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Look Before You Leap

Tom Griffiths, Ed.D.

A college student drowned in a campus lake late at night when the swimming area was closed. Of note, there was a large, colorful water trampoline located in deep water, but very close to the shore. With the trampoline situated in the deep water, the likelihood of a drowning significantly increased.

Testimony revealed that students often frequented the trampoline after hours. Although campus officials questioned the hazards of having a trampoline in the water, the university did not take any effective or proactive preventive actions to stop students from using the trampoline after hours. There was no warning signage, no

campus security patrols, no rescue equipment, no security cameras, no security lights and no buoyed boundaries defining the approved swimming area. Further, students were not warned of what ramifications, if any, would be enforced if they were caught swimming in the lake at night and/or using the trampoline.

Because the trampoline was so close to the shore and in deep water, it was foreseeable that students would be attracted to the beach, swimming area, as well as the trampoline, especially during the warm summer months.

This case settled quickly at mediation. 

Soiled Plans

Jonathan L. Bilow, PE

Case Synopsis: The subject retaining wall was a 2 tiered wall that ranged from 8 to 10 ft for the lower tier and 6 to 8 ft for the upper tier. The wall, which was mechanically stabilized, was constructed out of block material and had geogric to retain the soil behind the wall. Within 1 -2 years of being constructed, the retaining wall failed.

Expert Analysis: A geotechnical analysis on the soil material and condition, and wall construction was done to assist in determining why the wall failed. A geotechnical analysis was prepared to determine whether the wall was designed correctly, whether there was proper oversight, and if it was constructed in accordance with the approved drawings. During the investigation,

it was found that insufficient soil data was collected and analyzed - as a result, the wall was designed from soil parameters that were not consistent to the actual soil conditions. Furthermore, the soils retained an excessive amount of water, which caused the soils to move and fail the wall. The design did not account for the free-draining of the water. It was further determined that the wall failure was not a result of 1 specific thing, but to a number of issues including not properly analyzing the existing soils conditions, not allowing for water that penetrated the soils to freely drain, and to designing and constructing the retaining wall from incorrect soils information and data.

Result: Case settled. 

Training Wheels

John Schubert, Bicycle Expert

Case Synopsis: A middle-aged woman, seeking to improve her cycling from casual riding to triathlon competition, went to a bike shop to purchase a suitable competition bike, together with the special shoes and pedal binding system favored by competitors. While being fitted to the pedal binding system, on a bike on a trainer stand, she fell and sustained substantial injuries.

Expert Analysis: Every cyclist who gets a pedal binding system faces an initial period of getting accustomed to having his or her shoes secured to the pedals. The cyclist needs to learn the motion (moving the heel to the outside) that disengages the shoe from the pedal, and the cyclist needs to make that motion instinctive, and not feel afraid of the system.

The best place to learn this is on a bicycle mounted on a trainer stand. But even this "safe" environment requires care and knowledgeable precaution because a bicycle on a trainer stand is not very stable. Surprisingly, minimal sideways body motion will cause the bike, trainer stand and rider to fall over.

The store clerk was inexperienced in these matters. He tried to adjust the tightness of the binding system by working on the shoe; however, the tightness adjustment is an adjusting screw on the pedal as there is no adjustment on the shoe. In telling the customer how to position her body mass as she got on and off the bicycle on the trainer stand, he positioned her exactly the opposite of what he should have done -- positioning her body mass to the side, thus destabilizing her, rather than keeping her in the middle.

The customer was having trouble learning the motion, the binding system may have been adjusted too tight, and the clerk was not holding the bike securely, as he should have. As a result, the customer fell sideways. As "luck" would have it, the trainer stand was positioned next to a half wall, and her shoulder hit the half wall with considerable force.

Result: Case settled. 

Slippery When Wet

Robert Nobilini, Ph.D.

Case Synopsis: A bartender slipped and fell on a wet ceramic tile floor, fracturing her patella. The plaintiff's expert claimed that the design of the plaintiff's footwear was the primary cause of the fall.

Expert Analysis: Plaintiff's expert opined that the design of the footwear's sole reduced its contact area with the floor, which reduced the slip resistance of the footwear. It was shown that slip resistance is independent of surface contact area. Therefore, the plaintiff's expert's opinion contradicted the laws of physics.

