

# Preclusion of Expert Testimony of Alternative Designs Through LS-DYNA Testing Granted

Justice Milton A. Tingling

LASCANO v. LEE TRUCKING, 401255/02, Decided 09/07/07—

Attorneys for Plaintiff: Rheingold, Valet, Rheingold Shkolnik & McCartney LLP

Attorneys for Defendants: Sedgwick, Detert Moran & Arnold LLP

## DECISION and ORDER

In a Frye Hearing conducted before this Court between the dates of July 31, 2006 and August 2, 2006, defendants Hino Motors, Ltd. and Hino Diesel Truck USA, Inc. moved to preclude as trial evidence Plaintiff's proposed expert testimony as to alternative designs to the Hino FA truck.

This is a product liability action arising out of the personal injuries sustained by Plaintiff in a tragic motor vehicle accident on September 3, 1999. On the day of said accident Plaintiff was driving a 1990 Hino FA truck on the Long Island Expressway when he rear-ended a Mack M250P truck driven by defendant Sang Lee. The Mack's steel rear end penetrated the occupant compartment of the Hino truck, causing Plaintiff to suffer catastrophic injuries. Now a mutilated cripple, this accident has caused Plaintiff an immense amount of pain and suffering. In this product liability action, Plaintiff claims that the 1990 Hino FA cab-over-engine vehicle involved in said accident was defectively designed in that it did not adequately protect its occupant in the course of the motor vehicle accident.

The 1990 Hino FA truck is a cab-over-engine style vehicle. Cab-over-engine trucks are geared toward city use, and have been in use for decades throughout the United States and the rest of the world. What makes these trucks unique is that their engine is located below the driver compartment, thus providing excellent visibility for the driver by eliminating any blind spots that would ordinarily be caused by the engine. This design is well-suited for a city environment populated by children, bicyclists, and pedestrians.

In an action based on strict products liability for a design defect, the plaintiff is under an obligation to present proof of an alternative, safer design, practicable under the circumstances (*Garcia v. Rivera*, 553 N.Y.S.2d 378 (1st Dept. 1990); *Voss v. Black & Decker Mfg. Co.*, 450 N.E.2d 204 (N.Y. Ct. App. 1983)). Plaintiff has attempted to meet this burden of proof by introducing three alternative designs to the Hino FA truck. The alternative designs presented by Plaintiff include a conventional style truck, a modified conventional style truck, and a modified Hino FA cab-over-engine design with an enhanced structural integrity of the occupant safety cage. It is Plaintiff's contention that any of these alternative designs would have better protected Plaintiff in the course of his accident and would have minimized the injuries sustained by Plaintiff.

In order to prove that Plaintiff's alternative designs are safer than the Hino FA truck, Plaintiff relies on various simulated crash tests, numerous papers published by the Society of Automotive Engineers (SAE), a crash test of a Hino FA truck, as well as several National Highway Traffic Safety Administrator (NHTSA) crash tests. In support of Plaintiff's claim that a conventional truck is a safer alternative to the Hino FA truck, Plaintiff relies on an LS-DYNA simulation, several SAE papers, and a University of Michigan Highway Safety Research Institute study that concluded that conventional style trucks are safer than the cab-over-engine design. In support of his claims regarding the modified conventional style truck, Plaintiff relies upon an NHTSA crash test of a Toyota van as well as a 1999 SAE paper which advocates the use of conventional or modified conventional designs to increase occupant safety. Finally, Plaintiff attempts to validate the safer conditions of the alternative reinforced cab-over-engine design through reliance on various NHTSA crash tests, none of which involved a Hino truck, as well as said 1999 SAE paper.

It is a well-established rule that experimental tests will be admitted as evidence so long as the tests have gained general acceptance in the particular field to which they belong (see *Frye v. United States*, 293 F. 1013 (D.C. Ct. App. 1923); *Styles v. General Motors Corporation*, 799 N.Y.S.2d 38 (1st Dept. 2005)). According to Defendants, Plaintiff's assertion that the proposed alternative designs would have more adequately protected Plaintiff is not based upon reliable tests that have gained the general acceptance of the scientific or engineering communities and thus should be precluded from Plaintiff's expert testimony.

