining the sufficient conditions for "nonimplementability." Suppose that no one currently knows how to implement the change, but there is a known scientific principle that would solve the problem if someone could only achieve a mental breakthrough and apply the principle. For example, assume if the issue in *The T. J. Hooper* had been whether the tugboat should have been equipped with radar, rather than a radio. As early as 1886, a German physicist had demonstrated that radio waves could be beamed back from various objects. Roughly twenty years later, another German scientist demonstrated the use of radio echoes as an aid to ship navigation.²⁶⁶ Before these discoveries, radar was manifestly "technologically impossible." Still twenty years later, when the T. J. Hooper set out from Norfolk on its ill-fated voyage, radar installation was theoretically possible, if not technologically implementable. Was it, then, still technologically "impossible" to equip the T. J. Hooper with radar? Apparently so, but not in the same way it was impossible before the German discoveries. The asserted technological impossibility also differs from a claim that equipping the tug with radar was impossible because no one had yet thought of it—as would have been the case, for example, if radar had been discovered and used for various things, but no one had thought of using it for navigation.

Thus, a defendant may claim technological impossibility because (a) the relevant scientific principles are unknown, (b) no one has thought of applying the principles to the product involved in the case, or (c) no one has been able to translate the scientific principles into a workable product. Most cases involve situations described by (c); there is no question that a design change has been considered, and the relevant scientific principles have been discovered, but the manufacturer asserts that it was not yet known how to apply those principles to implement the design change. Within this class of cases, three questions arise in establishing the factual existence of technological impossibility: (1) When does the knowledge of how to implement the design change become sufficiently avail-

265. Whether a design change which is technologically possible but not practical or feasible constitutes any kind of defense is discussed later in this Article. See *infra* notes 279-85 and accompanying text.

266. Raleigh, *supra* note 5, at 255.

able that the technologically impossible becomes possible? (2) After the design change is technologically possible, for how long can the manufacturer continue to produce products of the earlier design? (3) From what temporal perspective is technological impossibility to be viewed?

To illustrate the first question, suppose Professor Jones of State University has conceived the technology needed to implement the design change. Furthermore, suppose that Professor Jones has written a monograph on the subject which had the misfortune to be reviewed for publication by an old rival, who rejected it without understanding it. The manuscript, therefore, was not published in a major journal, and now reposes in the library of the University. The idea is understood perfectly by Professor Jones and no one else, until the plaintiff's experts begin to study it. It is clear that Professor Jones's idea has advanced the state of the art, but to what extent can the manufacturer be held responsible for that knowledge? Strictly speaking, the design change is no longer technologically impossible to implement. The issue thus shifts to when the design change is technologically possible for the defendant manufacturer.

Courts have often said that a manufacturer is to be considered an expert in its field and thus have recognized a manufacturer's duty to keep abreast of developments therein.²⁶⁷ Courts have never explained the full extent of this obligation, however. For example, it is unclear whether the obligation would attach in the above hypothetical. A fair rule would be that a manufacturer must make all reasonable efforts to keep abreast of new ideas. The reasonableness of such an effort would depend on the difficulty involved in locating ideas. Thus, if a manufacturer making a reasonable effort to locate information relevant to the design change probably would not have run across Professor Jones's monograph, the manufacturer may raise the claim of technological impossibility in his defense to a products liability action.

The second question is how much time the manufacturer should have to implement the design change after the technological breakthrough has occurred. Suppose that Professor Jones's idea is published in a trade journal with maximum cir-

267. See *Schenebeck v. Sterling Drug, Inc.*, 423 F.2d 919 (8th Cir. 1970); *Hall v. E.I. Du Pont de Nemours, Inc.*, 345 F. Supp. 353 (E.D.N.Y. 1972); *Garst v. General Motors Corp.*, 207 Kan. 2, 484 P.2d 47 (1971); *Milau Associates, Inc. v. North Ave. Dev. Corp.*, 42 N.Y.2d 482, 368 N.E.2d 1247, 398 N.Y.S.2d 882 (1977); *Codling v. Paglia*, 32 N.Y.2d 330, 298 N.E.2d 622, 345 N.Y.S.2d 461 (1973).

ulation only two weeks before the manufacture of the product that causes the plaintiff's injury. Should the manufacturer be permitted any lead time during which he may still argue technological impossibility, and if so, how much? One commentator has suggested the strict rule that no lead time should be permitted,²⁶⁸ an approach that seems rather unfair to the manufacturer. Giving a manufacturer no time in which to make changes results in absolute liability, at least during the interval in which the manufacturer could not have done anything to obviate the hazard. On the other hand, if liberal amounts of delay are tolerated in implementing the new technology, the legal incentive to promote the design and manufacture of safer products is diminished, and an important policy of strict liability is subverted. The proper course appears to be to allow a reasonable amount of lead time to implement the new technology, with reasonableness based on the type of product and the difficulty involved in implementation.

In a sense, the question just discussed assumes the answer to the third question, the temporal perspective from which the technological impossibility must be judged. If technological impossibility were a defense only when the design change is still impossible at the date of trial, there would be no issue of a reasonable time to implement the change. Clearly, the logic of allowing the defense at all argues for choosing the time of manufacture as the critical point. Otherwise, a manufacturer who has responded to a spate of injuries by energetically and successfully researching the technology for a design change might find that it has in effect created its own liability.

Assuming that the evidence factually establishes technological impossibility, it must be determined whether the evidence is relevant in a design defect case, and if so, the issue to which it is relevant. Courts must also determine whether technological impossibility should constitute an affirmative defense. A "due care" argument undoubtedly could be made that what the manufacturer could do is directed at the element of negligence, which is not in issue in strict products liability. Under this argument, such evidence should be excluded, because it focuses on the reasonableness of the manufacturer's conduct instead of the product and its defectiveness. This approach appears to have been adopted in *Stanfield v. Medalist Industries, Inc.*,²⁶⁹ in which the plaintiff suffered the loss of several

268. See Note, *supra* note 253, at 952.

269. 34 Ill. App. 3d 635, 340 N.E.2d 276 (1975).

fingers while operating a boring and cutting machine. The plaintiff alleged that the machine was defective because it lacked a shield to prevent this sort of injury. The manufacturer defended by saying that no such safety devices were available at the time the machine was sold or even at the time of trial.²⁷⁰ The court quoted from *Cunningham v. MacNeal Memorial Hospital*,²⁷¹ to the effect that to allow this state of the art defense would signal a return to negligence theory, and concluded that "the availability or non-availability of safety devices or industry standards is, as stated by the Supreme Court in *Cunningham*, *supra*, 'of absolutely no moment.'"²⁷² This "due care" argument essentially precludes the products liability defendant from telling the jury or the court that the alternative design proposed by the plaintiff could not have been implemented when the product was manufactured, or even, as in *Stanfield*, at the time of trial. Courts are unlikely to adopt this approach in great numbers, because of their oft-stated antipathy to imposing absolute liability and forcing manufacturers and sellers to become insurers of their products.²⁷³

In *Stanfield*, technological impossibility apparently was also rejected as an affirmative defense. Other courts have admitted the evidence as relevant to some issue in the plaintiff's case, but not as an affirmative defense. For example, in *Bruce v. Martin Marietta Corp.*,²⁷⁴ the court found evidence of technological impossibility was relevant to a determination of consumer expectations, and consequently relevant to the issue of defectiveness. The court reasoned that no ordinary consumer would expect an aircraft made in the 1950's to employ the safety features of an aircraft made in the 1970's. In so holding, the court stated:

There is 'general' agreement that to prove liability under § 402A the plaintiff must show that the product was dangerous beyond the expect-

270. It is difficult to tell whether *Stanfield* involved a feasibility state of the art or a technologically impossible state of the art claim. Because the court stated that the safety devices were not "available," it will be assumed that the court was referring to technological impossibility. The same inference can be drawn from the court's reliance upon *Cunningham v. MacNeal Memorial Hosp.*, 113 Ill. App. 2d 74, 251 N.E.2d 733 (1969), *modified*, 47 Ill. 2d 443, 266 N.E.2d 897 (1970) because *Cunningham* was also a developmental limitations case.

271. 113 Ill. App. 2d 74, 251 N.E.2d 733 (1969), *modified*, 47 Ill. 2d 443, 266 N.E.2d 897 (1970).

272. 34 Ill. App. 3d at 641, 340 N.E.2d at 280.

273. "No one wants absolute liability where all the article has to do is to cause injury." *Phillips v. Kimwood Machine Co.*, 269 Or. 485, 491, 525 P.2d 1033, 1036 (1974).

274. 544 F.2d 442 (10th Cir. 1976).

tation of the ordinary customer. The state-of-the-art evidence helps to determine the expectation of the ordinary consumer. A consumer would not expect a Model T to have the safety features which are incorporated in automobiles made today. The same expectation applies to airplanes. [The] plaintiffs have not shown that the ordinary consumer would expect a plane made in 1952 to have the safety features of one made in 1970.²⁷⁵

Although the Model T illustration makes some sense, the analogy to the airplane is questionable. The ordinary consumer may well have some expectation about the safety features of automobiles, but it is unlikely that the ordinary consumer has any idea what safety features to expect in an aircraft from one year to the next. The court in effect imputes to the ordinary consumer technological data regarding the intricacies of aircraft design, an imputation that distorts the notion of an "ordinary consumer" beyond recognition.²⁷⁶ *Bruce* illustrates the inadequacy of the "ordinary consumer's expectation" definition of "defective,"²⁷⁷ and although the court avoided the specter of absolute liability, sparing the defendant required the court to overlook a patently spurious rationale.

Most courts reject the use of technological impossibility as an affirmative defense, but admit the evidence in connection with balancing tests comprising their definitions of defective design.²⁷⁸ These balancing tests sometimes include an explicit recognition that the plaintiff must demonstrate the feasibility of an alternative design.²⁷⁹ The defendant's evidence of technological impossibility is then relevant to feasibility. Dean Wade, in his analysis of the term "defective,"²⁸⁰ takes into account "the manufacturer's ability to eliminate the unsafe character of the product."²⁸¹ A product that cannot be made safer is not "defective." Thus, evidence of technological impossibility is directly pertinent to the Wade formula for assessing defectiveness.

275. *Id.* at 447.

276. See Note, *Restatement (Second) of Torts Section 402A and State of the Art Evidence*, 43 J. AIR L. & COM. 587, 599-600 (1977).

277. See Fischer, *Products Liability—The Meaning of Defect*, 39 MO. L. REV. 339, 348-52 (1974); Keeton, *supra* note 228, at 572.

278. See *Caterpillar Tractor Co. v. Beck*, 593 P.2d 871, 887 (Alaska 1979); *Barker v. Lull Engr. Co.*, 20 Cal. 3d 413, 431, 573 P.2d 443, 455, 143 Cal. Rptr. 225, 237 (1978); *Turner v. General Motors Corp.*, 584 S.W.2d 844, 851 (Tex. 1979).

279. See, e.g., *Pike v. Frank G. Hough Co.*, 2 Cal. 3d 465, 472, 467 P.2d 229, 236, 85 Cal. Rptr. 629, 636 (1970); *Price v. Niagra Mach. and Toolworks*, 67 Cal. App. 3d 185, 136 Cal. Rptr. 535, 538 (1977) (withdrawn by order of court); *Sutkowski v. Universal Marion Corp.*, 5 Ill. App. 3d 313, 319, 281 N.E.2d 749 (1972).

280. Wade, *On the Nature of Strict Tort Liability for Products*, 44 MISS. L.J. 825 (1973).

281. *Id.* at 837.

