ROBSON FORENSIC PRESENTS

Biomechanics

Our Bioengineering practice includes degreed and licensed Biomechanical and Biomedical Engineers. Our experts offer leading-edge technical expertise and interdisciplinary knowledge, combined with years of collective experience in litigation, arbitration and mediation. Working with both plaintiff and defense cases, we provide scrupulous analysis and a balanced perspective.

To contact us, call 800-813-6736, one of our office locations on the back of this piece, or visit www.robsonforensic.com.

Robson Forensic

Engineers, Architects, Scientists & Fire Investigators

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Biomechanics

Analysis of traumatic injuries related to:

- Vehicular Collisions
- Falls
- Sports and Recreation
- Occupation and Workplace
- Impacts and Overuse
- Failures of:
  - Medical Implants
  - Assistive Devices
  - Orthotics or Prosthetics
  - Consumer Products
- Assaults and Fights

Other expert areas:

- Human Factors
- Aquatics
- Sports and Recreation
- Product Liability
- Premise Liability
- Environmental Health and Safety
- Professional Liability
- Construction
- Industrial/Marine

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Recent Case Highlights

University held responsible for student's death

A college student was found dead one morning at the bottom of an exterior stair behind a fraternity house. The stair was poorly lit, covered with debris, and lacked a proper railing. Our architect expert showed that the stair violated applicable standards of care and that the stair was unreasonably dangerous. The university who owned the stair claimed there was no basis to determine that the student had actually fallen from the stair. They opined that he more likely fell or was pushed from a higher balcony for reasons unrelated to any defects of their property.

Our biomechanical expert calculated the energy necessary to cause the student's fatal fractures to establish the force of his impact with the ground. We used those injuries to also show that his body struck the ground in substantially the same location where he was found the next day. We ruled out the possibility that he fell from the balcony by reconstructing the consequences of such a fall. We showed that impact would have been far greater than that demonstrated by the injuries, and would also have been inconsistent with where his body landed.

In fact, we were able to show that the student's injuries and body location could only be explained by his losing balance and falling over the edge of the stair between the 4th and 9th riser from the bottom. This was the same area our architect had initially identified as defective and dangerous.

The case settled.

Survivable crash

Two passengers died in the rear of a GM Tahoe when the vehicle was broadsided, rolled and struck a utility pole. The pole impact crushed the vehicle roof. An elderly woman victim died of a thoracic injury and an 11-year-old boy a result of a skull fracture.

Our highway engineer showed how the utility's having placed the pole only 13 1/2" from the curb was not only improper, but also contrary to their own program for pole placement and relocation. Our crash reconstruction demonstrated that a properly installed pole would have prevented the vehicle roof damage. The utility company denied responsibility, claiming that the passengers' fatal injuries occurred during the roll-over and not when the Tahoe hit the pole.

Our biomechanical expert analyzed the medical examiner's records, and our vehicle experts reconstructed the movement of the victim's bodies within the vehicle during the event. While the medical examiner had only reported that the boy died as a result of a skull fracture, our analysis of the records showed he had actually sustained two separate skull impacts. We matched his injuries with the car interior and crash mechanics to show that both impacts could only have been caused by the pole impact – initially his head was struck by the reading/dome lamp upon first impact with the pole; then he was struck again as the pole continued to crush the roof.

We also showed that the elderly woman's fatal thoracic injury -- fractures and severed aorta – could only have occurred as the pole crushed the roof into the rear seat of the vehicle.

The case settled prior to trial.

Worker's injury claim discredited

A worker's hand was crushed while he was operating a baler/compactor at an aluminum siding plant. He claimed he had been properly operating the machine, and his hand became entrapped while he was re-engaging pieces of ejected aluminum. We were asked to evaluate the safety of the machine and also to determine if the injury could have occurred as the worker claimed.

Our machine analysis showed that the claimed area of entrapment was actually well outside the reach of an operator who was properly positioned at the machine. Our biomechanical expert analyzed the worker's injuries and showed the actual sequence of his injury: his 5th digit had been crushed first, followed by injuries to the center of his hand. This too was inconsistent with his description.

We tested the baler with an anatomically-correct synthetic arm to evaluate the worker's claimed sequence and also to determine entrapment scenarios that were actually consistent with his injuries. We showed that the only possible point of injury was to the side of the machine's feed opening, not where he had claimed. A hand engaged in this area entered the machine in a manner that mirrored the worker's fracture patterns.

The actual entrapment point was inaccessible from the position of a reasonably behaving operator, and we showed how the machine owner had acted responsibly in guarding the baler.

In deposition, we used our reconstruction to show that the worker's account of his actions could not have been correct. The case settled beneficially for the machine owner.