Defendants contend that the use of LS-DYNA simulations without real-life crash test validation is not generally accepted in the scientific or engineering communities. An LS-DYNA simulation is a finite element analysis (FEA) application design tool. FEA is a computer simulation technique used in engineering analysis. In an FEA simulation, the object of the computer simulation is represented by a geometric model similar to the object of the simulation and consisting of several linked, simplified representations of discrete regions, otherwise known as finite elements. In addition to its many other uses, FEA is used to analyze the movement and displacement of various components in the course of a crash event. LS-DYNA, an application of FEA, is the commercial version of the DYNA 3d code, which was developed by Mr. Lawrence Livermore in the 1980's. LSDYNA was written and commercialized

by Mr. John Hallquist who started the Livermore Technological Corporation.

Mr. Khanh Bui, an expert on finite element analysis and a witness for the Defense, has testified that real-life crash testing must be used to validate an LS-DYNA model. Mr. Bui has worked under Mr. John Hallquist, owner and developer of LS-DYNA. He was the fourth person to join the company started by Mr. Hallquist in Livermore. As such, he is a premier expert in the field of LS-DYNA simulations. Plaintiff disputes Mr. Bui's statements and contends that it is generally accepted to use LS-DYNA simulation tests without real-life crash test validation. In support of this contention, Plaintiff affirms that General Motors uses LS-DYNA for vehicle design without the use of real-life crash testing. Plaintiff, however, has failed to produce any reliable documentation to corroborate that statement. Mr. Bui, who testified to have simulated crashworthiness with LS-DYNA at General Motors and states that he is familiar with General Motors's use of LS-DYNA today, denies that claim, and asserts that General Motors does not use LS-DYNA as a final verification of a vehicle. Rather, General Motors still requires full real-life crash testing to validate an LS-DYNA model. An affidavit of Dr. Dean L. Sicking, produced by the defendants in this action, confirms the allegation that it is not acceptable to use LS-DYNA without crash test validation. Dr. Sicking is the director of the Midwest Roadside Safety Facility and a Professor of Civil Engineering at the University of Nebraska-Lincoln. He is also a former Associate Research Engineer at the Texas Transportation Institute. His professional experience includes computer simulation of vehicle dynamics, including finite element analysis and LS-DYNA, and he has written a number of peer-reviewed articles on the use of LS-DYNA. In his affidavit, Dr. Sicking states that "to date neither industry, government, nor engineering societies accept finite element methodology and LS-DYNA simulations without validation and correlation with real-world crash tests for the purpose of establishing the crashworthiness of any given design or that a vehicle structure could be expected to protect an occupant in any given accident".

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Plaintiff called to the witness stand Mr. Wayne McCracken, the bearer of a Bachelor's degree from Duke University in the discipline of electrical engineering. Mr. McCracken testified that he is a member of the Society of Automotive Engineers (SAE) and sits on the SAE's Accident Reconstruction Review Committee that reviews papers for publications through this society. The Society of Automotive Engineers is the largest organization of automotive engineers in the world. On cross-examination Mr. McCracken was unable to name a single paper published in the peer review journal which says that is acceptable in the science and engineering communities today to use LS-DYNA alone to prove crashworthiness. He was merely able to affirm that "I know that there is a movement in that direction...But where exactly it is in the process, I don't know" (page 93, lines 14-18 of Frye Hearing transcript).

Plaintiff next called to the witness stand Mr. Gerald Rosenbluth. Mr. Rosenbluth earned a Bachelor's degree and a Master's degree from Arizona State University in the area of industrial design and technology with a specialization in automotive technology and a minor in physical sciences. Mr. Rosenbluth stated that finite element analysis testing does not have to be confirmed with a real-life crash tests, yet Mr. Rosenbluth is not an engineer, and admitted that he himself does not perform finite element analysis. He conceded that he has never taken a formal engineering course. Mr. Rosenbluth admitted that automobile companies do crash test vehicles in addition to conducting a finite element analysis.

