IN THE UNITED STATES COURT OF APPEALS
FOR THE FIFTH CIRCUIT

United States Court of Appeals
Fifth Circuit

FILED
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Lyle W. Cayce
Clerk

No. 13-11119

SCOTT E. CASEY, Individually, as Administrator of the Estate of Dawna Marie Casey, Deceased and as Next of Friend of R.W.C. and A.L.C., his minor children; ROBERT JAMES GILLIS,

Plaintiffs – Appellants

v.

TOYOTA MOTOR ENGINEERING & MANUFACTURING NORTH AMERICA, INCORPORATED; TOYOTA MOTOR MANUFACTURING, INDIANA, INCORPORATED; TOYOTA MOTOR CORPORATION; CTS CORPORATION; TOYOTETSU AMERICA, INCORPORATED,

Defendants – Appellees

Appeal from the United States District Court
for the Northern District of Texas

Before KING, GRAVES, and HIGGINSON, Circuit Judges.

HIGGINSON, Circuit Judge:

Plaintiffs-Appellants Scott E. Casey and Robert James Gillis (collectively "Casey") filed this products liability suit against Defendants-Appellees (collectively "Toyota") stemming from a tragic single-car automobile accident in which Scott Casey's wife Dawna suffered fatal injuries. Among other claims, Casey brought manufacturing and design defect claims based on the failure of the vehicle's side curtain airbag to prevent Mrs. Casey's death. The district court granted judgment as a matter of law in favor of Toyota on Casey's manufacturing and design defect claims. Because Casey did not provide

sufficient evidence that the side curtain shield airbag suffered from a manufacturing defect or that there was a safer alternative design, we AFFIRM.

FACTS AND PROCEEDINGS

On April 29, 2010, Dawna Casey was driving her 2010 Toyota Highlander on North Tarrant Parkway in Tarrant County, Texas, with her two children in the back seat. Mrs. Casey was driving at a high rate of speed that was not a result of any unintended acceleration caused by the vehicle. The vehicle left the roadway, continued on the center median, then re-entered the roadway before striking a concrete culvert. The vehicle flew in the air for 130 feet, reaching a height of ten feet, and rolled two-and three-quarters times before coming to rest on the driver's side. Mrs. Casey was partially ejected through the side window and her head was trapped beneath the car. Mrs. Casey was declared dead at the scene of the accident. The children did not suffer significant physical injuries from the accident.

Scott Casey, along with Mrs. Casey's father, Robert Gillis, sued five Toyota entities, the car dealership, and three component manufacturers, on behalf of Dawna Casey and their children.[1] Casey alleged multiple theories of liability arising from defects in the braking, restraint, and airbag systems. Before trial, the district court granted summary judgment dismissing one of the component manufacturer defendants,[2] and Casey voluntarily dismissed

[1] These entities were Toyota Motor Engineering and Manufacturing North America, Inc.; Toyota Motor Manufacturing, Indiana, Inc.; Toyota Motor Corporation; Toyota Motor Sales, U.S.A., Inc.; Toyota Motor North America, Inc.; CTS Corporation; Toyotetsu America Inc.; Denso International America, Inc.; Freeman Financial Investment Company, Ltd. d/b/a Freeman Toyota.

[2] CTS Corporation.

two Toyota entities, an additional component manufacturer, and the dealership.[3] The remaining defendants proceeded to trial.

At trial, Casey introduced deposition testimony from Motoki Shibata, a Toyota engineer, that the side curtain shield airbags were designed to remain inflated for approximately six seconds, and that the time for deflation depended on the type of force applied to the airbag. During the accident, the side curtain airbag remained inflated for only approximately two seconds. Plaintiffs' expert, Dr. David Renfroe, testified that he was unaware of any testing of the side curtain air bag under real-world conditions. Casey also introduced a patent application for an abrasion and/or puncture resistant airbag, about which Renfroe also testified.

After Casey presented evidence at trial and rested, the parties stipulated to a judgment as a matter of law in favor of Toyota on five claims.[4] The district court also granted judgment as a matter of law in favor of Toyota on Casey's manufacturing and design defect claims relating to the failure of the side curtain shield airbags to prevent Dawna Casey's death. The parties stipulated to dismissal of Casey's remaining claims without prejudice,[5] permitting a final judgment and allowing this appeal of the district court's grant of judgment as a matter of law as to Casey's manufacturing and design defect claims.

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[3] Toyota Motor North America, Inc.; Toyota Motor Sales, U.S.A., Inc.; Denso International America, Inc.; and Freeman Financial Investment Company, Ltd.