A number of courts appear to have adopted this approach. For example, in *Price v. Niagara Machine and Tool Works*,²⁸² the plaintiff was injured while operating a press manufactured by the defendant. The plaintiff alleged that the press was defectively designed because it failed to incorporate safeguards to keep it from descending unexpectedly on an operator's hand. The defendant introduced evidence that it could not install safeguards on the press because of its multifunctional nature. In other words, a safeguard adequate for one function of the press would not be adequate for another, and might even compromise the press's utility for the second function. The court noted that one factor to consider in evaluating defectiveness is whether an alternative design could actually be produced.²⁸³ Similarly, in *Sutkowski v. Universal Marion Corp.*,²⁸⁴ the court pointed out that alternative designs are part of the process of evaluating a defective design. The *Sutkowski* court observed that consideration of an alternative design "introduces the feature of feasibility since a manufacturer's product can hardly be faulted if safer alternatives are not feasible. In this connection feasibility includes not only the elements of economy, effectiveness and practicality but also the technological possibilities viewed in the present state of the art."²⁸⁵

The approach of the *Bruce*, *Price* and *Sutkowski* courts is to take technological impossibility into account as one factor to be considered in establishing defectiveness, by reference either to consumer expectations or to alternative designs. This approach is probably motivated by a desire to avoid absolute liability on the one hand, and at the same time to avoid reintroducing negligence theory on the other. In reality, however, the approach achieves neither objective and leads to confusion in analysis. This Article already has noted that the "ordinary consumer expectations" test of defectiveness may lead to spurious reasoning in technical design defect cases.²⁸⁶ Use of the Wade formula to establish defectiveness by reference to alternative design potential is no better. This process merges technological impossibility with an analytically distinct

282. 67 Cal. App. 3d 185, 136 Cal. Rptr. 535 (1977) (withdrawn by order of court).

283. 136 Cal. Rptr. at 538. The court went on to say that "appellant cannot seriously suggest that he should have been permitted to show the absence of safeguards, but that Niagra could offer no explanation as to how the operator of the press was to be protected." *Id.* at 539.

284. 5 Ill. App. 3d 313, 281 N.E.2d 749 (1972).

285. *Id.* at 319, 281 N.E.2d at 753.

286. See *supra* text accompanying notes 276-77.

version of the state of the art called "feasibility," which will be discussed later in this Article. Feasibility state of the art cannot be accepted as a defense to a design defect action without reintroducing negligence, and mixing feasibility with technological impossibility unnecessarily injects negligence.²⁸⁷ At the same time, the mixture does not avoid absolute liability. If the defendant's evidence genuinely establishes the technological impossibility of a design change, then a judgment for the plaintiff results in absolute liability, however it is reached. Unless the technological impossibility is conclusive, it can be ignored. If it can be ignored, the plaintiff can recover when an alternative design is really technologically impossible. In such a case, the approach has failed to avoid absolute liability. It has only reduced the incidence of absolute liability, by sparing some defendants without articulating how they differ from those who must pay. Whatever may be said of absolute liability, few policy justifications can be offered for "roulette liability." Real, demonstrable technological impossibility forces a choice between an affirmative defense on the one hand and at least potential absolute liability on the other.²⁸⁸

Comment k of the Restatement²⁸⁹ may provide the basis for an affirmative defense. Comment k refers to products incapable, under the present state of human knowledge, of being made safe for their intended use. Any product that falls within the parameters of comment k is not defective as a matter of law.²⁹⁰ Whether a product falls within the ambit of comment k depends upon two factors: (1) whether the risk is unavoidable under the "present state of human knowledge," and (2) whether the utility of the product justifies its exception from strict liability.²⁹¹ An illuminating example of judicial reasoning along these lines can be found in *Borel v. Fibreboard Paper Products Corp.*²⁹² The plaintiff in *Borel* developed asbestosis after being exposed to asbestos dust, and brought suit against the asbestos manufacturer. The court observed that as-

287. See *infra* notes 330-98 and accompanying text.

288. It appears that the reasonableness of an alternative design would be a jury question while the effect of technological impossibility would be decided by the court.

289. See *supra* note 190.

290. See *Needham v. White Laboratories, Inc.*, 639 F.2d 394, 402 (7th Cir. 1981); *Reyes v. Wyeth Laboratories*, 498 F.2d 1264, 1274 (5th Cir.), *cert. denied*, 419 U.S. 1096 (1974); *Davis v. Wyeth Laboratories, Inc.*, 399 F.2d 121, 128 (9th Cir. 1968).

291. *Borel v. Fibreboard Paper Products Corp.*, 493 F.2d 1076, 1088-89 (5th Cir. 1973), *cert. denied*, 419 U.S. 869 (1974); *Murray, supra* note 50, at 655-56.

292. 493 F.2d 1076 (5th Cir. 1973), *cert. denied*, 419 U.S. 869 (1974).

bestos dust is an unavoidable byproduct of manufacturing asbestos insulation, and explained:

'Unavoidably unsafe products' are those which, in the present state of human knowledge, are incapable of being made safe for their ordinary and intended use. Strict liability may not always be appropriate in such cases because of the important benefits derived from the use of the product. This is especially so with respect to new drugs that are essential in treating disease but involve a high degree of risk. . . . It may also be so with respect to other commercial products possessing both unparalleled [sic] utility and unquestioned danger. As a practical matter, the decision to market such a product requires a balancing of the product's utility against its known or foreseeable danger.²⁹³

By definition, technological impossibility meets the first test the court mentioned. The risk is unavoidable under the "present state of human knowledge." Thus, in any particular case, the only element left to prove is that the utility of the product justifies its exception from strict liability.

Courts have treated technological impossibility as an affirmative defense even without the use of comment k. For example, in *E. R. Squibb & Sons, Inc. v. Stickney*,²⁹⁴ the plaintiff suffered injuries as the result of the unsuccessful implantation of a bone transplant product that involved a fifteen percent failure rate. Because the product was manufactured as intended or designed, *Squibb* can be considered a design case.²⁹⁵ On its facts, the case might have been appropriate for the application of comment k. Instead, the court emphasized evidence that the defendant had developed the bone transplant process to the highest degree then attainable.²⁹⁶ Similarly, *Olson v. Arctic Enterprises, Inc.*²⁹⁷ involved a plaintiff who injured his foot while riding a snowmobile. He alleged that the snowmobile was defectively designed because there was no adequate shielding for the machine's track. The court appeared to give conclusive effect to the fact that "snowmobile engineers have not succeeded in designing a shield that would leave the machine operable."²⁹⁸ If a court allows technological impossibility as an affirmative defense,²⁹⁹ then the burden of proof must be

293. *Id.* at 1088-89.

294. 274 So. 2d 898 (Fla. Dist. Ct. App. 1973), *cert. denied*, 416 U.S. 961 (1974).

295. In design defect cases, "the intended design itself is attacked by [the] plaintiff as the source of unreasonable risks of harm." Henderson, *supra* note 261, at 1547.

296. 274 So.2d at 901.

297. 349 F. Supp. 761 (D.N.D. 1972).

298. *Id.* at 765.

299. The state of the art as defined by technological impossibility, when viewed as an affirmative defense, raises a question whether the defendant has a continuing duty to issue new warnings as the state of the art advances. One

allocated. Under comment k, the defendant manufacturer appears to have the burden of proof.³⁰⁰ The burden would be better placed upon the defendant, however, regardless of whether comment k is used. The defendant, presumably has much greater knowledge of the state of the art than the plaintiff or any expert that the plaintiff could employ, so the defendant is in a superior position to bring forth state of the art evidence and to show that the design change is technologically impossible.³⁰¹

This Article has already mentioned that a genuine instance of technological impossibility, in the context of a design defect action, forces a choice between an affirmative defense and absolute liability, although some approaches have the effect of imposing absolute liability only in a random subset of cases. Making this choice requires serious consideration of policy.³⁰² Loss spreading, which is one rationale given for applying strict liability, also results when absolute liability is imposed. Impos-

court has held that if the state of the art advances in some meaningful way subsequent to a product's issuance, so as to reveal a newly discovered danger, the advance in technology calls for the issuance of new warnings. *Rozier v. Ford Motor Co.*, 573 F.2d 1332, 1344 (5th Cir. 1978). See also *Tinnerholm v. Parke Davis & Co.*, 285 F. Supp. 432, 451 (S.D.N.Y. 1968), *modified*, 411 F.2d 48 (2d Cir. 1969); *Baker v. St. Agnes Hosp.*, 70 A.D.2d 400, 406, 421 N.Y.S.2d 81, 85 (1979); *Kozlowski v. John E. Smith's Sons Co.*, 87 Wis. 2d 882, 901, 275 N.W.2d 915, 923-24 (1979). But see *Jackson v. New Jersey Manufacturers Ins. Co.*, 166 N.J. Super. 448, 465, 400 A.2d 81, 89 (1979).

300. Cf. *Murray*, *supra* note 50, at 657 (manufacturer utilizing "unavoidably unsafe" exception of comment k must demonstrate that the state of the art has not made the risk avoidable).

301. It has been suggested that this version of the state of the art should be relevant only for injuries caused by nonessential parts or devices, as opposed to devices essential to the intended purpose of the product. See Note, *Products Liability—Strict Liability—Elimination of the "State of the Art" Defense*, 41 TENN. L. REV. 357, 361 (1974). The writer of the Note argues that nonessential parts or devices are unnecessary for a machine to fulfill its intended purpose, and therefore, elimination of the state of the art defense in that context would not create a risk that the machine would be removed from the marketplace. On the other hand, if liability is imposed in situations in which it is technologically impossible to change the design of an essential part or device, then demanding such a change might result in the manufacturer's withdrawing the machine from production. In addition, a redesign of an essential part or device might create new and unforeseen hazards. *Id.*

This argument has some appeal, but one problem is to distinguish between essential and nonessential parts or devices in a given case. Courts and juries may easily become sidetracked by this issue, leaving the main issues to turn upon the outcome of an arbitrary analysis. On the other hand, there is no reason to deny an affirmative defense when the device involved is not necessary to the operation of the machine.

302. The two policy rationales most often cited to support strict products liability are loss spreading and accident minimization. See *supra* text accompanying notes 18-20. See also *Holford*, *supra* note 18, at 82.

ing absolute liability tends to distribute the cost of compensating the plaintiff throughout society.³⁰³ The defendant manufacturer is in a better position than the plaintiff to spread the loss, it is claimed, because the defendant may pass the cost on to consumers by raising prices or may purchase insurance from a pool supported by the premiums of other manufacturers. Unfortunately, this rationale, when unmodified by other constraints, may be used to support the imposition of a manufacturer's liability in nearly any situation.³⁰⁴ Not only does loss spreading argue for absolute liability in the context of technological impossibility, it argues for liability even without the requirements of defectiveness or causation.³⁰⁵ A loss spreading rationale taken at face value would suggest that manufacturers are ideally suited to compensate all injured and sick people. Assuming that other considerations place constraints on the loss spreading rationale, however, objections can still be made to relying on loss spreading as a reason to disallow evidence relating to technological impossibility and to impose absolute liability. For example, not every business is large enough to absorb the cost of products liability as a business expense and pass the costs on to the consumer.³⁰⁶ Moreover, advocates of loss spreading often assume that manufacturers are more likely than consumers to carry adequate insurance to cover the kind of loss involved. Although this claim has empirical support,³⁰⁷ one commentator has nevertheless argued that it is the consumer who is the most likely to be carrying adequate insurance, through his own major medical policies and employment benefits, and various welfare programs.³⁰⁸ Loss spreading also

303. See *Price v. Shell Oil Co.*, 2 Cal. 3d 245, 251, 466 P.2d 722, 725-26, 85 Cal. Rptr. 178, 181-82 (1970).

304. See *Wights v. Staff Jennings, Inc.*, 204 Or. 301, 307-10, 405 P.2d 624, 627-29 (1965). See generally Prosser, *The Fall of the Citadel (Strict Liability to the Consumer)*, 50 MINN. L. REV. 791 (1966).

305. Epstein, *Products Liability: The Search for the Middle Ground*, 56 N.C.L. REV. 643, 659 (1978). One court has gone so far as to say that to deny the plaintiff the benefit of the inference of proximate cause would frustrate the loss spreading policy. *Dimond v. Caterpillar Tractor Co.*, 65 Cal. App. 3d 173, 183, 134 Cal. Rptr. 895, 902 (1976). Although loss spreading is the decisive rationale, Professor Epstein has suggested that the legislature is better equipped to set the level of benefits and to decide questions of basic taxing policy. Thus, Epstein suggests there need be no tort system at all, but only a comprehensive system of first party insurance. Epstein, *supra*, at 660.

306. See Pearis, *The God in the Machine*, 29 B.U.L. REV. 37, 75-78 (1949). See also Smyser, *Products Liability in the American Law Institute: A Petition for Rehearing*, 42 U. DET. J. URB. L. 343, 350 (1965).

307. In a major survey of firms subject to products liability actions, 86% carried some form of insurance. REPORT, *supra* note 257, at III-2.

