



The Use of Photogrammetry in Accident Reconstruction

By Tamara B. Goorevitz

Although photogrammetry may be a generally accepted science, the expert must still have a sound basis for rendering opinions on its use.

Can Expert Opinions Be Successfully Challenged?

When an accident involving a tractor trailer occurs, the importance of preserving and documenting the actual evidence at the scene (including skid marks, tire marks and other physical evidence), by way of physical inspec-

tion and measurements, cannot be understated. Unfortunately, it is not uncommon for the accident scene to be cleared without any documentation of such evidence other than photographs. With a lack of sufficient documentation of physical evidence from the scene, accident reconstructionists involved in litigation are employing the use of photogrammetry to evaluate photographs only in order to formulate their opinions. This article will examine whether opinions by an accident reconstructionist that are based on the use of photogrammetry can and should be challenged. This article will also examine caselaw around the country addressing the issue of whether photogrammetry is a reliable scientific method sufficient to withstand *Daubert* challenges.

What Is Photogrammetry?

Photogrammetry is a method of obtaining information such as measurements and dimensions, primarily by the use of photo-

graphs. Research into the origins of photogrammetry reveals that this science dates back to at least the nineteenth century. The majority of photogrammetry's use and application seems to exist outside of the litigation arena, in areas such as engineering, construction, architecture and even medicine. As one commentator noted:

The applications of photogrammetry are widely spread. Principally, it is utilized for object interpretation (What is it? Type? Quality? Quantity) and object measurement (Where is it? Form? Size?). Aerial photogrammetry is mainly used to produce topographical or thematical maps and digital terrain models. Among the users of close-range photogrammetry are architects and civil engineers (to supervise buildings, document their current state, deformations or damages), archaeologists, surgeons (plastic surgery) or police departments (documentation of traffic accidents and crime scenes), just to mention a few.



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By using photogrammetry, experts can determine the distance between two points in a photograph by measuring their distance on the actual image and applying the appropriate scale to translate the measurement to actual size. Even three-dimensional objects can be measured from a two-dimensional photograph. For an interesting discussion of the “art of photogrammetry” and its history in the context of a declaratory judgment suit addressing the validity of a patent, see *O.M.I Corporation of America v. Kelsh Instrument Company*, 173 F. Supp. 445 (D. Md. 1959).

Photogrammetry’s application in the litigation arena remains largely unvetted. Nonetheless, the use of photogrammetry by accident reconstructionists has become increasingly common. Rather than measuring and documenting physical evidence at the scene of an accident, these experts use two-dimensional photographs to determine data such as crash severity, vehicle crush measurements, skid mark length, vehicle rest positions, and even speed. Few courts have published opinions discussing the admissibility of such opinions based on the use of photogrammetry. Of these opinions, only one has discussed the use of photogrammetry in accident reconstruction. Thus, the question remains as to whether this method should be accepted in courts to reconstruct important details of a motor vehicle accident such as speed, crush measurements, and crash severity from two-dimensional photographs.

Passing the Admissibility Test

Courts recognize that expert testimony has the potential to be both powerful and misleading. *Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 261 (4th Cir. 1999) (quoting *Daubert*, 509 U.S. at 595). “[G]iven the potential persuasiveness of expert testimony, proffered evidence that has a greater potential to mislead than to enlighten should be excluded.” *Westberry*, 178 F.3d at 261 (citing *United States v. Dorsey*, 45 F.3d 809, 815–16 (4th Cir. 1995)). Thus, the Supreme Court has declared that trial judges in federal court must act as gatekeepers to “ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.”

Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 588 (1993).

The *Daubert* Court enunciated five factors that the trial court may use in assessing the relevancy and reliability of proffered expert testimony: (1) whether the particular scientific theory can be (and has been) tested; (2) whether the theory has been subjected to peer review and publication; (3) the technique’s known or potential rate of error; (4) the existence and maintenance of standards controlling the technique’s operation; and (5) whether the technique has achieved general acceptance in the relevant scientific or expert community. *Daubert* at 593–94.