[4] These claims, which were dismissed with prejudice, were for misrepresentation, marketing defect, defects in the roof structure, defects in the handling and stability of the vehicle, and defects in the window glazing.

[5] These claims were for manufacturing and design defects as to the seatbelt system and braking system, as well as for gross negligence.

STANDARD OF REVIEW

This Court reviews the district court's grant of judgment as a matter of law *de novo*, applying the same legal standard as the district court. *Coffel v. Stryker Corp.*, 284 F.3d 625, 630 (5th Cir. 2002). Judgment as a matter of law is proper "[i]f a party has been fully heard on an issue during a jury trial and the court finds that a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue." Fed. R. Civ. P. (50)(a)(1). "In entertaining a Rule 50 motion for judgment as a matter of law the court must review all of the evidence in the record, draw all reasonable inferences in favor of the nonmoving party, and may not make credibility determinations or weigh the evidence." *Ellis v. Weasler Eng'g Inc.*, 258 F.3d 326, 337 (5th Cir.), *amended on other grounds*, 274 F.3d 881 (5th Cir. 2001). The court must review the record as a whole, but "must disregard all evidence favorable to the moving party that the jury is not required to believe." *Id.*

DISCUSSION

I. Manufacturing Defect

Texas products liability law controls this diversity case. Under Texas law, "[a] manufacturing defect exists when a product deviates, in its construction or quality, from the specifications or planned output in a manner that renders it unreasonably dangerous." *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800 (Tex. 2006) (quoting *Ford Motor Co. v. Ridgway*, 135 S.W.3d 598, 600 (Tex. 2004)). Casey bears the burden of proving "that the product was defective when it left the hands of the manufacturer and that the defect was a producing cause of the plaintiff's injuries." *Id.*

a. Product's deviation from the specifications or planned output.

To prove a manufacturing defect under Texas law, "a specific defect must be identified by competent evidence and other possible causes must be ruled out."). *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 42 (Tex. 2007) (internal quotation marks and citation omitted)). "Texas law does not generally recognize a product failure or malfunction, standing alone, as sufficient proof of a product defect." *Id.* at 42. Rather, "the deviation from design that caused the injury must be identified. Otherwise, the jury is invited to find liability based on speculation as to the cause of the incident in issue." *Id.* Casey does not present any evidence of the cause or nature of the defect beyond the fact that the airbag did not remain inflated during the rollover. Casey presents evidence that the side airbag is intended to remain inflated for approximately six seconds; that the airbag tore during the rollover; and that the airbag only remained inflated for approximately two seconds or less. Casey's evidence may support a finding of product failure, but it is not sufficient evidence of a defect in the manufacturing process. More is required.

First, Casey has failed to specifically identify a product defect. In that regard, this case is similar to *Mendez*, in which the Texas Supreme Court rejected a manufacturing defect claim involving a tire manufactured by Cooper Tire that lost its tread. 204 S.W.3d at 799. The car rolled several times and four passengers died at the scene. *Id.* After excluding expert testimony on the manufacturing defect issue, the Court held that "the mere fact that the tire failed in these circumstances is insufficient to establish a manufacturing defect of some sort" because this fact "would amount to evidence of a manufacturing defect so slight as to make any inference a guess [and] is in legal effect no evidence." *Id.* at 807 (alteration in original) (internal quotation marks and

citation omitted). Here too, the mere fact that the side air bag failed to remain inflated for six seconds is insufficient evidence of a manufacturing defect. Casey presented no evidence as to the reason why the air bag did not remain inflated and it is not appropriate for the jury to speculate as to the cause. As the Texas Supreme Court held in *Ford Motor Co. v. Ridgway*, upholding summary judgment for the manufacturer on a manufacturing defect claim:

> The Ridgways produced no direct evidence of the fire's cause, and their circumstantial evidence that a manufacturing defect existed in the Ford F-150 when it left the manufacturer does not exceed a scintilla. Ridgway's affidavit establishes only that a fire occurred, and Greenlees could say no more than that he "suspects" the electrical system caused the fire.

135 S.W.3d at 601. Here, Casey similarly established only that the air bag did not remain inflated for six seconds. In contrast to *Ridgway*, he does not even speculate as to the cause. The jury may not permissibly speculate that a defect existed on the basis of product failure alone.

Conceding that he presented no direct evidence of a deviation in construction or quality of the airbag, Casey next entreats us to find that the failure of the airbag to meet Toyota's *performance standards* is akin to a failure to meet specifications. We decline to read the law in this manner because it is inconsistent with the law as the Texas Supreme Court has stated it and as the Texas Supreme Court and intermediate appellate courts have interpreted it. Casey provides no support for its reading of the law, which would exempt plaintiffs from submitting evidence of the nature of the alleged defect and of the deviation from other products.