308. See Klemme, *supra* note 18, at 191-94 n.107 (1976). This argument may

could raise product prices to politically and socially unacceptable levels, although it is difficult to adduce empirical support for this claim. To the extent that the loss spreading rationale fosters absolute liability, it engenders resistance from courts³⁰⁹ and may invite dilution of existing products liability law. The sum of these arguments suggests that loss spreading, although it is one rationale for strict liability, should not be determinative of all strict liability issues. Other rationales must be weighed and considered.³¹⁰

Accident minimization, the other major policy rationale, leads to quite different conclusions from those suggested by loss spreading. If a design change is in fact technologically impossible, the manufacturer probably is in no better position than the consumer to eliminate or reduce the risk. Hence, there is no reason to hold the manufacturer liable for the design problem itself, although there may be a basis for liability in a warning case. Accident minimization, however, involves two closely related concepts, one of which may actually favor application of absolute liability. One concept is that of deterrence; strict liability should discourage manufacturers from marketing products without taking great care in production and design, or without devoting considerable resources to identifying and correcting preventable risks. As technologically impossible design changes are not preventable risks, the deterrence concept does not apply in this setting. Accident minimization also involves an incentive concept, however. Imposition of strict liability is thought to encourage research and development of newer and safer products.³¹¹ The incentive concept can be used to rationalize strict liability even when the design change is a technological impossibility.³¹² The factual correctness of the incentive concept has been challenged, however, as

have some validity in that, since 1975, rapidly increasing premiums for products liability insurance have made the use of such insurance impossible, as a practical matter, for many small manufacturers and retailers.

309. Cf. Weinberger, *supra* note 64, at 318. See generally Comment, *supra* note 125, at 922.

310. One commentator has suggested that the loss spreading principle in effect compels the consumer to buy accident insurance for himself through increased prices. Kalven, *Torts: The Quest for Appropriate Standards*, 53 CALIF. L. REV. 189, 205-206 (1965).

311. See First Nat'l Bank of Albuquerque v. Nor-Am Agricultural Products, Inc., 88 N.M. 74, 87, 537 P.2d 682, 695 (Ct. App. 1975). See also Shapo, *supra* note 18, at 1371; Note, *supra* note 301, at 363.

312. See Epstein, *supra* note 305, at 658-59; Plant, *Strict Liability of Manufacturers for Injuries Caused by Defects in Products—An Opposing View*, 24 TENN. L. REV. 938, 939 (1957); Posner, *Strict Liability: A Comment*, 2 J. LEGAL STUD. 205, 209 (1973).

resting on the incorrect assumption that a manufacturer can allot vast resources and attention to a few well defined classes of cases.³¹³ This hypothetical manufacturer, with a number of resources to devote to the solution of design problems, is not the prototypical products liability defendant. Even a large manufacturer cannot concentrate its resources on any single problem, or even on a few, because such a manufacturer can expect hundreds of lawsuits each year based on a wide variety of design theories. If in every case the plaintiff's lawyer is permitted to argue that the design problem could have been alleviated if only the defendant manufacturer had devoted some undefined additional amount of resources to research and development, the incentive concept effectively could lead to requiring manufacturers to produce perfect products.³¹⁴ In addition, at least one commentator has pointed out that most design problems are not well defined research questions.³¹⁵ Instead, the process of design necessarily involves a host of interrelated judgments and compromises.³¹⁶

Another observer has argued that strict liability may actually provide a disincentive to safer design under conditions of technological impossibility.³¹⁷ The writer notes that the extent of industrial research and development is motivated primarily by profit, and that this motive may retard possible advancement in safety design. To seek a technological breakthrough may be so unprofitable that the manufacturer would prefer to withdraw the product.

The opposing arguments are persuasive, but the problem is fundamentally empirical. Further argument about the incentive concept appears futile until the empirical work has been performed. It appears that the burden ought to be placed upon manufacturers to come forward with empirical evidence of whether strict liability will in fact motivate them to achieve technological breakthroughs or design changes that are purely for safety.

Meanwhile, a sensible approach to follow is to permit the manufacturer an affirmative defense if it can meet the test suggested by comment k. That is, if the defendant establishes the technological impossibility of a design change, and the utility of

313. See O'Donnell, *supra* note 97, at 645.

314. *Id.* at 645-56. See also Willis, *Product Liability Without Fault: Some Problems and Proposals*, 15 FOOD DRUG COSM. L.J. 648, 660-63 (1960).

315. See generally Henderson, *supra* note 261, at 1558.

316. *Id.*

317. See Note, *supra* note 301, at 361.

the product is sufficient to offset its hazards, such a showing should be conclusive of nonliability. There are several advantages to this approach. For one, this approach supplies a clearly articulated theory within which the role of technological impossibility is manifest. In addition, the approach achieves many of the social benefits of loss spreading and loss minimization,³¹⁸ while avoiding the social losses that would result from manufacturers withholding useful products from the market. Absolute liability is not eliminated, but there is a yardstick of usefulness for distinguishing which defendants will be subject to it and which will not. If a product cannot be made safer, the manufacturer will have a basis to judge whether it should withhold the product, distribute it, or invest extensively in making it safer. The judgment will reflect the manufacturer's assessment of the profitability of the product, the cost of its hazards, and the public's perception of its utility. Presumably, a manufacturer will be more likely to market products it believes the public will consider beneficial under the comment k approach suggested here. Finally, the suggested approach avoids negligence principles. Liability depends on the product's utility, if it cannot be made safer.

The use of comment k is not entirely without disadvantages, however. Freeing manufacturers of beneficial products from strict liability may create a disincentive to improve the design of those products, which might shift manufacturers' resources to design improvements in less useful but highly profitable products. Difficulties may also develop in judging product usefulness. Contraceptives, for example, may be judged less useful by juries in a heavily Catholic area than in a predominantly non-Catholic region. The result may be that a plaintiff injured by contraceptives in one jurisdiction recovers, while an identically-injured plaintiff in another does not. Despite these disadvantages, however, affording an affirmative defense under comment k when technological impossibility is the issue seems preferable to the alternatives of absolute liability, "roulette liability," or no liability.

V. FEASIBILITY

In addition to developmental limitations, the form a manufacturer's product ultimately takes depends to a great extent upon economics and upon maximizing the functioning of the

318. There is no reason to doubt that liability would still be extensive under this approach.

product for the purposes for which it was intended. These considerations involve "feasibility," and this concept has been used to define yet another version of the state of the art.³¹⁹ A manufacturer raising a claim of feasibility state of the art does not argue that greater safety in the product was impossible to achieve. Rather, the manufacturer maintains that it could have been achieved only at an inordinate cost. Usually the cost is economic, but in some design defect cases the manufacturer argues that the safety feature proposed by the plaintiff would have inordinately decreased the utility of the product. The troublesome concept is "inordinate." A miniscule price increase or a minimal increase in the difficulty of using the product obviously does not amount to infeasibility. On the other hand, a safety measure that adds \$1,000 to the cost of a \$100 item or that nearly destroys the utility of a product is plainly infeasible. Feasibility, therefore, inevitably raises issues of reasonableness and the relationship between feasibility and negligence theory. The issues and arguments usually center on whether evidence of infeasibility should be admitted at all and, if so, on what issue. If the evidence is admissible, the question becomes whether infeasibility should constitute an affirmative defense.

A. MANUFACTURING DEFECTS

In a manufacturing defect case, an issue may arise whether a better method of quality control was economically feasible.³²⁰ Several experts have suggested that "[o]ne hundred per cent quality control probably does not exist, and anything too closely approaching it might well price out of the market the product to which it is applied."³²¹ Quality control engineers de-

319. See, e.g., *Scott v. Dreis & Krump Mfg. Co.*, 26 Ill. App. 3d 971, 326 N.E.2d 74 (1975); *Sutkowski v. Universal Marion Corp.*, 5 Ill. App. 3d 313, 281 N.E.2d 749 (1972); *Roach v. Kononen*, 269 Or. 457, 525 P.2d 125 (1974).

320. "Quality control" here refers to the manufacturing process and its technology, as well as the process of locating defects after manufacture.

321. Bernstein, *supra* note 29, at 516. Bernstein cites several works on quality control, one of which states that the purpose of quality control is to insure that the "proportion of unsatisfactory or defective units is not excessive." D. COWDEN, *STATISTICAL METHODS IN QUALITY CONTROL 1* (1957). Another author has stated:

Under the speed of mass production, it is often impossible to continually turn out 100 percent satisfactory product. One must assume that a certain percentage of defectives will always occur on certain processes; however, if the percentage does not exceed a certain limit, it is often more economical to allow the defectives to go through rather than to screen each lot.

N. ENRICK, *QUALITY CONTROL 7* (4th ed. 1960).

termine the optimum level of risk by weighing the cost of quality control against the percentage of defective products the market will tolerate.³²² Professor Bernstein notes that even the careful and prudent manufacturer "deliberately assigns to each consumer a specific known risk that the product he buys will be defective."³²³ A manufacturer will not attempt to lower risks if lowering would require an inordinate increase in cost. If economic feasibility state of the art is recognized as an affirmative defense, a manufacturer would never be liable for defectively manufactured products that escape its quality control, providing it has correctly computed the optimal risk level. Under this standard, the manufacturer need only present evidence that its quality control is adequate, and that improved quality control would price its product out of the market. This showing would include a demonstration that the risk level has been set at a point at which the cost of injuries is outweighed by the cost of increased quality control.³²⁴ For example, suppose that the level of risk has been set at five percent, so that five percent of the manufacturer's defective products will escape quality control and enter the stream of commerce. Furthermore, assume that injuries resulting from the distribution of this five percent cost \$1 million a year. If the manufacturer were to reduce the level of risk by one-fifth, to four percent, the cost of the injuries would be proportionately reduced by one-fifth, to \$800,000 a year. The savings in injury costs would be \$200,000 per year. Assume, however, that it would cost about \$300,000 to catch this additional one percent of defective items. The manufacturer would be expending \$300,000 in order to save \$200,000, and the economic costs would be out of balance.³²⁵

One argument that can be made against economic infeasibility is that it is not relevant to any issue in the case.³²⁶

322. D. COWDEN, *supra* note 321, at 4-5, 101, 489. See generally N. ENRICK, *supra* note 321, at 6.

323. The level of risk most quality control planners will accept is between five and ten percent. D. COWDEN, *supra* note 321, at 489; Bernstein, *supra* note 29, at 516-17.

324. "Quality control consists of inspection (visual comparison) and testing (actual operation of the product). The two types of control inspection and testing procedures are (1) 100% inspection and testing and (2) sample inspection and testing." Sales & Perdue, *The Law of Strict Tort Liability in Texas*, 1977 Hous. L. Rev. 1, 171.

325. This hypothetical assumes that more economical design changes in the product or in the manufacturing equipment are not possible. For a description of additional cost that might be involved in setting a lower standard of risk, see Holford, *supra* note 18, at 84-86.

326. No cases involving a feasibility state of the art claim in a manufacturing defect case have been located.

For example, one might argue that economic feasibility is irrelevant to the existence of a defect. But this argument is unnecessary, because a defendant raising infeasibility in a manufacturing defect case effectively concedes that the product is defective. More to the point, one might assert that infeasibility evidence is simply evidence of the exercise of due care, focusing on the conduct of the manufacturer or seller rather than on the product, and consequently the evidence is out of place in a strict liability action.³²⁷ This argument cannot be gainsaid. The critical question is whether or not feasibility ought to *become* an issue in a section 402A case.

Proponents of feasibility state of the art offer what is essentially a policy argument transcending the confines of section 402A. The argument is that if a defendant must compensate for injuries caused by its defective products after it has set its quality control at optimum levels, then beneficial products will be driven from the market because of the increase in cost. Several responses effectively dispose of this argument. First, the optimum risk level itself depends on whether the manufacturer or the consumer pays the cost of injuries caused by defective products that escape the quality control net. Reconsider the scenario suggested earlier. Is the \$1 million the cost of injuries paid by the manufacturer, or is it the cost of those that actually occurred? If it is the cost of injuries that actually occurred, then absolute liability is warranted, for the risk/benefit level, and hence the product price, have been set to cover all costs of injury resulting from the use of the product. Under these conditions, whenever the manufacturer escapes payment it receives a windfall. An alternative, and far more likely, scenario is that the \$1 million is only the cost of injury actually paid by the manufacturer. Perhaps the actual cost of injury is \$2 million, \$4 million, or even more. Reconsider the computation using a \$2 million figure. The cost savings from a one-fifth reduction in cost would be \$400,000, rather than \$200,000, and an expenditure of \$300,000 to achieve it would be economically feasible. The feasibility of lower risk levels, then, depends on the injury costs the manufacturer actually pays, which is partly determined by the outcome of products liability lawsuits.³²⁸ So long as the seller can show it has set the level of risk at an optimum level, then a jury could very easily find that the seller had

327. *Gonzales v. Caterpillar Tractor Co.*, 571 S.W.2d 867, 871 (Tex. 1978).