Plaintiff's expert stated that the midsole stiffness of the footwear increased the push off force between the footwear and the floor. However, he failed to provide any scientific basis to support his opinion. In fact, the design of the incident footwear was shown to be similar to other footwear on the market. It was also shown that the expert made certain assumptions about the plaintiff's fall mechanics that were incorrect. Therefore, the stiffness of the footwear was determined not to be a factor.

A biomechanical analysis of the woman's fall mechanics revealed that her injuries were consistent with her lead foot slipping forward, causing her body to fall straight down onto her trailing knee. The floor was not available for examination; however, it was described as a ceramic tile floor, which had water and/or ice on it at the time of the incident. Since the plaintiff's fall was consistent with a slip, there was no evidence that her footwear was a factor, and the slip resistance of ceramic tile is commonly reduced when wet and/or icy. As a result, it was determined that the primary cause of the plaintiff's fall was the condition of the floor.

Result: Case settled. 

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Label Fable

Robert J. Bockserman, BSc., MSc.

Case Synopsis: A chemical worker, employed by a chemical company, was instructed to adjust the pH of a chemical mixture contained in a reactor by adding phosphoric acid. He located a black polyurethane drum labeled in white-stenciled letters "Phosphoric 75." Relying on the accuracy of this stenciled information, he poured the liquid into a 5 gallon bucket which he then poured into the reactor, causing a violent reaction that caused him to step back, lose his balance and drench himself with the remainder of the fluid. The chemical used by the worker to fill his 5 gallon bucket proved to be 98% highly corrosive sulfuric acid, which caused the violent reaction to spontaneously occur. The worker suffered severe burns, extreme physical pain, and permanent injuries.

Expert Analysis: An investigation revealed that the stencil on the top of the drum specified phosphoric acid, while a label on the side of the drum specified sulfuric acid. Any company reusing reconditioned drums must completely check every drum for cleanliness and obliteration of a prior label before the drums are filled with a new chemical compound. Any drum not meeting approval must be segregated and not used. An inventory notation is produced in written form and then maintained permanently. When a company is ready to fill drums with a chemical compound,

the drums are lined up, checked again for prior content identification and an inventory is taken of the liquid to be put into the drums. A written form is maintained for permanent record. The filling operator waits for a second check of the filling procedures by a supervisor, the operator signs a packaging format and the format is countersigned by a supervisor. The number of drums filled, labeled, stenciled and put into inventory is placed on an inventory card or entered into computer files that become a permanent record maintained by the filler.

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The mandatory continued checking and monitoring of the filling, labeling, and stenciling (and a written procedure as formulated by top management made available to all chemical operators) would have prevented a mix-up of product labeling and, therefore, would have prevented the accident and injuries that the worker sustained.

Every company, from the re-conditioner of the drums to the filler and distributor of the drums, to the user of the drums, shares in the responsibility of carefully examining, labeling, inspecting and accurately maintaining records to make absolutely certain that every piece of identification of contents matches perfectly before shipping or use.

Result: Case settled in favor of the chemical worker. 


The Drop Off

Scott McMackin, PE

Case Summary: A man operating his motorcycle entered a New Jersey interstate highway. The particular portion of the interstate was under construction, with the left and center lanes having been recently milled and overlaid. The motorcycle operator was traveling in the right lane, which was already milled and awaiting to be repaved. Upon attempting to change lanes, the driver lost control of his motorcycle and crashed, resulting in his death.

Expert Analysis: Police reports and analysis concluded that the crash was consistent with the driver of the motorcycle contacting the higher edge of the center lane while attempting to change lanes. The elevation difference between lanes was measured by state police accident investigators to be 2½". The project specifications permitted


an elevation difference of 2¼" before a wedge joint would be necessary for safety of the traveling public. An analysis of the construction logs and reports, pavement cores, and other relevant documentation related to the repairing project led to the conclusion that the measurements taken by state police investigators were accurate, and the roadway was not constructed according to specifications and was left in an unsafe condition.

Result: After review and analysis, it was concluded that the difference in elevation between the two lanes was excessive and unsafe. This condition led to the "tire scrubbing" that directly caused the driver to lose control of his motorcycle as he attempted to change lanes. The case settled. 