Casey cites two cases as support for his argument that Texas courts and this court have both accepted and required analysis of performance standards to establish a manufacturing defect. Neither case supports such a reading of

Texas law. First, *iLight Technologies, Inc. v. Clutch City Sports & Entertainment, L.P.* makes no mention that, in Texas, deviation from performance standards is proof of a manufacturing defect: "The Supreme Court of Texas has made clear that a showing that the product deviated in its construction or quality from *specifications or planned output* is essential to maintaining a strict liability manufacturing defect claim." 414 S.W.3d 842, 847 (Tex. Ct. App. 2013) (emphasis added). Far from providing support for Casey's interpretation, *iLight* distinguishes Texas from other jurisdictions that *may* consider performance standards. *Id.* at 847 n.2. And in *Leverette v. Louisville Ladder Co.*, this court interpreted the test for products liability under Mississippi law and found that the district court did not abuse its discretion by excluding expert testimony for failing to address whether the allegedly defective product met performance and dimensional requirements. 183 F.3d 339, 341 (5th Cir. 1999). Besides the fact that it interpreted Mississippi, not Texas law, *Leverette* did not hold that evidence of failure to meet performance standards was proof of a manufacturing defect.

Our decision not to interpret Texas's law on manufacturing defects to include violations of performance standards, without more, is bolstered by a comparison of the text of manufacturing defect statutes or rules in other states. Unlike Texas's rule, as stated, for example, in *Mendez*, 204 S.W.3d at 800, the text of other jurisdictions' relevant statutes explicitly contemplates consideration of deviation from performance standards. *See, e.g.*, La. Rev. Stat. Ann. § 9:2800.55 ("A product is unreasonably dangerous in construction or composition if . . . the product deviated in a material way from the manufacturer's specifications *or performance standards* for the product or from otherwise identical products manufactured by the same manufacturer." (emphasis added)); Ohio Rev. Code Ann. § 2307.74 ("A product is defective in

manufacture or construction if, when it left the control of its manufacturer, it deviated in a material way from the design specifications, formula, o*r performance standards* of the manufacturer, or from otherwise identical units manufactured to the same design specifications, formula, *or performance standards*." (emphasis added)).

As discussed, Texas does not permit proof of a manufacturing defect by showing a deviation from performance standards alone. *See Mendez*, 204 S.W.3d at 800. Since Casey's evidence goes to performance standards and not specifications, it fails as evidence of a manufacturing defect.[6] Each piece of evidence submitted by Casey on this point is result-oriented, not manufacturing-oriented, and provides no detail on how the airbag is constructed. Casey presented the deposition testimony of Motoki Shibata, Toyota's 30(b)(6) witness, in which he stated that "[t]he curtain shield air bag equipped with rollover sensors are designed to maintain the bag pressure for approximately 6 seconds." Casey also introduced Plaintiffs' Exhibit 2179, which describes a "Toyota Engineering *Standard*," requiring that the "[o]ccupant's head shall not be thrown out the vehicle." (emphasis added). These standards describe the intended *result* of the air bag but nothing about

[6] Renfroe testified that Toyota's objective that the air bag remain inflated for six seconds is a "design specification." Similarly, Toyota expert Karen Balavich testified that the six-second standard was a "design specification." But just calling a performance standard a "specification" does not make it so. Specifications for the purposes of a manufacturing defect contain design details and are not simply statements about the result or expected performance. *See BIC Pen Corp. v. Carter*, 346 S.W.3d 569, 579 (Tex. Ct. App. 2008) (analyzing, for manufacturing defect purposes, evidence "detailing the precise specifications" for the product, including "a list of measurements representing the forces that must be exerted upon the [product] in order to activate it"), *rev'd on other grounds*, 346 S.W.3d 533 (Tex. 2011); *Ledesma*, 242 S.W.3d at 38 (analyzing specifications that detailed the torque and heights of u-bolts).

its technical specifications or design. Thus, they are not specifications for the purposes of showing a manufacturing defect.

Casey's manufacturing defect claim also fails because he has not demonstrated that the airbag in this case performed differently from other airbags in the same product line. Because of this weakness, Casey's evidence is better suited to a design defect claim. Texas law recognizes two distinct theories of recovery in products liability cases.

> Manufacturing defect cases involve products which are flawed, i.e., which do not conform to the manufacturer's own specifications, and are not identical to their mass-produced siblings. The flaw theory is based upon a fundamental consumer expectancy: that a mass-produced product will not differ from its siblings in a manner that makes it more dangerous than the others. Defective design cases, however, are not based on consumer expectancy, but on the manufacturer's design of a product which makes it unreasonably dangerous, even though not flawed in its manufacture.