328. The optimum risk level also depends on whether a strict liability or negligence theory of liability is employed.

not violated the standard of ordinary care.³²⁹ Feasibility arguments in this type of case are circular and bypass a major policy basis of strict liability theory: compelling manufacturers to set a lower level of risk.

In addition, the argument that beneficial products will disappear from the market if manufacturers and sellers must pay for the injuries caused by defective products is essentially an argument for abandoning strict liability and returning to a negligence standard of liability. A negligence standard no doubt would lower considerably the cost of injuries borne by products liability defendants, thus encouraging "beneficial" products to remain on the market. Unfortunately, such lowered costs would raise the optimum level of risk, and the economics of the marketplace are such that actual risks would doubtlessly rise. Strict liability in tort was adopted precisely for that reason, and permitting feasibility to become an issue in a manufacturing defect case surely subverts its purposes. Strict liability in tort displaced negligence not simply to keep the level of risk low, but to impose liability for risks falling within the optimum level. It was designed to afford compensation for these risks on the theory that the seller is in the best position either to minimize or to spread the loss.

The argument that beneficial products will be driven from the market if the defendant cannot escape liability for risks falling within the optimal risk levels is subject to a further criticism. The policy implications of the argument depend heavily on the word "beneficial," which is actually an irrelevant concept. The impact of products liability lawsuits and feasibility/infeasibility arguments is the same regardless of how beneficial the product is. Although some situations may exist in which the benefits of the product are relevant to a manufacturer's defense, a manufacturing defect case involving infeasibility is not one of them. If a product is highly beneficial, then the public will be willing to pay enough for it to render the increased cost of improved quality control economically feasible. Economic infeasibility, therefore, may be a defense most frequently invoked for products of questionable benefit.

One should also remember that manufacturers set risk levels based only on the relative dollar cost of the injuries and the dollar cost of increased quality control. Dollar costs are not the only costs which should be considered. Human and social

329. In many negligence cases, the standard of the reasonably prudent seller would be used.

costs accompany every injury, and are rarely taken into account by manufacturers. The courts must encourage manufacturers to set risk levels that factor these costs into the analysis.

In summary, if infeasibility could become an issue in a manufacturing defect case, there would be an effective return to a negligence standard. If manufacturers and sellers are relieved of liability for defects falling within the optimum level of risk, they will be encouraged to raise the level of risk. An infeasibility defense thus subverts the important rationale of accident minimization underlying section 402A and, by avoiding compensation for risks defined by manufacturers as "acceptable," subverts its loss spreading rationale as well.

B. DESIGN DEFECTS

Feasibility state of the art issues arise most often in design defect cases. The principal issue is usually the feasibility of the design changes advocated by the plaintiff. One resulting question is whether the defendant should be permitted to demonstrate the infeasibility of the alternative design. If so, a second question is the point in time at which infeasibility is relevant. A defendant who argues that the plaintiff's alternative design is infeasible concedes that it could be technologically implemented, but contends that it is impractical to do so. The reasons usually involve inordinate economic costs, decrease in product utility, or a claim that the alternative design creates the same risk or a greater one than the design under attack. Some or all of these factors are weighed in determining if the alternative design is infeasible. Again, the most common issue is whether the defendant's evidence of infeasibility is admissible on any proper issue in the case, and if so, on which issue. A second question is whether infeasibility should constitute an affirmative defense barring the plaintiff's recovery.

The primary argument against admitting evidence of infeasibility is the same "due care" argument previously encountered; that feasibility evidence is simply evidence of the exercise of due care, and thus relevant only in a negligent design case, not in a strict liability case. The usual corollary also applies, that feasibility evidence relates only to the reasonableness of the defendant's conduct in designing its product, whereas the strict liability case looks only to the defectiveness of the product.³³⁰

330. *Rainbow v. Albert Elia Bldg. Co.*, 79 A.D.2d 287, —, 436 N.Y.S.2d 480, 485

A recent case advancing this position is *Baily v. Boatland of Houston, Inc.*,³³¹ a wrongful death action in strict liability against the seller of a fishing boat. The plaintiff's decedent was thrown from the boat when it struck a partially submerged tree stump and, with its motor still running, turned and circled sharply, killing the decedent with its propeller. The plaintiff's primary contention was that the boat should have been equipped with a "kill switch" that automatically would have cut the boat's motor when the decedent fell out. The plaintiffs elicited testimony that kill switches are relatively simple devices and that they significantly increase boat safety at minimum cost. The inventor of the kill switch testified that the concept behind them was not new, and that something similar had been used for thirty years on racing boats. Apparently, nothing like a kill switch had ever been used on the type of boat involved in this case, and although the inventor of the switch had applied for his patent about five months prior to the accident, he did not market them until about fifteen months after the accident. No other kill switches for fishing boats were being marketed prior to the accident. The defendant's state of the art evidence was that kill switches were not "commercially available" at the time this boat was sold, even though the concept of kill switches was not new. The president of Boatland testified that he did not know about kill switches until about the time of the accident, and did not begin to sell them until a year later.³³²

The trial court admitted the evidence, but the court of civil appeals reversed.³³³ It rejected the defendant's argument that evidence of infeasibility due to the commercial unavailability of kill switches could be used to establish the reasonable expectations of the ordinary consumer, defined as the ordinary knowledge common in the community as to the product's characteristics, which would be relevant to the existence of a defect.³³⁴ The court stated:

[T]he intent and purpose of strict tort liability would [not] be satisfied by the expectations of consumers being defined by the actions of man-

(1981), *aff'd*, 56 N.Y.2d 550, 449 N.Y.S.2d 967 (1982); *Claytor v. General Motors Corp.*, — S.C. —, 286 S.E.2d 129, 131 (1982).

331. 585 S.W.2d 805 (Tex. Civ. App. 1979), *rev'd*, 609 S.W.2d 743 (Tex. 1980).

332. Boatland was the retailer, not the manufacturer, of the boat. Neither the court of civil appeals nor the supreme court, however, drew any distinction between a retailer and a manufacturer with respect to state of the art evidence. *Id.*

333. The Supreme Court of Texas reversed the court of civil appeals in *Boatland of Houston, Inc. v. Baily*, 609 S.W.2d 743 (Tex. 1980). The supreme court's reasoning is discussed *infra* at notes 351-54 and accompanying text.

334. See RESTATEMENT (SECOND) OF TORTS § 402A comment i (1965).

ufacturers and suppliers whose products may be defective. This philosophy presupposes that the expectation of an ordinary consumer as to the safety of a product is determined by generally accepted trade practices within the industry. That line of reasoning requires the presumption that an ordinary consumer is aware of all the technical expertise of the manufacturers, who are charged with having expert knowledge in the field. The expectation of the ordinary consumer should be based on experience with the product itself, not the expert technological knowledge of the manufacturer within the industry.³³⁵

The court's analysis exaggerated the argument favoring admissibility on the consumer expectation definition of defectiveness. The expectations of the ordinary consumer are not claimed to be "determined by generally accepted trade practices within the industry," but only influenced by them. Furthermore, admitting this evidence on the issue of defectiveness does not require the presumption "that an ordinary consumer is aware of all the technical expertise of the manufacturers . . ." It only presumes that the ordinary consumer is aware of the state of the art as it is incorporated into the product involved and similar products. Thus, the expectation of the ordinary consumer is based on experience "of the product itself," not the "expert technological knowledge of the manufacturer." To that extent, the state of the art influences the expectations of the ordinary consumer.³³⁶

The court of civil appeals also took the position that evidence of infeasibility in this case was simply "due care" evidence. It quoted section 402A of the Restatement, that the seller is liable for a defective product even though it had exercised "all possible care in the preparation and sale of his product."³³⁷ The court concluded:

[E]vidence pertaining to the existing state of the art addresses the irrelevant issue of care. To allow a defense to strict liability on the basis a product was made in accordance with the best available practices and existing technology in the industry at the time of production, it is argued, would emasculate the doctrine of strict tort liability and 'signal a return to a negligence theory.'³³⁸

The court went on to state:

335. 585 S.W.2d at 808.

336. The charge in *Baily* defined "defective" in terms of the expectations of the ordinary consumer, or, in the alternative, whether a prudent seller, aware of the risks, would place the product in the channels of commerce. Telephone interview with Donald B. McFall, defense attorney (Aug. 10, 1981). At the time of the case, however, the law of Texas was clear that an alleged defective design would be judged in terms of utility versus risk. See, e.g., *Helicoid Gage v. Howell*, 511 S.W.2d 573, 577 (Tex. Civ. App. 1974). See also *Campbell v. General Motors Corp.*, — Cal. 3d —, 649 P.2d 224, 184 Cal. Rptr. 891 (1982).

337. RESTATEMENT (SECOND) OF TORTS § 402A (2)(a) (1965).

338. 585 S.W.2d at 809.

The focus in a strict liability case is on the product not the reasoning behind the manufacturer's adoption of the design or the care exercised by the manufacturer in making such decision The admission of the evidence of the unavailability of kill switches was erroneous. It did not address the 'utility' of the product or establish the *process* by which the design was adopted but rather emphasized the care exercised by the manufacturer, and other manufacturers, in designing the boat in question. The care exercised by appellee is not in issue.³³⁹

The court appears to have reasoned that the product's design should be judged on the basis of utility versus risk. If the danger of the design is in fact greater than the utility of the product, then the product is defective. It does not matter why the manufacturer chose that particular design, even if it could not feasibly have done otherwise.

This reasoning overlooks two important points. First, the court notes that one of the factors a jury may consider in evaluating risk versus utility evidence is "the manufacturer's ability to eliminate the unsafe character of the product without seriously impairing its usefulness or significantly increasing its costs" ³⁴⁰ This factor clearly invites feasibility evidence and an inquiry into the reasoning behind a manufacturer's adoption of a particular design. Many courts and commentators have taken the position that the only difference between strict liability and negligence is the defendant's knowledge of the danger.³⁴¹ In strict liability, the manufacturer is conclusively presumed to know of all dangers associated with the product. The remaining inquiry is whether the risk of harm outweighs the utility of the product.³⁴² This inquiry injects a concept of reasonableness in a design defect case.³⁴³ The sec-

339. *Id.* at 810-11 (emphasis in original). From these passages, it appears that the court was not certain whether this was an "industry custom" case or a "feasibility" case. The supreme court treated the case as a "feasibility" case. See Keeton, *Tort Liability of an Occupier of Land to an Employee of an Independent Contractor*, 35 Sw. L.J. 1, 13 (1981); Note, *Use of "State of the Art" Evidence in Strict Liability Claims: The New Texas Standard*, 33 BAYLOR L. REV. 165, 170 (1981).

340. 585 S.W.2d at 811.

341. See *supra* notes 54-62 and accompanying text.

342. See, e.g., *Bcrl v. Fibreboard Paper Products Corp.*, 493 F.2d 1076, 1088-89 (5th Cir. 1973), *cert. denied*, 419 U.S. 869 (1974); *Dorsey v. Yoder Co.*, 331 F. Supp. 753, 760 (E.D. Pa. 1971), *aff'd mem.*, 474 F.2d 1339 (3d Cir. 1973); *Aller v. Rodgers Mach. Co.*, 268 N.W.2d 830, 835 (Iowa 1978); *Phillips v. Kimwood Machine Co.*, 269 Or. 485, 495, 525 P.2d 1033, 1038 (1974); Keeton, *supra* note 111, at 404; Phillips, *supra* note 2, at 117; Wade, *supra* note 54, at 835. *But see* *Berkebile v. Brantly Helicopter Corp.*, 462 Pa. 83, 96-97, 337 A.2d 893, 900 (1975).