Engineering Your Witness “Credibility”

Steven M. Schorr, PE

Engineers working in the forensic world are exposed to “rules of evidence” that engineers in other fields do not have to consider. While very few engineering experts are practicing trial attorneys, we eventually find out that one of the “rules” is that the engineering expert is there to aid the jury or “Trier of Fact” with his or her special expertise; however, they cannot infringe on the purview of the jury. This issue often arises when an expert is asked to evaluate the “credibility” of testimony. The issue of credibility is in the “wheelhouse” of jury responsibility, not typically expert testimony; however,

an engineer can “scientifically evaluate” testimony. For example, the laws of physics dictate that there is a relationship between time, distance and speed. That is, speed is distance divided by time (i.e. miles per hour). If a witness testifies to time/distance/speed relationships, an engineer can often times help evaluate the testimony to determine if it makes “scientific” sense. This expert testimony can be provided to the jury as additional data for their evaluation of the credibility of a witness; something to consider prior to taking the deposition testimony of a witness. 

The Runaway

R. Scott King, BSME

Case Synopsis: The operator of a commercial tractor-trailer was fatally injured when the brakes on his vehicle failed while descending a long hill. Witnesses had reported seeing smoke and smelling a strong burning odor from the truck shortly before the incident. After the incident, police investigators discovered various braking deficiencies consistent with reduced braking efficiency, which would have rendered the vehicle out-of-service. Researching the vehicle’s service and maintenance history revealed a recent Department of Transportation (DOT) inspection that reportedly included inspection and servicing of the tractor-trailer’s brakes. Based on this, the estate of the deceased operator filed suit against the defendant repair shop alleging defective vehicle inspection, maintenance and repair procedures.

Expert Analysis: After preserving the incident vehicle, a joint-expert examination was conducted. In addition to a full brake system inspection, which included removal of all tires, wheels and brake drums, the tractor’s Engine Control Module (ECM) was imaged. Consistent with the police inspection, the independent inspection revealed numerous braking deficiencies

that adversely affected vehicle braking characteristics. Experts for the defendant repair facility conceded that several of the braking deficiencies likely existed at the time of the recent DOT inspection; however, it was clear that several others occurred after that inspection. Further, all of those deficiencies should have been identified during a proper pre-trip inspection. Moreover, a review of the ECM data, combined with an analysis of the tractor’s transmission and drive axle configuration, revealed that the operator initially selected a gear that was several gear ranges too high for the hill he was descending, and that he attempted to downshift into a lower gear midway down the hill but was unable to do so. As a result, the vehicle descended the remaining grade in neutral rendering the engine brake ineffective.

Based on the inspection observations, test results and ECM data, investigators concluded that factors contributing to the incident included the operator’s inexperience, improper transmission operation, and inadequate pre-trip inspection, as well as improper maintenance by the defendant repair shop.

Result: Case settled. 


Loosely Pinned

Thomas J. Cocchiola, PE., C.S.P.

Case Summary: During the construction of a college dormitory, a masonry subcontractor rented a forklift with a telescoping mast and forklift attachment. While operating the forklift to place material on an elevated floor, the attachment separated from the mast, fell and struck a worker walking through the area.

Expert Analysis: When the attachment is mounted to the mast, it rests on two pins, which support it from the top. A worker actuates a lever that engages a locking pin to secure the attachment to the mast. The locking mechanism design requires two independent actions to actuate the lever and disengage the pin. Consequently, the locking mechanism cannot disengage inadvertently. Testimony indicated that an equipment rental company mechanic mounted the attachment to the mast, inspected and operated the forklift, and then delivered it to the jobsite days before the accident. The masonry subcontractor operated the forklift without incident prior to the accident.

Post-accident inspections revealed that the attachment separated from the mast and fell because the locking pin was not engaged before the operator raised the load. The inspections confirmed that the attachment did not separate because the locking mechanism was not damaged or in disrepair.

Result: An operator is required to inspect the forklift before operating it. The operator of the subject machine admitted he saw the lever in the disengaged position immediately after the accident, indicating he did not properly inspect the forklift before the accident. Analysis demonstrated that the accident was not caused by the equipment rental company. 

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