Green v. R.J. Reynolds Tobacco Co., 274 F.3d 263, 268 (5th Cir. 2001) (quoting *Ford Motor Co. v. Pool*, 688 S.W.2d 879, 881 (Tex. Ct. App. 1985), *aff'd in part and rev'd in part on other grounds*, 715 S.W.2d 629 (Tex. 1986)).[7]

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[7] *See also* William C. Powers, Jr., *The Persistence of Fault in Products Liability*, 61 Tex. L. Rev. 777, 782 (1983) ("Defects generally are classified in three categories: flaws or manufacturing defects, design defects, and warning or informational defects. Manufacturing defects or flaws are variations that occur when a product deviates from the manufacturer's specifications and therefore is unintentionally different from other products in the line. A design defect is a feature that conforms to the specifications of a product (and therefore is similar to other products in its line) but imposes an inappropriate risk of injury." (footnotes omitted)); *Carter v. Massey-Ferguson, Inc.*, 716 F.2d 344, 346 n.1 (5th Cir. 1983) ("'Defective' is a term of art that encompasses several actionable defects. A product can be defective because it is flawed. Flawed products are not in their intended condition because of an error in the manufacturing process. Although the condition of a product complies with the manufacturer's intention, it can still be 'defective' if the design is not sufficiently safe or if the product does not have adequate instructions or warnings.").

Unlike a design defect claim, a touchstone of a manufacturing defect claim is proof that the allegedly defective product differs from other products in the same product line. *See id.* Thus, in order to prove a manufacturing defect in this case, Casey must show that the airbag in this case differs from the airbags that Toyota produced in the same time period and installed in other Highlander vehicles. Casey, however, provides no evidence that other Highlander airbags would have remained inflated for six seconds under similar accident conditions. *See Ledesma*, 242 S.W.3d at 41-42 (requiring that the product deviate from specifications or planned output). He has thus not shown that a reasonable jury could find a manufacturing defect.[8]

Finally, Casey suggests that the agreed-upon jury instructions in this case[9] permit deviation from Texas's definition of manufacturing defect by allowing Casey to show a manufacturing defect without proving the specific nature of the defect. To begin, the jury instruction is unclear and we are not

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[8] Casey also misses the mark when he argues that a single manufacturing defect could well impact hundreds or thousands of airbags, or even an entire line. While we agree that Casey need not prove that the airbag at issue differed from *every other* airbag that Toyota produced, he is still required to identify the specific defect that caused the airbag (or a number of airbags) to differ from its mass-produced siblings. *See Mitchell v. Lone Star Ammunition, Inc.*, 913 F.2d 242, 247 n.10 (5th Cir. 1990) (hypothesizing that a defect that occurs throughout an entire line of products can be a manufacturing defect). Casey presents no such proof but asks the court to "assume" there might be such a defect. Casey also says that Toyota sought to bar him from introducing evidence of similar incidents, which Casey asserts was a tacit admission of the unique nature of the problems with the Casey vehicle, and thus evidence of a manufacturing defect. Even assuming that Casey's accident was the only one in which the side airbag failed, Casey is still required to identify the defect in the manufacture of the airbag at issue. He has not identified a defect or shown that other airbags produced in the same line would not have performed similarly.

[9] The jury instructions read, in relevant part: "A manufacturing defect with respect to the product means that the failure of one or more of the components of the product or the product itself to comply with the manufacturer's specifications or an act or omission in the process of manufacturing, fabricating or assembling the components on the product itself which renders the product unreasonably dangerous to an extent beyond which would be contemplated by the ordinary user of the product, with the ordinary knowledge common to the community as to the product's characteristics."

convinced that the jury instruction actually instructs the jury that Casey need not prove the nature of the defect. But even if Casey's interpretation of the instruction is correct, it is legally erroneous. A jury instruction must track the law. *See Ledesma*, 242 S.W.3d at 41. Casey must prove what the Texas Supreme Court requires for a manufacturing defect: that the product deviated, in its construction or quality, from its specifications or planned output. *See Mendez*, 204 S.W.3d at 800. Moreover, Casey's suggestion at oral argument that Texas law differs in a material way from the rule found in the Restatement is not borne out by the cases. The general rule, as found in the Restatement is that "a manufacturing defect is a departure from a product unit's design specifications." Restatement (Third) of Torts: Products Liability § 2(a), comment c (1998). In fact, the Texas Supreme Court has expressly incorporated the Restatement's rule on manufacturing defects. *See Ledesma*, 242 S.W.3d at 42-43 (finding reversible error in a jury instruction that was inconsistent with the Restatement definition that requires that the "product departs from its intended design") (quoting Restatement (Third) of Torts: Products Liability § 2(a) (1998)); *cf Am. Tobacco Co. v. Grinnell*, 951 S.W.2d 420, 426 (Tex. 1997) ("In Texas, section 402A of the *Restatement (Second) of Torts* governs claims for strict liability in tort.").