343. Some courts have felt that the phrase "unreasonably dangerous" in § 402A of the *Restatement (Second) of Torts* unnecessarily employs a negligence concept. See, e.g., *Cronin v. J.B.E. Olson Corp.*, 8 Cal. 3d 121, 132, 501 P.2d 1153, 1161-62, 104 Cal. Rptr. 433, 441-42 (1972).

ond problem with the court's "due care" argument is the fact that a safer design is necessarily an integral part of a design defect case. The plaintiff cannot attack an allegedly defective design without offering an implicit or explicit alternative. When the plaintiff's lawyer tells the jury how the product should have been designed, the jury is implicitly or explicitly told that the alternative design is feasible. The plaintiff's own case really puts the feasibility of the alternative design in issue, a position well summed up by a statement of the court in *Sutkowski v. Universal Marion Corp.*:³⁴⁴ "The possible existence of alternate designs introduces the feature of feasibility since a manufacturer's product can hardly be faulted if safer alternatives are not feasible."³⁴⁵ If the plaintiff must put the feasibility of an alternative design in issue, not only is it unfair to the manufacturer not to permit it to point out reasons why the alternative is infeasible, but it is unfair to the jury, which can only assume the design suggested by the plaintiff is feasible unless the defendant shows otherwise. The "due care" argument overlooks the requirement that the plaintiff must establish the possibility of a safer design.³⁴⁶

The position of the court of civil appeals in *Baily* illustrates a tension which permeates the law of products liability. Many courts desire strict liability in tort to be genuinely strict, and not a higher form of negligence. Other courts, perhaps concerned about social, economic, and political implications, fear that a pure form of strict liability is too harsh, and thus import the notion of reasonableness into design defect cases.³⁴⁷ A court's view of the purposes of a products liability lawsuit will likely determine its position concerning evidence of a manufacturer's conduct in a design case, including the admissibility of evidence relating to feasibility. The court is more likely to find reasons to admit such evidence if it is concerned about the possible unfairness to the manufacturer in not allowing it to explain why it chose the design it did, or if it is concerned that true strict liability will drive some companies out of business or impose a heavy economic burden on consumers. On the other

344. 5 Ill. App. 3d 313, 281 N.E.2d 749 (1972).

345. *Id.* at 319, 281 N.E.2d at 753.

346. The reference to "care" in the *Restatement* only appears to establish the principle that a lack of negligence does not provide a defense. This reference cannot necessarily be read to mean that all evidence of "care" is irrelevant.

347. Texas is one of the states that has incorporated a notion of reasonableness into design defect cases. See *Turner v. General Motors Corp.*, 584 S.W.2d 844 (Tex. 1979).

hand, if the court is concerned about compensating the plaintiff and providing an incentive for manufacturers to produce safer products, it is more likely to opt for strict liability without permitting introduction of any concept which explicitly considers reasonableness.

Most of the arguments that can be advanced regarding infeasibility evidence favor admitting it. One such argument is found in the oft-repeated rule that a seller is only obliged to design a reasonably safe product. The seller is not required to design the safest possible product or to adopt those features that represent the maximum in safety of design.³⁴⁸ If this rule is to be meaningful, evidence of infeasibility ought to be admissible. If a jury is not informed as to the infeasibility of a suggested alternative design, then nothing prevents it from forcing the manufacturer to adopt the ultimate in safety and design. The same rule can be taken to mean that a product is not necessarily defective even if a safer, and feasible, design was available.

A more compelling argument for admitting evidence of infeasibility is that the evidence is relevant to the issue of defectiveness, based on one of the two major tests for a design defect.³⁴⁹ One test of defective design is the balancing of utility versus risk. The cases that have addressed the issue of feasibility of an alternative design in the context of this test generally have held that the plaintiff must demonstrate the feasibility of the alternative design in order to show that the design used was defective.³⁵⁰ This was the position advanced by the Supreme Court of Texas in reversing the court of civil appeals in *Boatland of Houston, Inc. v. Baily*.³⁵¹ The supreme court recognized that the plaintiff's case implicitly required proof of a feasible alternative design when it stated that the

348. *Weakley v. Fischbach & Moore, Inc.*, 515 F.2d 1260, 1267 (5th Cir. 1975); *Warner v. Kewanee Mach. & Conveyor Co.*, 411 F.2d 1060, 1066 (6th Cir. 1969), *cert. denied*, 398 U.S. 906 (1970); *Garst v. General Motors Corp.*, 207 Kan. 2, 20, 484 P.2d 47, 61 (1971); *Henderson v. Ford Motor Co.*, 519 S.W.2d 87, 93 (Tex. 1974).

349. See *supra* notes 46-62 and accompanying text.

350. Feasibility of the alternative design is not an issue in every case, because the feasibility of the alternative design may be so obvious that it will not be controverted by the defendant. When the feasibility of the alternative is not obvious, however, and the defendant controverts the feasibility of the alternative design, then the plaintiff must demonstrate feasibility as part of his or her burden of proof. Of course, a design is not determined to be defective solely on the basis of the feasibility of an alternative design. Feasibility of an alternative design is a necessary condition to liability, but it is not a sufficient condition to liability. See O'Donnell, *supra* note 97, at 637.

351. 609 S.W.2d 743 (Tex. 1980).

"defectiveness of the product in question is determined in relation to safer alternatives . . ." ³⁵² The court then elucidated the requirement of feasibility in the alternative design:

Whether a product was defectively designed must be judged against the technological context existing at the time of its manufacture. Thus, when the plaintiff alleges that a product was defectively designed because it lacked a specific feature, attention may become focused on the feasibility of that feature—the capacity to provide the feature without greatly increasing the product's cost or impairing usefulness. ³⁵³

The Texas Supreme Court went on to hold that the commercial unavailability of kill switches was a legitimate aspect of feasibility state of the art and that evidence of this commercial unavailability was admissible. ³⁵⁴

The *Boatland* court is on the right track, although its holding could have been more tightly drawn, and its reasoning, although sound, may have been inapposite to the facts of the case. In *Boatland*, "commercial unavailability" apparently meant that the defendant could not buy kill switches on the commercial market. Depending on the factual issues posed by the case, such evidence may or may not be relevant. When the defendant is a seller who adds various features to a basic product made by another, commercial unavailability is relevant to feasibility. On the other hand, when, unlike *Boatland*, the defendant is a manufacturer, there may be a duty to manufacture the safety feature, not just to purchase it. If such a duty exists, commercial unavailability becomes irrelevant to the feasibility issue. A manufacturer in such a case should not be able to escape liability by proving that the safety feature could not be purchased elsewhere. ³⁵⁵ Such a rule might encourage manufacturers to make a bare bones product and allege that produc-

352. *Id.* at 746.

353. *Id.* The court also made suggestions as to how a plaintiff may demonstrate feasibility:

A plaintiff may advance the argument that a safer alternative was feasible with evidence that it was in actual use or was available at the time of manufacture. Feasibility may also be shown with evidence of the scientific and economic capacity to develop the safer alternative. Thus, evidence of the actual use of, or capacity to use, safer alternatives is relevant insofar as it depicts the available scientific knowledge and the practicalities of applying that knowledge to a product's design.

Id.

354. The court indicated that feasibility state of the art evidence, even though admissible, did not constitute a defense to the plaintiff's action, nor entitle the defendant to a defensive issue. *Id.* at 749 n.3.

355. As to whether a nonmanufacturing seller should be treated differently from a manufacturing seller, see W. KIMBLE & R. LESHNER, *supra* note 22, § 138. In fact, the defendant in *Boatland* was a nonmanufacturing seller, but the court drew no distinction between these two types of sellers.

tion of safety features was beyond the scope of its duty. When the manufacturer establishes it had no duty to produce the safety feature, commercial unavailability may become relevant. No such showing was made in *Boatland*, however, and in fact the kill switch would no doubt have been easy and economical to produce and install. Consequently, commercial unavailability should not have been a consideration in the case.³⁵⁶

Boatland can also be critiqued on another ground. The court defined state of the art as including the "scientific knowledge, economic feasibility, and the practicalities of implementation when the product was manufactured. Evidence of this nature is important in determining whether a safer design was feasible."³⁵⁷ The state of the art was thus defined to include both technological impossibility and feasibility, concepts which are distinguished in this Article. It is preferable to analyze technological impossibility separately from feasibility, because the concepts are discrete and relate to issues and policies differently.

Notwithstanding these criticisms, the Texas Supreme Court now expressly requires a plaintiff to show his or her alternative design is feasible as part of the plaintiff's affirmative case on the issue of defectiveness. Other courts have permitted the defendant to raise feasibility on the same issue, but without use of the word "feasibility." The Wade formula for defective design, which has been adopted extensively by the courts, includes "the ability to eliminate the danger without seriously impairing the usefulness of the product or making it unduly expensive."³⁵⁸ Most courts which have adopted the risk

356. A strong dissent was registered on exactly this ground. See 609 S.W.2d at 752-53.

357. 609 S.W.2d at 748.

358. The Wade formula for defective design involves balancing the following factors:

- (1) the usefulness and desirability of the product—its utility to the user and to the public as a whole;
- (2) the safety aspects of the product—the likelihood that it will cause injury and the probable seriousness of the injury;
- (3) the availability of a substitute product which would meet the same need and not be as unsafe;
- (4) the manufacturer's ability to eliminate the unsafe character of the product without impairing its usefulness or making it too expensive to maintain its utility;
- (5) the user's ability to avoid danger by the exercise of care in the use of the product;
- (6) the user's anticipated awareness of the dangers inherent in the product and their avoidability, because of general public knowledge of the obvious condition of the product, or of the existence of suitable warnings or instructions;
- (7) the feasibility, on the part of the manufacturer, of spreading the loss by setting the price of the product or carrying liability insurance. (footnote omitted).

Wade, *supra* note 54, at 837-38. Dean Keeton's formula considers:

versus utility test for design defect have adopted all or part of the Wade formula.³⁵⁹

Several cases illustrate how variations of the Wade formula invite evidence of feasibility to establish defectiveness. In *Huddell v. Levin*,³⁶⁰ the court stated that the "manufacturer is required to take reasonable steps—within the limitations of cost, technology, and marketability—to design and produce a vehicle that will minimize the unavoidable danger."³⁶¹ The court required that the plaintiff "offer proof of an alternative, safer design, practicable under the circumstances."³⁶² Another court, in *Lollie v. Ohio Brass Co.*,³⁶³ stated that the plaintiff must establish that "in terms of cost, practicality and technological possibility, the alternative design was feasible."³⁶⁴ Finally, in *Wilson v. Piper Aircraft Corporation*,³⁶⁵ the requirement was expressed with particular lucidity. In *Wilson*, the plaintiff's evidence indicated that the design of the airplane's fuel system contributed to the likelihood of carburetor ice formation, and that the crash was probably caused by engine failure due to carburetor icing. Nevertheless, the court held that the plaintiff had not presented a prima facie case. The court stated:

[T]he court is to determine, and to weigh in the balance, whether the proposed alternative design has been shown to be practicable. The trial court should not permit an allegation of design defect to go to the jury unless there is sufficient evidence upon which to make this determination. If liability for alleged design defects is to 'stop somewhere short of the freakish and the fantastic,' plaintiffs' prima facie case of a defect must show more than the technical possibility of a safer

(1) That there was in fact an appreciable danger from some condition, ingredient, or component of the product; (2) That it was a known or scientifically knowable fact at the time of sale that harm could result from a condition or an ingredient of the product; (3) That the maker realized or should have realized in the exercise ordinary care the dangers involved in the product's use; and (4) That an ordinary man would have concluded that the magnitude of the discovered danger outweighed the benefits of the product, at least in the absence of more satisfactory instructions or information.

Keeton, *Manufacturer's Liability: The Meaning of "Defect" in the Manufacture and Design of Products*, 20 SYRACUSE L. REV. 559, 565 (1969).

359. See, e.g., *Turner v. General Motors*, 584 S.W.2d 844, 846 (Tex. 1979).

360. 537 F.2d 726 (3d Cir. 1976).

361. *Id.* at 735.

362. *Id.* at 737.

363. 502 F.2d 741 (7th Cir. 1974).

364. *Id.* at 744. In a negligence case, one court has held that the plaintiff's alternative design must be practical in the relevant context. This means that the design must be functional with respect to the product in question. That the design would work well in a different product with a different purpose proves nothing. *Dreisonstok v. Volkswagen Werk, A.G.*, 489 F.2d 1066, 1072 (5th Cir. 1974).

