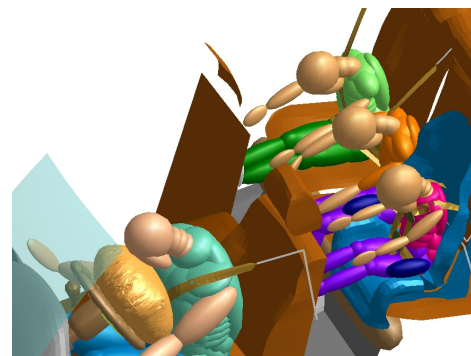




Crashtams – BioMx

Biomechanics Can Enhance Your Collision Reconstruction Expert's Opinions and Findings

Despite years of experience, occupant kinematics is simply too involved in relying on vehicular and road inspection alone. There also may be unique intricacies in the vehicle cabin that alters the motion/forces experienced by the occupants. While relying on literature documenting particular vehicle impacts with occupant injuries are extremely important, there is no guarantee that a particular study will emulate a particular case at hand. Further, these studies typically rely on a certain population size – mainly 50th percentile. Also, when expert testimony is certainly enough to assess possible injury, it is still beneficial to compare with actual computation to support injury claims.



Biomechanics



The next step in enhanced reliability in assessing the potential for occupant injury is to bolster the accident reconstruction (AR) with biomechanical analysis.

Biomechanics is an applied science encompassing the disciplines of both biology and mechanics. It specifically utilizes the laws of physics and concepts relevant to both engineering and medicine to describe human motion to determine the causal relationship of applied forces/accelerations and/or impacts on the nature and severity of physical injury. Considerable background in the nature, severity and prevention of human injury is also extremely valuable in analyzing injuries related to accidents. The science historically has provided valuable applications in cardiovascular and respiratory medicine, orthopedic, industrial and rehabilitative medicine, automotive medicine, sports medicine, cellular mechanics, injury mechanisms related to human acceleration and/or impact trauma, and sports protective equipment.

What We Do

Crashtams offers a wide range of biomechanical services to enhance our crash reconstructionist expert's services related to injury mechanisms. Crashtams - BioMx provides services including medical file review and analysis, physical injury analysis and causation, three-dimensional modeling and simulation, as well as providing concise verbal and written reports. Crashtams - BioMx also provides independent peer review of scientific papers and analytical reports pertaining to the origin and cause of physical injury.

Analysis and Consultation

Typical areas in biomechanical analysis and consultation include:

- *Low and high speed motor vehicle accident analysis*
- *Vehicle/pedestrian analysis*
- *Rollover accident and occupant ejection*
- *Seat belt use and effectiveness*
- *Air bag related injury*
- *Motorcycle and bicycle accident*
- *Water, train, bus and aircraft accident*
- *Head, spinal injury*
- *Extremity trauma*
- *Hollow and solid organ trauma*
- *Orthopedic and occupational biomechanics*
- *Job and tool analysis*
- *Repetitive trauma disorder*
- *Lifting/pushing and pulling injuries*
- *Slip/trip and fall analysis*
- *Sports and sports equipment related injury*



Analysis and Consultation

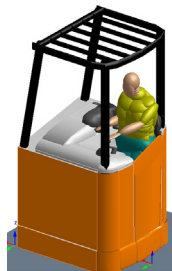
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By constructing validated biomechanical models, Crashteam – BioMx has provided valuable expertise within the areas of injury biomechanics. Injury dynamics and the role of various types of equipment and environmental designs are effectively modeled and tested using mathematical simulations specifically targeted to occupant kinematics/kinetics to confirm injury causation. Information gathered from AR can be incorporated into a cabin environment enveloping the occupant with detailed interior contacts. With a rich selection of validated dummy models, dynamic simulations can be performed giving injury profiles and accelerations at every time instant of an accident pulse. Further, we are not limited to occupants that do not fall in the 5th, 50th, or 95th percentile population sets. With the proper scaling techniques, any size and shape of occupant can be modeled. Finally, not only typical vehicular accidents can be simulated. We possess the ability to model pedestrian, work accident, trip/fall, watercraft, trains, buses, and amusement rides. Really, there is almost no situation that cannot be modeled to assess occupant kinematics and injury profiles.

Dynamic Biomechanical Modeling and Simulation

Biomechanical modeling utilizing MADYMO (Mathematical Dynamic Model) tools is extremely valuable in understanding pathological joint motion and/or joint forces as a result of trauma. A review of all diagnostics and a complete review of the medical records provide the necessary materials in completing a biomechanical investigation. Typical areas of biomechanical analysis include: spinal injury, concussion, bone fracture, solid and hollow organ trauma, carpal tunnel syndrome, rotator cuff tear, hip, knee and shoulder injury, cumulative trauma disorder, seat belt and airbag induced injury, temporomandibular joint (TMJ) disorder and knee meniscus and ligamentous injury.

Crashteam – BioMx utilizes the MADYMO computer package to simulate collision situations to a high degree of engineering accuracy. It is also capable of assessing the level of injury severity sustained by humans. Physics based simulations are possible with MADYMO.



“... there is almost no situation that cannot be modeled ...”

Further, MADYMO is extremely useful in analyzing the effects of various restraint systems, including seat belts and air bags. Although originally developed to study occupant behavior during collisions, the MADYMO program is sufficiently robust for analyzing collisions involving other means of transportation including trains, airplanes, watercraft, motorcycles and bicycles.

Crashteam – BioMx Biomechanical Experts

Michael L. Woodhouse, Ph.D.

Principal Biomechanical consultant specializing in injury mechanics and causation relating to impacts. He has also provided expert testimony in both federal and state courts of law.

Sebastian Y. Bawab, Ph.D.

Chief Scientist and Principal bioengineering consultant specializing in kinematics/dynamics, biomechanics, modeling and simulation, computer aided design (CAD), MADYMO, failure & finite element analysis (FEA).

Steven A. Hans, Ph.D.

Mechanical engineer with expertise in kinematics/dynamics, modeling and simulation, FEA, CAD, MADYMO, design optimization and biomechanics. In addition, Dr. Hans has expertise in Information Technology (IT) management.