b. Unreasonably Dangerous

In sum, because we find that Casey failed to submit evidence of the airbag's deviation from Toyota's specifications or planned output, his manufacturing defect claim fails and we need not reach the question of whether the inclusion of the airbag rendered the vehicle unreasonably dangerous.

II. Design Defect

To prevail on his design defect claim, Casey must prove that "(1) the product was defectively designed so as to render it unreasonably dangerous; (2) a safer alternative design existed; and (3) the defect was a producing cause of the injury for which the plaintiff seeks recovery." *Goodner v. Hyundai Motor Co.*, 650 F.3d 1034, 1040 (5th Cir. 2011); *see also* Tex. Civ. Prac. & Rem. Code Ann. § 82.005(a). Here, Casey's design defect claim fails because he failed to present evidence from which a jury could find that a safer alternative design existed. *Hernandez v. Tokai Corp.*, 2 S.W.3d 251, 258 (Tex. 1999) (holding that a safer alternative design is a necessary, but not sufficient, element of liability under both Texas law and the common law). A "safer alternative design" means:

> a product design other than the one actually used that in reasonable probability: (1) would have prevented or significantly reduced the risk of the claimant's personal injury, property damage, or death without substantially impairing the product's utility; and (2) was economically and technologically feasible at the time the product left the control of the manufacturer or seller by the application of existing or reasonably achievable scientific knowledge.

Tex. Civ. Prac. & Rem. Code Ann. § 82.005(b). "A design is *not* a safer alternative if, under other circumstances, [it would] impose an equal or greater risk of harm than the design at issue." *Hodges v. Mack Trucks, Inc.*, 474 F.3d 188, 196 (5th Cir. 2006) (internal quotation marks and citation omitted). "Similarly, the plaintiff must show the safety benefits from [the] proposed design are foreseeably greater than the resulting costs, including any diminished usefulness or diminished safety." *Id.* (alteration in original) (internal quotation marks and citation omitted).

As evidence of a safer alternative design, Casey introduced a patent application, titled "Abrasion and/or Puncture Resistant Fabrics, Airbag Cushions, and Methods," which was described at trial by Renfroe.[10] The patent application proposed using a different material for side curtain airbags (elastomer), instead of the material used in the airbag here (nylon). Renfroe relied on this patent application as support for his testimony that a safer alternative design existed. A single patent or patent application may form the basis of an expert's conclusion that there exists a safer alternative design, but only if the patent or patent application, together with the expert's analysis of it, proves all of the elements of a safer alternative design. *See Hodges*, 474 F.3d at 196-97. We thus inquire whether the patent application and Renfroe's testimony together constitute evidence from which a reasonable jury could conclude that the elements of safer alternative design were met.

a. Prevent or Reduce the Risk of Injury

It is Casey's burden to demonstrate that the alternative design "would have prevented or significantly reduced the risk of the claimant's personal injury, property damage, or death." Tex. Civ. Prac. & Rem. Code Ann. § 82.005(b)(1). Renfroe testified that, had Toyota used the alternative airbag described in PX 1198, Mrs. Casey "would have been . . . retained within the vehicle."[11] This statement, however, is not sufficient evidence that the

[10] Casey also relies on three other patents and patent applications. Because Renfroe testified that Plaintiffs' Exhibit 1198 would assist most in discussing feasible alternate materials, and was the only patent application discussed by Renfroe, we limit our analysis to that exhibit.

[11] We note that Renfroe never testified that, with the alternatively-designed airbag, Mrs. Casey would have *survived* the accident, just that she would have been "retained within the vehicle." If coupled with evidence that the alternative design would have restrained Mrs. Casey within the vehicle, this opinion testimony combined with testimony from the medical examiner, Dr. William Rohr, that Mrs. Casey's fatal injuries were sustained when she was partially ejected from the vehicle, would together be sufficient to show that the alternative

alternative design would have prevented or reduced the risk of injury because Renfroe did no testing to suggest that the presence of the alternative airbag would have changed the result in this case. Additionally, the testing described in the patent application was too far afield to constitute evidence that the alternative design would have reduced the risk of injury in this particular accident.