365. 282 Or. 61, 577 P.2d 1322 (1978).

design.³⁶⁶

Later in the opinion, the court also stated:

It is not proper to submit such allegations to the jury unless the court is satisfied that there is evidence from which the jury could find the suggested alternatives are not only technically feasible but also practicable in terms of cost and the over-all design and operation of the product. It is part of the required proof that a design feature is a 'defect' to present such evidence.³⁶⁷

The *Huddell, Levin* and *Wilson* cases illustrate the approach of those jurisdictions that have adopted a utility versus risk analysis. Must the plaintiff also prove a feasible alternative design in states which have adopted the "consumer expectation" test of defectiveness? Section 402A of the Restatement requires the plaintiff to show that the product was dangerous beyond the expectation of "the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics."³⁶⁸ The primary arguments against admitting feasibility evidence are the "due care" and conduct versus product arguments; that feasibility evidence is irrelevant to the expectations of ordinary consumers and would therefore constitute only evidence of "due care," and that feasibility focuses on the manufacturer's conduct rather than the defectiveness of the product.

A recent Arizona case illustrates this position. In *Brady v. Melody Homes Manufacturer*,³⁶⁹ the plaintiff's decedents perished in a fire which destroyed their mobile home, manufactured by the defendant. Liability was premised upon alleged design defects. The mobile home contained only one egress, and the manufacturer had installed no smoke detector alarms, escape hatches, or pop-out windows. The trial court granted summary judgment for the defendant. On appeal, the Arizona Court of Appeals recognized the controversy surrounding the

366. *Id.* at 68, 577 P.2d at 1326.

367. *Id.* at 69, 577 P.2d at 1327. On rehearing, the court stated: "In our original opinion in this products liability case we held that a prima facie case of a design defect must include evidence which would permit a finding that a safer design would have been practicable." *Wilson v. Piper Aircraft Corp.*, 282 Or. 411, 413, 579 P.2d 1287, 1287 (1978). For other cases applying evidence of feasibility, see *Kerns v. Engelke*, 76 Ill. 2d 154, 162-63, 390 N.E.2d 859, 864 (1979); *Back v. Wickers Corp.*, 378 N.E.2d 964, 970 (Mass. 1978); *Owens v. Allis-Chalmers Corp.*, 83 Mich. App. 74, 78-79, 268 N.W.2d 291, 293 (1978); *Bexiga v. Haver Mfg. Corp.*, 60 N.J. 402, 410-11, 290 A.2d 281, 285 (1972). See also W. KIMBLE & R. LESHNER, *supra* note 22, § 133, at 164-65; Keeton, *The Meaning of "Defect" in Products Liability Law—A Review of Basic Principles*, 45 Mo. L. REV. 579, 593 (1980).

368. RESTATEMENT (SECOND) OF TORTS § 402A comment i, at 352 (1965); *Barker v. Lull Engineering Co.*, 20 Cal. 3d 413, 418, 573 P.2d 443, 446, 143 Cal. Rptr. 225, 228 (1978).

369. 121 Ariz. 253, 589 P.2d 896 (1978).

feasibility of a safer design as an element of a design defect case. The court then identified the critical question, whether the facts at trial should be limited to those relating to the product alone, or whether the conduct of the manufacturer in producing the item could also be considered. The court concluded that if the harm-producing design fell within the Restatement definition of "defect," a condition which made the product dangerous beyond the expectations of the ordinary consumer,³⁷⁰ only evidence relating to the product itself should be considered, and that courts which consider feasibility have moved out of the area of strict liability and into the area of the reasonableness of the manufacturer's conduct. The court explained:

If a trier of fact or a judge must consider such factors as the 'mechanical feasibility,' 'financial cost,' and 'adverse consequences to the product,' . . . we do not conceive how this can be done without considering whether the manufacturer's conduct was reasonable in choosing the design utilized. For example, if a given product incorporated all of the safety factors known to technology at the time of the manufacture, and advanced technology renders that design obsolete, must not the trier of fact consider whether the manufacturer's conduct in choosing the existing 'mechanical feasibility' was reasonable? Or, would not the trier of fact consider whether a manufacturer's conduct was reasonable in discarding a safety device costing \$1,000 on a product made to sell for \$100?³⁷¹

To the Arizona Court of Appeals, at least, the feasibility of a safer, alternative design is not an issue in a strict liability design defect case. Apparently, if the expectations of the ordinary consumer demanded a safety device costing \$1,000 on a product selling for \$100, that court would find the product is defective if the safety device were not included. The court appears to have opted for absolute liability in design defect cases involving infeasible alternatives.³⁷² A most cogent criticism of the court's holding can be found in its own opinion in which the court stated that if "[i]n defining the word 'defect' we have eliminated any semblance of correctible wrong on the part of the defendant, we have moved out of the area of tort law and

370. RESTATEMENT (SECOND) OF TORTS § 402A comment g (1965).

371. 121 Ariz. at 259, 589 P.2d at 902.

372. The court concluded that the only design defects that are to be governed by strict liability are those that result in "a condition not contemplated by the ultimate consumer, which will be unreasonably dangerous to him." *Id.* at 257, 589 P.2d at 900 (quoting RESTATEMENT (SECOND) OF TORTS § 402A comment g (1965)). For products for which the reasonable expectation test may not be applicable because the consumer has no idea how safe the product could be made, liability is to be determined by negligence principles, through a risk/benefit analysis which considers feasibility as one of the factors in the analysis. 121 Ariz. at 259, 589 P.2d at 902.

into a compensation system based on injury."³⁷³

When the expectations of the ordinary consumer define defectiveness, the argument for admitting feasibility evidence is that such evidence can be used to establish that the product is similar to all other products of the same type, and that therefore an ordinary consumer would have realized the potential danger.³⁷⁴ The argument is simple and compelling. If the alternative design is infeasible, it is highly unlikely that any product so designed has ever appeared in the marketplace. If the ordinary consumer has never encountered the proposed alternative design, then it is unlikely that ordinary consumer expectations would require such a design. Of course, a consumer, through lack of technical expertise, occasionally might expect infeasible safety features. These expectations would change, however, if the consumer were informed of the infeasibility of the alternative design.³⁷⁵

One commentator has contended that, if a manufacturer can avoid the liability because alternative designs are infeasible, product safety research may be suspended.³⁷⁶ Although overstated, the argument may have some merit. Manufacturers may be less motivated to invest heavily in turning infeasible designs into feasible ones, if they can argue infeasibility in court. Even so, the drawbacks of the imposition of absolute liability when alternative designs are infeasible outweigh its potential benefits for several reasons. First, however motivated a manufacturer may be to make a currently infeasible design feasible, the multifaceted nature of the design process³⁷⁷ is interposed between the manufacturer's motivation and the ultimate product. If that process does not lend itself to resolving a well defined problem, even massive increments in manufacturer

373. 121 Ariz. at 259, 589 P.2d at 902. In *Aller v. Rodgers Machinery Mfg. Co.*, 268 N.W.2d 830 (Iowa 1978), the court took an unusual approach which combines the consumer expectation test with the risk/utility test. This court resolved the risk/utility question from the standpoint of the expectations of the ordinary consumer. It seems that under this hybrid the feasibility of an alternative design would be admissible evidence, especially since the court stated that the balancing process involved in a strict liability design case is the same as that used in a negligence case. The court asserted that the balance of risk and utility from the standpoint of the consumer is no different than from the standpoint of the seller. *Id.* at 835.

374. Murray, *supra* note 50, at 654; Note, *supra* note 339, at 171; Comment, *supra* note 125, at 928.

375. Although this amounts to changing the consumer's expectations in the courtroom, not to do so would be manifestly unfair.

376. Note, *supra* note 253, at 953.

377. See *supra* note 70 and accompanying text. See also Henderson, *supra* note 261, at 1540.

motivation may yield relatively small increases in product safety. In addition, small manufacturers may not have the resources to assign to solving feasibility problems, regardless of their motivations. Large manufacturers, on the other hand, may have so many design problems to attend to that an infeasible design change cannot command a very large proportion of its resources. Under these conditions, the imposition of absolute liability when alternative designs are infeasible may produce very attenuated social benefits, despite any motivation absolute liability may give to defendant manufacturers.

Against these uncertain benefits must be weighed the costs of absolute liability in this context. One cost is potential injustice. The plaintiff may offer a design more dangerous in some respects than the one under attack. If the defendant is not allowed to respond to this alternative, the plaintiff may win on a fundamentally spurious premise. Surely this result cannot have been intended by the framers of section 402A, or the jurisdictions that have adopted it. To hold that a defendant may not attack the feasibility of the plaintiff's design also distorts the normal structure of trial argumentation. A key element in the plaintiff's case, the existence of a feasible alternative, is in essence conclusively presumed. Conclusive presumptions of this kind may be justified in some cases—for example, when proof is very difficult and the presumption is historically accurate. Because the existence of a feasible alternative does not fit this pattern, however, its existence should not be conclusively presumed, unless the presumption results in a direct, tangible benefit. The marginal increases in product safety that may occur in response to absolute liability in this context do not appear sufficient to warrant adopting such a presumption. Overall, the benefits that may result from excluding infeasibility evidence appear too speculative and slight to offset the costs. It would be preferable to admit the evidence on the issue of defectiveness, specifically, on the existence of a preferable alternative design.

The preceding discussion leaves several questions which merit response. Consider, for example, why technological impossibility should constitute an affirmative defense for products covered by comment k, while infeasibility does not. The explanation lies in the distinction between the two concepts as drawn in this Article. Technological impossibility is a concept that involves a binary analysis. Under the present state of human knowledge, the defendant could either produce a design change which would eliminate the risk and maintain a worka-

ble product, or it could not. If the defendant could not eliminate the risk, the argument is strong for precluding liability when the product is extremely beneficial. In such cases, the product design will be conclusively presumed to have been reasonable. Feasibility, in contrast, is a concept that is not disjunctive, and involves a multifaceted analysis. As the Texas Supreme Court stated in *Boatland*, "feasibility is a relative, not an absolute, concept; the more scientifically and economically feasible the alternative was, the more likely that a jury may find that the product was defectively designed."³⁷⁸ In other words, the economic costs, additional risks, and decrease in utility created by the alternative design are factors which determine feasibility. Each varies with the circumstances and each is variably influenced, depending on the proposed alternative design. If feasibility necessarily involves reasonableness, then the jury ought to decide the weight to be given to evidence of infeasibility when evaluating the reasonableness of an alternative design.

Another question concerns who bears the burden of proof and the burden of producing evidence of feasibility or infeasibility. All the cases examined thus far have held that the burden is on the plaintiff to prove feasibility of the alternative design. Although none of these cases have advanced any reasons for such an allocation, it presumably derives from the fact that proving defectiveness is part of the plaintiff's affirmative case. In the two cases that have explicitly discussed the burden of proof, however, the burden has been placed upon the defendant seller.³⁷⁹ A discussion of the burden of proof is beyond the scope of this Article, as a showing of defective design involves far more than the feasibility of an alternative design. The issue of the burden of production, however, is more intimately related to feasibility state of the art and the scope of this Article. Although none of the cases have explicitly so held, the inference is that the burden of production is also on the plaintiff. The only case to grapple with this subject is *Caterpillar Tractor Co. v. Beck*,³⁸⁰ which articulated the most cogent reason for placing the burden of production upon the defendant. The court noted that this rule "puts the burden of producing the relevant complex and technical evidence on the party

378. 609 S.W.2d at 746.

379. *Caterpillar Tractor Co. v. Beck*, 593 P.2d 871, 885-86 (Alaska 1979); *Barker v. Lull Engineering Co.*, 20 Cal. 3d 413, 431-32, 573 P.2d 443, 445, 143 Cal. Rptr. 225, 237 (1978).

380. 593 P.2d 871 (Alaska 1979).

who has the most access to and is the most familiar with such evidence."³⁸¹ The manufacturer has the greatest access to this technical material and also possesses the greatest understanding of the material. Logically, the party with the greatest access to such a complex material ought to bear the burden of producing it.³⁸²

Another issue is the point in time at which feasibility should be measured. The choice is usually limited to the time of sale or the time of the accident. This question only arises, of course, when the alternative design has become more feasible between the sale and the accident.³⁸³ One of the major complaints of manufacturers is that the adequacy of their products is judged by post hoc standards. These manufacturers complain that safer designs developed after a product has been marketed are introduced into evidence to determine product defectiveness, without any showing that the later design was scientifically or technologically feasible when the product was made.³⁸⁴ In negligence cases, courts have long held that the defendant's product is judged by the state of the art as it existed at the time of manufacture or sale.³⁸⁵ In strict liability design defect cases, the courts have been almost unanimous in adopting the similar rule that the feasibility of an alternative design must be determined as of the time the product is designed.³⁸⁶ In fact, Dean Keeton has stated that:

It is difficult to find any support for the position that an unavoidably unsafe characteristic of a product at the time it was manufactured can nevertheless make a product defective as designed simply because under the state of the art at the time of trial it could have been designed more safely.³⁸⁷

The reason behind this rule is that "[o]therwise, a product could become defective merely through technological advances that make a safety feature, which was not technologically feasible when the product was manufactured, feasible at the time

381. *Id.* at 886.