Many state courts around the country have chosen not to apply the *Daubert* test (generally thought to be a more liberal admissibility test) and instead apply other admissibility tests such as the test enunciated in *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923) of “general acceptance within the field,” e.g., *Owens Corning v. Bauman*, 726 A.2d 745 (Md. App. 1999); *Watkins v. U-Haul Intern., Inc.*, 770 So. 2d 970 (Miss. App. 2000); *People v. Wesley*, 633 N.E.2d 451 (N.Y. 1994). Therefore, the use of photogrammetry as a basis for opinions regarding speed of vehicles, crush damage, skid mark length, severity of impact and other related opinions should be examined under the appropriate test of admissibility in the applicable jurisdiction.

Court Rulings Regarding the Admission of Photogrammetry Evidence

This author’s research revealed only seven court opinions discussing the admissibility of expert testimony based on the use of photogrammetry to interpret photographs. Only one of these opinions addressed its use in the context of accident reconstruction.

In *Lombard v. Dobson*, 16 A.D.2d 1031 (N.Y.A.D. 1962), the court held that the plaintiff’s expert, “a consulting engineer who said that he had taken a few months’ training in the technical and scientific reconstruction of accidents,” should not have been permitted to testify as to his conclusions regarding the speed of the defendant’s vehicle at the time of impact. The expert in question testified that he analyzed photographs of the positions of the cars after the accident, examined the dam-

age to the cars, and applied the science of photogrammetry and “other scientific formulae” to reach his conclusions. *Id.* The court’s one-paragraph opinion noted that the expert’s qualifications were not sufficient to allow the testimony; however, the court concluded that the admission of the testimony did not require reversal.

In *Papadopoulos v. Fred Meyer Stores,*

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Inc., 2006 WL 3404950, 2–3 (W.D. Wash. 2006), a premises liability case, the court issued an order denying defendant’s motion *in limine* to exclude plaintiff’s expert, who would be called to testify regarding the height of a floor tile ridge. Plaintiff claimed that he caught his foot on a “ridge” in a floor tile that was elevated higher than the rest of the tiles. The height and slope of the “ridge” was at issue. Plaintiff took photographs of the ridge shortly after the incident and his expert employed photogrammetry to evaluate the photographs and to opine as to the height of the ridge and the depth of a depression in the floor. Defendant contended that the calculations were unreliable and that the testimony should be excluded. The court noted that close-range photogrammetry has been subjected to peer review, publication and was generally accepted within the relevant scientific community. However, the court did note its concern as to whether the testimony is based on “sufficient facts or data” due to the resolution of the photographs used.

In *United States v. Quinn*, 18 F.3d 1461 (9th Cir. 1994), the court examined whether to admit expert opinion testimony as to the height of a robbery suspect based on the use of photogrammetry to interpret surveillance photographs. The expert in question used a formula to measure the change in the dimensions of the robbery suspect in the photographs as the suspect moved away from the camera. This formula was then tested against objects of known dimensions in the same photograph and the indi-

vidual's height was thus derived. Applying *Daubert* and Federal Rule of Evidence 702, the court concluded that the expert's process was "nothing more than a series of computer-assisted calculations that did not involve any novel or questionable scientific technique." *Id.* at 1465. Accordingly, the testimony was admitted.

Four other courts have addressed the admissibility of opinions based on photogrammetry, all holding that opinions based on its use were admissible: *U.S. v. Williams*, 235 Fed. App'x 935 (3d Cir. 2007) (holding that the technique of reverse projection photogrammetry was sufficiently reliable to satisfy the admission requirements of F.R.E. 702 in determining the height of a suspect captured on a surveillance camera); *Vincente v. City of Rome, Ga.*, 2005 WL 6032876 (N.D. Ga. 2005) (slip. op.) (expert sufficiently qualified to give testimony using photogrammetry to determine bullet trajectory); *Chapman ex rel. Estate of Chapman v. Bernard's, Inc.*, 167 F.Supp.2d 406 (D. Mass. 2001) (finding that expert's opinion regarding space between spindles in a daybed based on the use of photogrammetry was not based on "junk science" and was sufficiently reliable to be admitted); *Reichhold, Inc. v. U.S. Metals Refining Co.*, 2007 WL 674686 (D. N.J. 2007) (holding that testimony regarding ground elevations at release site based on aerial photogrammetry was admissible even though the height of the aerial photography was not in compliance with recommendations by the American Society of Photogrammetry and Remote Sensing).