Texas law expects that an alternative design be tested before a jury can reasonably conclude that the alternative would prevent or reduce the risk of injury. In *Hodges*, for example, an expert examined how the proposed alternative compared to the product used in the accident. 474 F.3d at 196-97. The expert examined how possible alternative designs performed compared to the latch at issue and reasoned that "the Eberhard latch is 25% thicker at the stress point and provides 12,000 pounds of additional holding strength compared to the Mack latch, all factors that, in his opinion, would have prevented it from breaking in the accident." *Id*; *see also Damian v. Bell Helicopter Textron, Inc.*, 352 S.W.3d 124, 151-52 (Tex. Ct. App. 2011) (finding that expert testimony was "no evidence of a safer alternative design" when the design "could have been tested but was not"); *Gen. Motors Corp. v. Harper*, 61 S.W.3d 118, 126 (Tex. Ct. App. 2001) (finding that patents "constituted no evidence of . . . a safer alternative design" because, among other things, "nothing in the patents compared the safety of the patented inventions with the restraint system used in Harper's pickup").

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design "would have prevented or significantly reduced the risk of the claimant's personal injury, property damage, or death." *See* Tex. Civ. Prac. & Rem. Code Ann. § 82.005(b)(1). To provide evidence of this element, Renfroe need not testify directly that the alternative design would have caused Mrs. Casey to survive the accident.

Here, by contrast, Renfroe did not compare the Highlander airbag's abrasion resistance to that of the proposed alternative airbag. Moreover, Renfroe admittedly did no testing to support his conclusion that the alternative design would have changed the outcome for Mrs. Casey in this accident. Renfroe does not explain why he believed that an airbag equipped with the stronger fabric would have withstood the forces in Mrs. Casey's accident beyond simply asserting "that the air bag would have stayed inflated in this accident." Instead, Casey, and Renfroe, rely on the patent application itself to provide the comparison between the Highlander's airbag and the proposed alternative design. To be sure, an expert is not required to duplicate or repeat a detailed testing procedure described in a patent application that, standing alone, is evidence that the alternative design would have reduced the risk of injury in the applicable accident situation. But here, Renfroe's reliance on the patent application's tests was not evidence of the alternative design's superior safety because the testing did not involve similar forces and factors as involved in Mrs. Casey's rollover accident.

The patent application describes three tests: two involving sliding or scrubbing a test bag against a gravel or concrete surface, and one in which a 25-pound weight was dropped on a test bag that lay on a surface covered with vehicle window glass. In his testimony, Renfroe referred to the patent application, specifically the third test, and opined that "[a] 25 pound weight being dropped from 5 and-a-half feet impacting a bag would be quite similar to what occurred in this particular case." But Renfroe provides no support for his assumption that the testing conditions reflected in the patent application were equal to the forces at play in this accident. He did not calculate the actual forces imparted to the airbag in this accident. Crucially, none of the patent application's tests involved an airbag installed in any vehicle, a simulated or

actual rollover, or the forces involved in Mrs. Casey's accident. In *Harper*, plaintiff's expert relied on a test conducted by others as evidence that a material described in a patent was a safer alternative design for a seatbelt webbing that would protect a vehicle's occupants from neck injuries sustained from impact with a steering wheel in a frontal crash. 61 S.W.3d at 127. Because the test did not involve steering wheels or steering columns, the court held that the testing constituted "no evidence" that the alternative design would have protected the driver from the risk. *Id.* Similarly, here, we cannot credit as evidence of a safer alternative design Renfroe's reliance on general tests of the proposed airbag material that were divorced from the conditions of this accident. *See also Ford Motor Co. v. Wiles*, 353 S.W.3d 198, 202-03 (Tex. Ct. App. 2011) (finding that plaintiff presented "no probative evidence to show there was 'a safer alternative design'" where no applicable tests involving the purported safer alternative design were conducted and the expert did not testify that the forces involved in testing were similar to the forces exerted in the accident situation). In addition, there is no evidence in the record that the baseline material to which the patent applicants compared their invention was the same as the airbag used in the airbag installed in Mrs. Casey's vehicle. While both used nylon, there is no evidence that the weave, coating, or other construction of the Toyota airbag was the same as the baseline used in the patent's tests. In sum, because the patent application did not test the alternative material under similar accident conditions, Casey has failed to show that using that material would have prevented or reduced the risk of injury in Mrs. Casey's accident.