382. For a criticism of this theory, see Henderson, *supra* note 47, at 782-97.

383. Professor Phillips has argued that if an alternative design is feasible at one point in time, it will usually be difficult to conclude that the design was not feasible at an earlier time. See Phillips, *supra* note 2, at 115.

384. *Id.* See generally O'Donnell, *supra* note 97, at 649; Raleigh, *supra* note 5.

385. Karazik, *supra* note 193, at 351; Phillips, *supra* note 2, at 115.

386. Anderson v. Heron Engineering Co., 40 Colo. App. 191, 193, 575 P.2d 16, 17 (1977), *rev'd*, 198 Colo. 391, 604 P.2d 674 (1979); Olson v. A.W. Chesterton Co., 256 N.W.2d 530, 535 (N.D. 1977); Boatland of Houston, Inc. v. Baily, 609 S.W.2d 743, 748 (Tex. 1980); Note, *supra* note 253, at 950. But see Bell Helicopter Co. v. Bradshaw, 594 S.W.2d 519, 533 (Tex. Civ. App. 1979).

387. Keeton, *Torts, Annual Survey of Texas Law*, 34 Sw. L.J. 1, 13 (1980).

the injury occurs."³⁸⁸ Thus, if there has been a delay between design and manufacture, the feasibility of alternative designs should be judged as of the time of manufacture rather than the time of design.³⁸⁹

Although the courts unanimously repeat the foregoing rule, in practice the rule is under heavy attack. Courts increasingly admit evidence of subsequent design changes, usually, although not necessarily, changes made by the defendant. A common way in which the courts do this is to import the subsequent repair rule from common law negligence cases, and then to admit the evidence under an exception to the common law rule. Evidence of subsequent repairs is not normally admissible on the question of negligence;³⁹⁰ an exception to the rule, however, involves the feasibility of precautionary measures. If the plaintiff alleges that it would have been feasible for the defendant to take precautions to avoid the injury, and the defendant denies it, the plaintiff may introduce evidence that the defendant subsequently took the precautions to rebut the defendant's assertion of infeasibility.³⁹¹ A number of courts in strict liability cases have used this exception to permit a plaintiff to proffer evidence of subsequent design changes to rebut the defendant's evidence of infeasibility.³⁹² Some courts have even admitted this evidence as relevant to feasibility without requiring that it controvert an allegation of infeasibility.³⁹³ Clearly, the plaintiff ought to be able to rebut a defendant's infeasibility evidence. But this result should not depend on the applicability of the exceptions to the common law rule. It would be better to determine whether the common law rule applies at all in a strict liability design case. The policy arguments for and against excluding subsequent design changes in strict lia-

388. Note, *supra* note 339, at 168.

389. *Id.*

390. C. McCORMICK, HANDBOOK OF THE LAW OF EVIDENCE § 275, at 666 (2nd ed. 1972).

391. *Id.* at 667. This rule was codified as FED. R. EVID. 407.

392. *Opera v. Hyva, Inc.*, 86 A.D.2d 373, —, 450 N.Y.S.2d 615, 616 (1982).

393. *See, e.g.*, *Farner v. Paccar, Inc.*, 562 F.2d 518, 528 (8th Cir. 1977); *Caterpillar Tractor Co. v. Beck*, 593 P.2d 871, 887 (Alaska 1979); *Ault v. International Harvester Co.*, 13 Cal. 3d 113, 119, 528 P.2d 1148, 1151, 117 Cal. Rptr. 812, 815 (1974); *Christophenson v. Hyster Co.*, 58 Ill. App. 3d 791, 802-03, 374 N.E.2d 858, 867-68 (1978); *Sutkowski v. Universal Marion Corp.*, 5 Ill. App. 3d 313, 319, 281 N.E.2d 749, 753 (1972); *La Monica v. Outboard Marine Corp.*, 48 Ohio App. 2d 43, 45, 355 N.E.2d 533, 534 (1976); *Chart v. General Motors Corp.*, 80 Wis. 2d 91, 100, 258 N.W.2d 680, 683 (1977). *See generally* *Westner v. Upjohn Co.*, 628 F.2d 848, 853 (4th Cir. 1980); *Hayson v. Coleman Lantern Co.*, 89 Wash. 2d 474, 485, 573 P.2d 785, 791 (1978); L. FRUMER & M. FRIEDMAN, *supra* note 8, at § 16A [4] [j] (1979).

bility cases are briefly mentioned in the footnotes.³⁹⁴ While a detailed discussion of this issue is beyond the scope of this Article, it appears reasonable that if the plaintiff is saddled with the burden of proving the feasibility of alternative designs, then the plaintiff should be permitted to proffer evidence of subsequent design changes, because the changes are relevant to the issue of feasibility. If the design change was feasible a few years after the sale of a product, then inferentially it was feasible at the time the product was designed. Of course, the defendant can rebut this inference with appropriate evidence.³⁹⁵

The inference that a subsequent remedial change demonstrates feasibility at the time of design attenuates with the passage of time.³⁹⁶ If twenty years elapse between sale and

394. The policy argument against the exclusionary rule was enunciated in the seminal case of *Ault v. International Harvester Co.*, 13 Cal. 3d 113, 528 P.2d 1148, 117 Cal. Rptr. 812 (1974). The court maintained:

It is manifestly unrealistic to suggest that such a producer will forego making improvements in its product, and risk enumerable additional lawsuits and the attendant adverse effect on its public image, simply because evidence of adoption of such improvement may be admitted in an action founded on strict liability for recovery on an injury that preceded the improvement It has been pointed out that not only is the policy of encouraging repairs and improvements of doubtful validity in an action for strict liability since it is in the economic self-interest of the manufacturer to improve and repair defective products, but that the application of the rule would be contrary to the public policy of encouraging the distributor of mass-produced goods to market safer products.

Id. at 117, 528 P.2d at 1152, 117 Cal. Rptr. at 816. See also Davis, *Evidence of Post Accident Failures, Modifications and Design Changes In Products Liability Litigation*, 6 ST. MARY'S L.J. 792, 797-801 (1975); Swartz, *The Exclusionary Rule on Subsequent Repairs—A Rule In Need of Repair*, 7 FORUM 1, 6 (1971); Note, *Products Liability and Evidence of Subsequent Repairs*, 1972 DUKE L.J. 837, 845-852. On the other hand, one court has stated:

[The] lack of probative value is the fundamental reason for excluding such evidence. Although such evidence may be admissible under the modern, more liberal test of relevance, the attendant danger that a jury would misconstrue and misapply it to the prejudice of the accused is so great as to require exclusion A danger particularly relevant to the present case is that a jury, influenced by hindsight evidence, might apply an artificially high standard in determining the adequacy of warnings.

Ortho Pharmaceutical Corp. v. Chapman, 388 N.E.2d 541, 561 (Ind. App. 1979). However one may evaluate these policy considerations, the evidence of remedial changes will no doubt have a substantial prejudicial effect. The jury is likely to interpret such evidence as an injurious admission. Phillips, *supra* note 2, at 119.

395. A defendant could probably avoid the evidence of subsequent remedial change by stipulating that the alternative design suggested by the plaintiff was feasible, if that is the case.

396. The court in *Ault v. International Harvester Co.* stated that the subsequent repairs may well illustrate the feasibility of the improvement "if the

accident, the inference may not be justifiable.³⁹⁷ The trial judge should be permitted to allow evidence of subsequent remedial measures when it appears relevant to feasibility of alternative design at the time the product was sold. The trial court should have the discretion to require the plaintiff to proffer other evidence, or to give reasons why the inference of prior feasibility can be drawn from subsequent remedial measures taken after a substantial lapse of time.³⁹⁸

C. ADEQUACY OF WARNING

Feasibility state of the art may also arise in warning cases. The problem in these cases involves the cost of warning all users or consumers, typically when the warning cannot be placed on the product itself. This situation would include, for example, package inserts for drugs and certain products that require accompanying manuals. The seller's argument is that cost or other difficulties make it infeasible to send the warning to all potential users or consumers. Therefore, evidence as to the infeasibility of such warnings ought to be admissible on the question of whether or not there has been a breach of the duty to warn.

The seller's argument must be evaluated in light of the current state of the law on duty to warn and its breach. Some courts limit the duty to warn to foreseeable risks,³⁹⁹ while other courts do not.⁴⁰⁰ In order for the warning to be adequate,⁴⁰¹ it

changes occur closely in time." 13 Cal. 3d at 119, 528 P.2d at 1151, 117 Cal. Rptr. at 815.

397. See *McCants v. Salameh*, 608 S.W.2d 304, 308 (Tex. Civ. App. 1980) ("[T]he mere fact that a manufacturer produced a safer product twenty years after the production of an allegedly unsafe product would in no way be indicative of the capabilities existing at the time of the manufacture of the earlier design.").

398. Several state legislative acts follow the general rule. See ARIZ. REV. STAT. ANN. § 12-686 (2) (Supp. 1980); COLO. REV. STAT. § 13-21-404 (Supp. 1980); NEB. REV. STAT. § 27-407 201 (Supp. 1979). The Colorado statute declares that any scientific advancement or other knowledge in techniques or design theory is not admissible for any purpose other than to show a duty to warn.

399. See, e.g., *Borel v. Fibreboard Paper Prod. Corp.*, 493 F.2d 1076 (5th Cir. 1973), cert. denied, 419 U.S. 869 (1974); *Woodill v. Parke Davis & Co.*, 79 Ill. 2d 26, 402 N.E.2d 194 (1978); *Ortho Pharmaceutical Corp. v. Chapman*, 388 N.E.2d 541 (Ind. App. 1979); *Crocker v. Winthrop Laboratories*, 514 S.W.2d 429 (Tex. 1974).

400. See, e.g., *Jackson v. Coast Paint & Lacquer Co.*, 499 F.2d 809 (9th Cir. 1974); *Hamilton v. Hardy*, 37 Colo. App. 375, 549 P.2d 1099 (1976); *Ulrick v. Kasco Abrasives Co.*, 532 S.W.2d 197 (Ky. 1976); *Little v. PPG Industries*, 19 Wash. App. 812, 579 P.2d 940 (1978).

401. A legally adequate warning must meet the following criteria: (1) Its form must be such that it could reasonably be expected to catch the attention of the reasonably prudent person in the circumstances of its use [here, mem-

must be reasonably calculated to reach the ultimate consumer.⁴⁰² The word "reasonably" in the previous sentence would indicate that the feasibility of conveying the warning is important. Indeed, under negligence law, the feasibility of conveying a warning has always been a relevant consideration. For instance, a comment to section 388 of the Restatement⁴⁰³ states that in order "to satisfy the requirements of reasonable care, the magnitude of the risk involved must be compared with the burden which would be imposed by requiring [the warnings]. . . ." ⁴⁰⁴ The same comment states that the means of disclosure should be "practicable and not unduly burdensome" ⁴⁰⁵

Of course, reasonable care in a negligence case fundamentally implicates a calculus of risk, in which the magnitude and probability of a risk is balanced against the burden of alleviating the risk.⁴⁰⁶ The question is whether the same calculus applies in a case of strict liability in tort. The preponderance of authority appears to apply it, when the issue is whether there has been a breach of the duty to warn. For example, in *Smith v. E. R. Schwibb & Son, Inc.*,⁴⁰⁷ the Supreme Court of Michigan stated:

when the factual issue is not whether the product itself is defective, but is whether the manufacturer has provided adequate warnings, the existence of a product defect and a breach of duty is determined by the same standard—reasonable care under the circumstances Determination of whether a product defect exists because of an inadequate warning requires the use of an identical standard. Consequently, when liability turns on the adequacy of a warning, the issue is one of reasonable care, regardless of whether the theory plead is negligence, implied

bers of the medical profession]; (2) The content of the warning must be of such a nature as to be comprehensible to the average physician; (3) It must indicate the nature and extent of the danger to the mind of the reasonably prudent user; (4) It must warn with the degree of intensity that would cause the reasonably prudent user to exercise caution commensurate with the potential danger. *Mahr v. G.D. Searle & Co.*, 72 Ill. Spp. 3d 540, 562, 390 N.E.2d 1214, 1230 (1979). *See also* *Bituminous Casualty Corp. v. Black & Decker Manufacturing Co.*, 518 S.W.2d 868, 872-73 (Tex. Civ. App. 1974).