Unsafe helmet

A motorcyclist was killed in a collision with a minivan. His helmet was found nearby. Responding to the product liability suit filed by the decedent's family, the helmet manufacturer argued that the helmet must have been improperly fitted or the straps improperly adjusted. The plaintiff engaged Robson Forensic to analyze the helmet and biomechanical factors surrounding the fatal injury.

Our helmet expert demonstrated that the helmet's polystyrene liner had never been compressed, proving that the helmet was not on the rider's head when he impacted the ground and sustained the fatal skull fracture.

Our biomechanical and helmet experts then analyzed the straps, the fit, and the design of the helmet, and compared this information with the proper design of a safe helmet. The helmet was found with its straps still engaged, proving the helmet left his head with the strap secured. We also proved that the straps had been properly tightened, as evidenced by the impression marks under the chin of the rider. Our experts determined that the helmet was defective, in part because the placement of the strap attachments was flawed, allowing the helmet to be easily removed from wearer's head without disengaging the straps.

The manufacturer further claimed that the helmet had performed as designed, and that the fatal impact was received at the chin level, an area that is not protected by a helmet. Our experts disproved this claim by establishing that a blow to the chin area would have also caused a jaw fracture – of which there was no evidence. Injury patterns were instead consistent with the fatal impact being sustained at the crown of the rider's head – an area that should have been protected by the helmet. We proved that the helmet's absence during the impact directly contributed to the fatal outcome.

Having shown that the helmet was not on the rider's head when he died, having demonstrated that the helmet was properly sized and adjusted, and having proven that the helmet would have protected him against the fatal skull fracture, the defense case was disproved.

The case ended with substantial settlement for the plaintiff.

Featured Experts

Thomas P. Lacek, P.E.

Biomechanics, Crash Injuries, Crash Reconstruction

Tom has been a crash and vehicle expert with Robson Forensic for nearly 20 years. His area of specialty began with vehicles: cars, bicycles, and boats, and extended into a focus on vehicle related injuries and biomechanics. His cross-disciplinary work includes vehicle restraint system performance, engine control, sudden acceleration, ABS, park-to-reverse, and extensive experience in pedestrian knock-downs and ejected, partially ejected, and unrestrained passengers.

His expertise in biomechanical aspects of vehicle injuries enables him to determine causation and impact of injury, to identify the facets of a crash or vehicle that could worsen an injury, and to determine location of passengers/ pedestrians based on characteristics of the sustained injuries.

Having been involved in automotive engineering for nearly 30 years, Tom's knowledge of vehicle systems is unparalleled. He can put a car together from scratch.

Tom is a registered Professional Engineer in Pennsylvania, and he is a member of a number of professional organizations including the Society of Automotive Engineers.

Mari S. Truman, P.E.

Impact and Injuries Biomechanics & Orthopedic Biomechanics

Mari has been a biomechanical engineering expert with Robson for five years. Her leading-edge technical expertise includes examining motions and forces applied by and to the body during a fall and fall recovery, projectile impacts, vehicular collisions and sports, recreation and occupational overuse or injury. She has over 26 years experience of product design and development in orthopedic medical devices. She has earned three patents for implants and instruments used for human joint and skeletal reconstruction. She has published and lectured.

Mari applies the principles of engineering mechanics to basic biological processes and mechanisms related to the structure, function and injury thresholds of body tissues, with emphasis on bone and other skeletal tissues and organ systems such as the brain, skin, heart and abdominal organs.

When evaluating medical device failures, she draws on her strong knowledge of design assurance, design control, failure modes and effects analysis, and intra- and post-operative device loading.

Mari is a registered Professional Engineer in Ohio. Her professional affiliations include membership in the International Society of Biomechanics and the American College of Sports Medicine.

Jamie R. Williams, Ph.D.

Biomedical Engineer / Biomechanics and Bioengineering

Jamie's extensive research career in orthopedic and musculoskeletal biomechanics has provided her in-depth knowledge of anatomy and physiology in applied engineering. Her extensive technical skill enables her to comprehensively analyze the forces and motions exerted on or produced by the body during a variety of situations including vehicular collisions, falls and trauma, and overuse injuries relating to occupational conditions, sports or recreational activities.

Jamie holds multiple teaching and research appointments and has ten years experience conducting biomechanical testing using a variety of experimental and computational methods. She has a concentrated research interest in disc degeneration and low back pain, and oversees several industry-funded projects on development and testing of orthopedic implants. Her work has been published in top-tiered medical and technical journals, and she has presented her research at national and international conferences and symposia. Her research is funded by federal agencies including the National Institutes of Health. Jamie also develops course work and teaches undergraduate and graduate level biomechanics classes, most recently on soft tissue biomechanics.