b. Risk-Utility

Even assuming that the proposed alternative would have prevented or significantly reduced the risk of Mrs. Casey's death, Renfroe did not conduct a

risk-utility analysis. To prove safer alternative design, a "plaintiff must show the safety benefits from [the] proposed design are foreseeably greater than the resulting costs, including any diminished usefulness or diminished safety." *Hodges*, 474 F.3d at 196 (alteration in original) (internal quotation marks and citation omitted). In *Hodges*, this court recognized the necessity of a risk-utility analysis beyond the mere admission of a patent into evidence:

> Syson also conducted the *requisite risk-utility analysis*. He testified: a driver faces a significant risk if a door opens during an accident; engineers do not, and cannot, design for one particular accident; and the Eberhard latch would not impair the door's usefulness. In other words, part of a latch's utility is its ability to keep a door shut during a vehicle crash and using the Eberhard latch would *not* diminish the door's utility. Therefore, there was sufficient evidence for a jury to find Syson's testimony satisfied the requisite risk-utility test.

Id. at 197 (first emphasis added).

Renfroe did not evaluate whether the new airbag would inject any new risks into the vehicle or diminish its usefulness or safety in any way. In fact, Renfroe admitted that he had not personally done a risk-utility analysis to determine whether this airbag would even work or fit in the 2010 Toyota Highlander. This court has, in similar circumstances, reversed a design defect verdict when an expert did not conduct a risk-utility analysis of a proposed alternative design. *See Smith v. Louisville Ladder Co.*, 237 F.3d 515, 519 (5th Cir. 2001) (reversing a finding of design defect because plaintiff's expert "conceded that he made no risk-benefit analysis" and thus did "not establish that his proposed design would not have substantially impaired the [product's] utility"). Renfroe instead relies on the patent itself for a risk-utility analysis. The patent application contains, and Renfroe cites to, additional benefits related to storing the airbag and preventing "blocking" of the airbag portions,

but these benefits are just one side of a risk-utility analysis. The patent application does not speak to whether the inclusion of the proposed alternative design in the 2010 Highlander would have diminished usefulness or safety, and there was no evidence that any risks were outweighed by the utility of the alternative design. Accordingly, neither Renfroe nor the patent application conducted a risk-utility analysis.

c. Technological Feasibility

Casey also must show that the alternative design was technologically feasible. Casey need not actually build a prototype, but he must prove that the alternative design is "capable of being developed." *Gen. Motors Corp. v. Sanchez*, 997 S.W.2d 584, 592 (Tex. 1999). For this element, Casey relies on the patent and on Renfroe's testimony. Use of the design by Toyota or another manufacturer would be evidence of technological feasibility, but Renfroe testified that the alternative design had never been tested in a vehicle, and that he could not tell the jury whether the proposed fabric had ever been installed in a vehicle. *See Goodner*, 650 F.3d at 1043 ("Under Texas law, the use of an alternative design by another manufacturer may establish technological feasibility."). Renfroe did testify that, based on the out-of-vehicle testing described in the patent application, the proposed alternative "would be an alternative that existed at the time that could have been used in this Highlander to prevent punctures." This conclusory statement, however, is not evidence of technological feasibility.

Moreover, the patent application does not provide evidence that the alternative design could have been implemented in the 2010 Toyota Highlander, has been implemented in any vehicle, or could possibly be implemented. The patent application recognizes that "attempts at constructing side curtain airbags and in particular side curtain airbags with

rollover protection has [sic] been problematic." Although the patent application purports to provide an airbag that is thinner and easier to pack, there is no statement in the application demonstrating that this design could have been implemented in the 2010 Toyota Highlander. Accordingly, Casey's evidence on this point is solely Renfroe's assertion that this airbag could have been used in this Highlander. When considered along with Renfroe's testimony that the design was never tested or installed in a vehicle, and the patent application's failure to assert that it could have been used in the 2010 Toyota Highlander, Renfroe's unsupported assertion would not be enough for a reasonable jury to conclude that this alternative design was technologically feasible. *See Merck & Co. v. Garza*, 277 S.W.3d 430, 440 (Tex. Ct. App. 2008), *rev'd on other grounds*, 347 S.W.3d 256 (Tex. 2011) (holding that, where plaintiffs' only proof of technological feasibility is a patent application, "something else must be found in the record to corroborate" the probability that the alternative was technologically feasible).