402. *See* *Sales & Perdue*, *supra* note 324, at 23. Another authority does not use the word "reasonably," although it does state every potential user need not be warned by the supplier himself. *See* D. NOEL & J. PHILLIPS, *supra* note 211, at 191.

403. RESTATEMENT (SECOND) OF TORTS § 388 comment n (1965).

404. *Id.*

405. *Id.*

406. For cases which consider the burden or feasibility involved in conveying the warning, see *Griggs v. Firestone Tire & Rubber Co.*, 513 F.2d 851 (8th Cir. 1975); *Weekes v. Michigan Chrome & Chemical Co.*, 352 F.2d 603 (6th Cir. 1965); *Seibel v. Symons Corp.*, 221 N.W.2d 50 (N.D. 1974).

407. 405 Mich. 79, 273 N.W.2d 476 (1979).

warranty or strict liability in tort.⁴⁰⁸

A similar result was reached in *Bryant v. Hercules Inc.*,⁴⁰⁹ in which the plaintiffs were personal representatives of eight employees who were fatally injured in a coal mine explosion. The defendant was the manufacturer of explosives that were used in the mine. The plaintiffs contended that the manufacturers had a duty to warn the decedent miners of the danger of leaving explosives exposed only forty-five feet from a prepared blast. The court held that

[i]t would be a fantastic stretch of the law to require the manufacturer of explosives to go beyond its written warnings and personally warn every miner not to tolerate the stacking of dynamite near a point of blast when it is something that supervision is already aware of, something that is covered by state and federal law and something that federal inspectors specifically call to the attention of those in direct supervisory control at the mine.⁴¹⁰

Apparently, the failure to warn, both in negligence and in strict liability, involves the matter of reasonableness in determining the adequacy of the warning.⁴¹¹ The plaintiff must prove that the defendant's method of discharging its duty to warn was unreasonable under the circumstances. Evidence as to the feasibility of other means of warning, under the facts of a specific case, is palpably relevant to the reasonableness of the warning method chosen by the defendant. If infeasibility evidence is produced, the issue should be whether the seller made a reasonable attempt to convey the warning, in light of the burden of conveying the warning and the probability and magnitude of the harm.⁴¹² The seller ought to have the burden of

408. *Id.* at 83, 273 N.W.2d at 480. The Michigan Supreme Court opinion affirmed a decision by the Michigan Court of Appeals, which had stated that "the type of evidence considered in determining whether the duty [to warn] had been discharged will include the degree of risk posed by the drug's dangerous propensities and the difficulties inherent in bringing the warning home to the medical profession." *Smith v. E.R. Schwibb & Sons, Inc.*, 69 Mich. App. 375, 382, 245 N.W.2d 52, 56 (1976). This position was also upheld in *McEwen v. Ortho Pharmaceutical Corp.*, 270 Or. 375, 390, 528 P.2d 522, 530 (1974). See also *Sterling Drug, Inc. v. Yarrow*, 408 F.2d 978, 993 (8th Cir. 1969). The Second Circuit held in *Doss v. Apache Power Co.*, 430 F.2d 1317, 1321 (5th Cir. 1970) that a warning does not have to be given to every user. The warnings must be such as to be reasonably calculated to be read. It is very difficult to tell, however, whether these statements apply only in a negligence case.

409. 325 F. Supp. 241 (W.D. Ky. 1970).

410. *Id.* at 246. See also *Hercules Powder Co. v. Hicks*, 453 S.W.2d 583 (Ky. 1970).

411. See *Ortho Pharmaceutical Corp. v. Chapman*, 388 N.E.2d 541, 549 (Ind. App. 1975); *Rainbow v. Albert Elia Building Co.*, 79 A.D.2d 287, 436 N.Y.S.2d 480, 484 (1981); *Rourke v. Garza*, 530 S.W.2d 794, 801 (Tex. 1975).

412. There appears to be no reason infeasibility, if proven by the defendant, should be permitted as a complete defense. If the ultimate issue is reasonable-

producing evidence of the infeasibility of transmitting the warning to the plaintiff, because the seller is in a superior position to produce that evidence.

Infeasibility evidence arguably signals a return to negligence. The very ideas of reasonableness and calculus of risk conjure up negligence principles. One may ask whether, if these factors are to exist in strict liability warning cases, there is any basis on which to maintain a distinction between negligence and strict liability in these cases. One interesting answer to this question focuses on the different theoretical bases of strict liability and liability for failure to warn,⁴¹³ a subject beyond the scope of this Article. A more predictable argument is that, without some element of reasonableness, there would be absolute liability in cases involving the feasibility of warnings and, unless absolute liability is the favored policy, some standard of reasonableness must be used.⁴¹⁴ Although this argument is valid, a middle ground exists between absolute liability and complete readoption of negligence. For example, the defendant seller might be allowed to escape liability only when it has reasonably relied on another party, such as a distributor or an employer purchaser, who had the duty to convey the message to the ultimate consumer or user.⁴¹⁵ Such an ap-

ness, then it should be left to the jury to decide what weight to give evidence of infeasibility.

413. See L. FRUMER & M. FRIEDMAN, *supra* note 8, § 16A[4] [f] [vi], at 153.

414. See BRUSTER, *Comparative Negligence In Strict Liability Cases*, 42 J. AIR L. & COM. 106, 110 (1976); MONTGOMERY & OWEN, *Reflections on the Theory and Administration of Strict Tort Liability for Defective Products*, 27 S.C.L. REV. 803, 824 (1976); Note, *Elimination of "Unreasonably Dangerous" from § 402A—The Price of Consumer Safety*, 14 DUQ. L. REV. 25, 33 (1975).

415. Several courts have already held that the duty to warn is discharged by warning an employer or a distributor. In *Jones v. Hittle Service, Inc.*, 219 Kan. 627, 549 P.2d 1383 (1976), the court held that a manufacturer of LP gas which sells it to a distributor in bulk fulfills its duty to the ultimate consumer when the "manufacturer ascertains that a distributor is adequately trained, is familiar with the properties of the gas and safe methods of handling it, and is capable of passing on this knowledge to its consumers. The manufacturer then owes no duty to warn the ultimate consumer." *Id.* at 639, 549 P.2d at 1394. The court also noted that the manufacturer had no way to know who the ultimate purchaser might be and had no package on which to endorse a warning. *Id.* Similarly, in *Reed v. Pennwalt Corp.*, 22 Wash. App. 718, 591 P.2d 478 (1979), the court held that a supplier had fulfilled its duty when it gave an adequate warning to an intermediate buyer and when the product was not in the original can, box, or form. The court found the warning adequate when it was reasonable to expect that the intermediate buyer had a safety program and that it would communicate necessary information to the ultimate users. *Id.* at 724, 591 P.2d at 481-82. See also *Wilhelm v. Globe Solvent Co.*, 373 A.2d 218, 223 (Del. 1977) (holding that the manufacturers and distributors of cleaning solvent used in a dry cleaning establishment had only a duty to warn an injured employee's employer).

proach represents the best solution currently available to the competing considerations in a case in which the feasibility of a more adequate warning is at issue.

VI. CONCLUSION

The term "state of the art" encompasses a variety of different claims made by products liability defendants. This Article has considered and distinguished four major classes of such claims: industry customs, governmental standards and regulations, developmental limitations and feasibility. Each usage of the state of the art was considered in the context of the three major types of product liability actions: manufacturing defect, design defect, and inadequate warning. The Article evaluated arguments for and against admitting the defendant's evidence, as well as arguments for and against allowing that evidence to form the basis of an affirmative defense. A summary of the recommendations follows.

Evidence of customary industry practices should be admissible in all kinds of products liability cases. In manufacturing and design defect cases, this evidence is relevant to show that the product is not defective. In manufacturing defect cases, evidence that the product was manufactured in a standard way tends to show that it is a standard, nondefective product. Custom evidence in design defect cases tends to show that the design was not defective under either of the two major tests of design defect. Under the "ordinary consumer expectations" test, this evidence establishes the range of similar products with which consumers could be acquainted, and hence what their expectations might be. Under the Wade-Keeton test of defectiveness, custom evidence is relevant to establish industrywide judgments of a reasonable balance of utility and risk. In neither case, however, should custom evidence be conclusive against the plaintiff. In warning cases, admissibility of custom evidence depends on whether the jurisdiction has adopted foreseeability as a limitation on the duty to warn. If foreseeability is an element, evidence of industry standards is plainly relevant, and should be admitted, on the issue of foreseeability. In jurisdictions in which foreseeability is not a limitation on duty to warn, custom evidence may be introduced to rebut certain claims that a warning was inadequate. Again, however, there is no basis to permit evidence of prevailing industry practices to rise to the level of an affirmative defense.

Governmental standards and regulations generally are not

relevant in manufacturing defect cases. In design defect cases, the current rule, that noncompliance with such regulations is defectiveness *per se*, while evidence of compliance does not relieve the manufacturer of liability, appears to be sound. Evidence of compliance, however, should be admissible on the issue of product defectiveness. The general rule appears to be similar in the few inadequate warning cases involving governmental standards. Governmental standards set minimum requirements, but the defendant may have to provide a better warning. In some jurisdictions, however, compliance with governmental warning standards is very nearly conclusive, and in some it creates a rebuttable presumption that the warning was adequate. These jurisdictions implicitly assume that the politically sensitive processes by which governmental standards are developed provide adequate consumer protection. To the extent that these jurisdictions rely on this assumption, it is probably unwarranted. The general rule appears to be the preferable approach.

Developmental limitations in a manufacturing defect case usually amount to a claim that the risk was undiscoverable, so that it is known that some product samples are defective, but it is impossible to determine which ones. This claim, and the other claims of developmental limitations, do not make conceptual sense as "mere evidence." If the evidence is admitted at all, it should support an affirmative defense. At least some examples of products involving an undiscoverable risk are specifically mentioned in comment k to section 402A of the Restatement, and for these products the comment supports an affirmative defense. Various policy considerations argue for limiting the availability of this defense to those types of products explicitly mentioned in comment k. By implication, therefore, evidence of the undiscoverability of the risk should be excluded in cases involving other products.

In an inadequate warning case, the developmental limitation amounts to a claim that the risk was unknowable in advance, and consequently, that the defendant could not warn against it. When there is no duty to warn of unforeseeable risks, the defendant's evidence obviously establishes an affirmative defense. When foreseeability is not a limitation on duty to warn, however, most of the policy rationales support imposition of liability even in cases of unknowable risks.

Developmental limitations in a defective design case usually involve the defendant's assertion that it was impossible to

implement a design change because the relevant scientific or technological expertise simply did not exist. While some courts have applied comment k in this setting, and others have permitted an affirmative defense on other theories, it appears that the best approach is to permit an affirmative defense for products within the scope of comment k.

Finally, the state of the art has encompassed the concept of feasibility. Although the product could have been made safer, the manufacturer argues that it was not economical or practical to do so. In a manufacturing defect case, the argument invariably involves the economic feasibility of reducing the incidence of defective products. The situation is plainly prototypical of those envisioned by the drafters of section 402A, and consequently one in which strict liability ought to be strict. In this setting, the court should exclude evidence that improving manufacturing technology was not feasible. The situation is different in a design defect case. The plaintiff's affirmative case for defectiveness involves an alternative design which the defendant argues is, or was, not feasible. Under these circumstances, the defendant should be permitted to rebut this element of the plaintiff's case. Arguments can be made for this use of evidence of infeasibility whether the jurisdiction uses the "ordinary consumer expectations" test of defective design or the Wade-Keeton test balancing utility and risk. The burden of producing evidence of infeasibility should fall on the defendant, who has greater access to it, and infeasibility should not constitute an affirmative defense. Feasibility is also relevant in an inadequate warning case, in which it is apparently impossible to exclude at least some considerations of reasonableness without creating absolute liability. Various formulas are available for courts to use in fashioning a middle ground between absolute liability and a return to negligence.

It should be evident from the multiplicity of concepts derived from the term "state of the art" that the expression should be abandoned. Depending on which of its various usages is involved, the defense merits very different judicial treatment. Use of the expression "state of the art" in statutes and court opinions will engender needless confusion. It would be preferable to adopt more specific terms, such as those suggested in this Article, to articulate the very different concepts encompassed under the state of the art rubric.