Plaintiff's expert witness in the area of finite element analysis and LS-DYNA, Dr. Robert Bocchieri, is the bearer of a Master's and Ph.D in aerospace engineering from the University of Texas at Austin, with a specialty area in structural mechanics and materials analysis. He currently manages the Silicon Valley office of the Applied Research Association (ARA). His office specializes in LS-DYNA simulations of various crash impact events as well as other dynamic events. While he stated that finite element analysis is widely accepted in the scientific community, Dr. Bocchieri conceded that any good engineer would want to have some validation test. The website of the ARA, where Dr. Bocchieri works, contains the following statements of Dr. Kirkpatrick, a colleague of Dr. Bocchieri: "FEA is not a replacement for actual crash testing but it streamlines the process... We use FEA, finite element analysis, for evaluation of candidate safety products prior to full scale testing which allows the customer to perform the only minimum number of full scale tests for product qualification". Plaintiff's witnesses have thus failed to convince this Court that it is generally accepted and reliable to use an LS-DYNA simulation test without the follow-up of a real-life crash test validation.

Further, in order to be admitted as evidence, the conditions of Plaintiff's tests must also be substantially similar to the conditions of Plaintiff's accident (58 N.Y. Jur.2d, Evidence and Witnesses, §439; *Styles v. General Motors Corporation*, supra). Concerning the numerous SAE papers and reports submitted by Plaintiff, said papers and reports must not be overly broad and lack detail as to actual tests conducted upon vehicles. If said papers and reports are of a sweeping nature and lack detail regarding any actual testing conditions, the papers and reports may not be admitted as evidence (see *Cramer v. Kuhns*, 630 N.Y.S.2d 128 (3rd Dept. 1995)).

Plaintiff supports his claim as to his first alternative design, a conventional style truck, by relying on an LS-DYNA simulation. The LS-DYNA simulation relied upon by Plaintiff was developed to assess roadside guard barriers. As it is not intended to predict how a truck would perform in a frontal collision with another truck, it lacks sufficient detail to provide any reliable insight into the truck's crashworthiness in any frontal impact accident. In addition, the first of the SAE papers cited by Plaintiff, SAE paper 751018, as well as the University of Michigan Highway Safety Research Institute study cited by Plaintiff, do not contain details of any actual testing done to prove the superiority of the conventional truck from a safety perspective. Further, despite Plaintiff's contention that his attack is limited to the 1990 Hino FA and not all cab-over-engine vehicles, said paper and report refer to cab-over-engine vehicles in general, and not specifically to the 1990 Hino FA. Consequently, the sweeping nature of the paper and

the report must result in their preclusion. Further, the testing conditions contained in SAE paper 1999-01-3056 are not sufficiently similar to the conditions of Plaintiff's accident, thus rendering the results of the testing in said paper irrelevant to Plaintiff's accident. This deficiency, together with the absence of testimony from anyone involved in the writing of the study, are a cause for the paper's preclusion as trial evidence.

In regard to Plaintiff's second alternative design, a modified conventional style truck, Plaintiff supports his claim by relying on an NHTSA crash test of a Toyota van as well as SAE paper 1999-01-3056 which advocates conventional or modified conventional designs to increase occupant safety. The vehicle subject of the crash test was not a conventional truck similar in class to the Hino FA truck, but rather a Toyota van. Further, the NHTSA crash test relied upon did not involve a front impact beam being crashed into a barrier. This Court thus finds that the conditions of said crash test were not substantially similar to the conditions of Plaintiff's accident. The NHTSA crash test in question is so dissimilar from the accident circumstances that reliance on this test is misplaced. The crash test is therefore precluded as trial evidence. Regarding the SAE paper, it too must be precluded as trial evidence (see supra).