d. Economic Feasibility

Finally, Casey also failed to demonstrate that the alternative airbag would have been economically feasible. "To establish economic feasibility, the plaintiff must introduce proof of the 'cost of incorporating this technology.'" *Honda of Am. Mfg., Inc. v. Norman*, 104 S.W.3d 600, 607 (Tex. Ct. App. 2003) (citation omitted). For this element, Casey again relies on Renfroe's testimony and on the patent application. Renfroe's testimony does not establish the alternative design's cost effectiveness. First, Renfroe relied exclusively on the patent application, testifying that the material described in the patent application was "[c]ost effective. That was the objective of their patent, obviously, is to try and sell this material." Renfroe's opinion, however, is not evidence of economic feasibility because he provides no support for his opinion

that the new material was cost effective. *See Dewayne Rogers Logging, Inc. v. Propac Indus., Ltd.*, 299 S.W.3d 374, 384 (Tex. Ct. App. 2009) (finding that an affidavit stating that a safer alternative design was economically feasible without "any facts supporting these conclusions" was insufficient evidence of that element). While the *objective* of most patent applicants surely is to commercialize and profit from their inventions, this objective does not guarantee success. Next, Renfroe testified that the "air bag *material* that is talked about in this patent . . . is commercially available." But the commercial availability of a *component* of the finished product is not, in itself, evidence of the economic feasibility of the safer alternative design. In *Goodner*, along with proof that the new design was installed in some cars, an expert "testified that alternative designs were economically feasible, which he defined as a cost that would not render the vehicle so expensive that it's impractical to purchase it." 650 F.3d at 1044 (internal quotation marks omitted). Here, by contrast, there is no testimony or evidence suggesting that a car equipped with the alternative design could still be sold at a reasonable cost. Renfroe's statements about cost effectiveness thus were insufficient because no reasonable juror could find that the alternative design could be economically feasible without any evidence of the cost of incorporating this design. *See Jaimes v. Fiesta Mart, Inc.*, 21 S.W.3d 301, 306 (Tex. Ct. App. 1999) ("Fiesta contends that because Jaimes's expert did not address the economic feasibility of using another substance or making the balloons unpalatable, his affidavit was inadequate as summary judgment evidence. We agree.").

Nor does the patent application contain non-hypothetical evidence of the cost of incorporating the alternative technology. To prove economic feasibility where the product is not yet in use, courts generally require a party to present evidence of either an estimate or range of the cost of the alternative design.

See Brochtrup v. Mercury Marine, 426 F. App'x 335, 339 (5th Cir. 2011) (concluding that testimony from builder of alternative design that building cost was $400 was sufficient evidence of economic feasibility to avoid judgment as a matter of law); *A.O. Smith Corp. v. Settlement Inv. Mgmt.*, No. 2-04-270-CV, 2006 WL 176815, at *3-4 (Tex. Ct. App. Jan. 26, 2006) (concluding that detailed testimony about how proposed alternative design would add between $5 and $200 per unit was "some evidence" of economic feasibility). The patent application, however, does not provide any cost-analysis beyond asserting a goal to make the air bag cheaper.[12] Moreover, Casey submitted no evidence that the parties making the cost effectiveness statements—here, the patent applicant and Renfroe—have any experience designing and marketing air bags. *See A.O. Smith Corp*, 2006 WL 176815, at *4 (concluding that testimony of economic feasibility was not mere speculation when cost estimates were combined with the expert's "background in designing and marketing" products in the relevant field).[13] In short, Casey has not provided evidence of economic feasibility of his proposed safer alternative design.

Because Casey fails to present evidence from which a reasonable jury could find that there was a safer alternative design, the district court did not err in granting judgment as a matter of law as to Casey's design defect claim.

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[12] The patent application contains several statements suggesting that the design will cost less than existing air bags. *See, e.g.*, PX1198 ¶ 0034 ("Compared to a similar structure laminated with a layer of heavy fabric, the inventive structure . . . costs less."); *id.* ¶ 0089 ("Thus, the inventive fabric permits an improved, cost-effective, method of making a 'pillowed' inflatable fabric."); *id.* ¶ 0095 ("Furthermore, it goes without saying that the less film coating composition required, the less expensive the final product."). But these statements do not purport to estimate the cost of the design or the "cost of incorporating this technology" into a Highlander. *See Norman*, 104 S.W.3d at 607 (citation omitted).

[13] Casey asserts that Renfroe "personally holds the rights to five active patents in relation to various automotive inventions including steering mechanisms" but does not claim that Renfroe has any experience that would render him an expert on the cost-effectiveness of a new airbag design.

We therefore need not determine whether the Highlander's side curtain airbag was unreasonably dangerous or whether the airbag was a producing cause of Mrs. Casey's injury. *See Goodner*, 650 F.3d at 1040.

CONCLUSION

For the foregoing reasons, we AFFIRM the district court's grant of judgment as a matter of law to Toyota on Casey's manufacturing and design defect claims.