Can Opinions by an Accident Reconstructionist Based on Photogrammetry Be Successfully Challenged?

As the cases above demonstrate, it is more likely than not that a court addressing the issue of admissibility of photogrammetry evidence will generally find the science of photogrammetry to have been tested, subjected to peer review and widely published. Although the only court to date to publish an opinion as to the admissibility of such evidence in the reconstruction of motor vehicle accidents noted that the expert was not sufficiently qualified, *Lombard, supra*, no courts have addressed the *reliability of the data* in this context. There

is, however, literature available that discusses the use of photogrammetry to determine vehicle crush and crash severity. See S. Fenton & W. Johnson, *Using Digital Photogrammetry to Determine Vehicle Crush and Equivalent Barried Speed (EBS)*, SAE Technical Paper Series 1999-01-1439 (Society of Automotive Engineers); S. Fenton & R. Ziernicki, *Using Digital Photogrammetry to Determine Crash Severity*, ICRASH 2000 (International Crashworthiness Conference, London).

The introduction of testimony regarding speed, crush, skid mark length and severity of impact based only on the use of photographs should nonetheless be questioned. The expert's methodology, experience and familiarity with the use of photogrammetry should be explored. The use of photogrammetry is an extremely technical science and can require the manipulation of the photographs as well as overlapping of several photographs in order to obtain accurate measurements. Therefore, if possible, a discovery deposition of the expert should be taken in order to explore the exact methodology, including the extent to which the expert feels the data obtained is accurate. Lee DeChant, the expert challenged in the *Papadopoulos* case, *supra*, published an article in the *Nevada Lawyer* in May 2006. The article is entitled "How a Photogrammetry Expert Can Help You Win Your Case." (available on Westlaw at 14-MAY Nev. Law. 19). Although the clear purpose of the article is to advance the use and acceptance of photogrammetry, and in particular, the use of the author as an expert, it also identifies some of the factors that are necessary to obtain reliable photogrammetric data. Further, the article notes that the experience of the expert in photogrammetry is paramount ("A competent photogrammetrist should be well versed in forensic measurements... with years of practical field experience, as well as publishing papers or articles on the subject matter of photogrammetry"). Therefore, it follows that if the expert offering the opinions based on photogrammetry cannot demonstrate sufficient competency in the field of photogrammetry, this article may serve as a potential means to exclude the expert.

It is also important to examine the quality of the photographs. If the photographic

image is poor the data obtained by the use of photogrammetry may be questionable. Additionally, digital photographs can be easily manipulated and altered, which may serve as an additional basis to question the reliability of conclusions based on digital photographs only.

Lastly, regardless of the offering party's ability to show that photogrammetry is a reliable scientific method, subject to peer review, and sufficiently reliable to withstand *Daubert* or other evidentiary challenges, it is likely that most judges will agree that nothing can be more accurate and reliable than data and actual measurements obtained directly from the accident scene and directly from the involved vehicles. Therefore, as the admissibility of expert testimony always lies in the sound discretion of the trial judge, a viable argument remains that this evidence should not be admitted, especially when other reasons (such as quality of the photographs or the offering expert's own uncertainty as to the reliability of the data or inexperience with photogrammetry) exist that it should be excluded. In the event that the evidence is admitted over objection, the trier of fact should be reminded that. Although the opinions may be admissible, the trier of fact must still consider whether the opinions should carry any weight.

Conclusion

Expert opinions regarding crucial issues such as speeds of vehicles, crush severity, impact severity, skid mark length and other opinions related to the nature of an accident involving a tractor trailer should always be carefully scrutinized. When the opinions are obtained from the use of photogrammetry to analyze photographs, the party against whom such opinions are being introduced must examine the basis of the opinions and the expertise of the expert offering the opinions. Although photogrammetry may be a generally accepted science, the expert must still have a sound basis for rendering opinions based on its use. Ultimately, should opinions based on the use of photogrammetry be admitted into evidence, the trier of fact should always be reminded that although a picture may be worth a thousand words, the evidence that may be obtained from the pictures alone may not be.