In support of his third alternative design, a modified Hino cab-over-engine truck, Plaintiff relies upon numerous NHTSA crash tests and SAE paper 1999-01-3056. This Court finds that the conditions of the NHTSA crash tests were not sufficiently similar to the conditions of Plaintiff's accident to render them admissible as evidence. The tests did not involve a Hino FA truck nor did they involve a front impact beam being crashed into a barrier. There is a substantial disparity of several thousand pounds between the weight of the cars used in the crash tests and the weight of the Hino truck that Mr. Lascano was driving at the time of his accident. None of the vehicles in the NHTSA crash tests had an offset collision, and none of them had an under-ride, unlike the conditions of Mr. Lascano's accident. Moreover, said crash tests did not involve front impact beams or grille guards and did not involve a projection barrier similar to the rear end of a Mack truck. Thus, this

Court finds that the conditions of the NHTSA crash tests are not even remotely similar to the conditions of Mr. Lascano's accident. Mr. Rosenbluth, a witness for the plaintiff, has himself admitted that these crash tests are not very similar to the Lascano accident. In addition, as part of Plaintiff's third alternative design, Plaintiff has suggested the use of front impact beams in conjunction with side door beams. Yet, Plaintiff has presented no reliable tests to support his claim that such a design would have made a material difference to Plaintiff's safety. Further, this Court finds that there is no general acceptance of Plaintiff's opinion that the use of a front impact beam made from the same material as a side impact beam would have minimized Plaintiff's injuries. Mr. Rosenblatt, a witness for the plaintiff, admitted that he is unaware of a single cab-over-engine vehicle manufactured for sale in the U.S. in 1990 or today that has a front impact beam. As part of Plaintiff's third alternative design, Plaintiff also suggests the use of side door impact beams without front impact beams. Plaintiff conducted various metallurgical tests of side door impact beam materials and concluded that a Hino FA truck with side door beams would have greater protected Plaintiff in the course of his accident. Yet, Plaintiff did not conduct any crash tests on a Hino FA cab-over-engine truck with side door impact beams, thus failing to prove that such a design would have proven safer than the Hino FA truck involved in Plaintiff's accident. Plaintiff has also failed to produce a crash test on a Hino FA truck with a grille guard installed above the level of the bumper to prove that such a design is in fact superior to the 1990 Hino FA truck from a safety perspective. In respect to the SAE paper, it too must be precluded (see supra).

Plaintiff also relies upon a crash test of a 1991 Hino FA truck. Said truck involved in the crash test did not contain front or side impact beams or grille guards, which according to Plaintiff's third alternative design would have better protected Plaintiff in the course of his accident. Thus, this crash test can not be used to prove that Plaintiff's third alternative design would have better protected Plaintiff. As this crash test was conducted on a Hino cab-over-engine truck, it also fails to prove that a conventional style truck or a modified conventional style truck would have minimized Plaintiff's injuries.

Plaintiff's tests have thus failed to fulfill the "substantial similarity" condition as set forth in *Styles, supra*. As such, Plaintiff has failed to produce reliable evidence proving the existence of a safer alternative design to the Hino FA truck. The burden of proving the reliability and relevance of evidence rests upon the party seeking to introduce the evidence. In the case at bar, it is Plaintiff who seeks to introduce evidence of alternative designs to the Hino FA cab-over-engine vehicle. As Plaintiff has failed to meet its burden of proof, Plaintiff's proposed expert testimony as to alternative designs must be precluded.

Accordingly, as a result of Plaintiff's failure to prove the general acceptance of the use of LS-DYNA without real-life crash test validation, as well as his failure to demonstrate a substantial similarity between the conditions of Plaintiff's tests and the conditions of Mr. Lascano's accident, the defendants' Motion for the preclusion of Plaintiff's expert testimony as to alternative designs must be granted. There may soon come a day when the use of LS-DYNA without real-life crash test validation will be generally accepted for the specific application sought herein, however that day has not yet arrived. This constitutes the Decision and Order of the Court. Settle Order on notice. ■