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BIOMX CONSULTING

BioMx Consulting Solves Complex Legal Cases with Help of Visual-Safe MAD

THE CHALLENGE

BioMx Consulting helps its clients involved in criminal cases by recreating an incident or accident virtually and applying biomechanical and structural analysis principles. In this case, BioMx Consulting had to identify the exact location of a pedestrian hit by a truck in the countryside in order to determine the responsibility of the truck company. BioMx Consulting had to recreate the accident scenario taking into account the physics model for the truck, the human model and the road topography, and to analyze the cause of the accident while being fair to both parties.

THE BENEFITS

- $2-3 million of lawsuit saved.
- 3 to 4 weeks to solve a case instead of months.
- Reliable results due to the usability and versatility of the software.

"It's easy to bring a CAD model into Visual-Safe MAD and mesh it, to bring in a topography and map it, or to bring in a dummy and see it. They can be placed all together and integrated in one environment, which helps solve the case."

Dr. Sebastian Bawab, Mechanical Engineer BioMx Consulting, Professor Old Dominion University.

BioMx Consulting helps its clients involved in criminal cases of various nature, be they homicides, road accidents or similar civil accidents. Computation, biomechanics and structural analysis are its prime offerings. The company has been associated with ESI Group for the past 14 years. They use ESI's software Visual-Safe MAD for pre and post processing when recreating virtually accident scenarios for their clients.

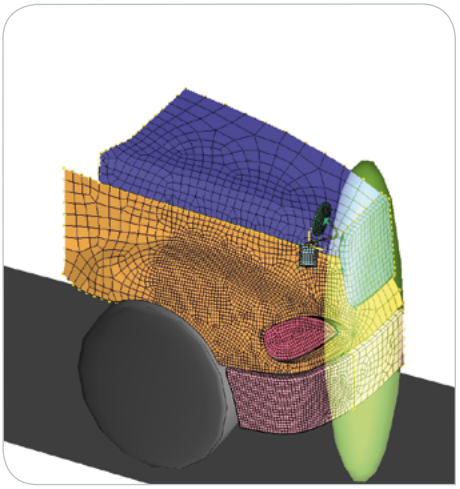
Case to be solved

A truck hits a pedestrian late at night in the countryside. Sadly, the pedestrian doesn't recover. As the truck company is under scrutiny, it calls on BioMx Consulting to help identify the cause of this accident and hopefully avoid a long and costly lawsuit.

Reconstructing the accident scene accurately

BioMx Consulting used Visual-Safe MAD to recreate the accident scenario, starting with the road profile and its topography. A human dummy model with the pedestrian's dimensions was imported. With all the elements in place, BioMx Consulting started experimenting scenarios and analyzed navigation and trajectory. The Computer Aided Design (CAD) model of the truck was converted into a physics model and imported with matching material properties. Fig 1 and 2 demonstrate how the front of the truck, the fender, headlights, mirrors and bumper were created in Visual-Safe MAD. Material properties had to be accurate for every part of the truck. Hence if it was fibre, composite or steel, depending on its characteristics, a finite element model was

The truck (Fig. 1)
and its simulation (Fig. 2) in Visual-Safe MAD



made. Based on this the impact on the bumper or the fender could be calculated accurately. Visual-Safe MAD was used to mesh all the surfaces that mattered on the truck. Later the road survey map was brought into the environment since it was important to consider the topography which would eventually affect the trajectories of the pedestrian and of various debris after impact.

Simulating the trajectory

The trajectory after impact was recreated by making a contact of the truck and the human dummy model at the standard speed of 60-65 miles/hr. The trajectory was recorded for two different cases:

1. The truck hitting the pedestrian on the side of the road (shoulder of the road);
2. The truck hitting the pedestrian in the middle of the road.

The results of these simulations were recorded and compared to the actual accident site and the trajectory of the pedestrian after being hit by the actual truck.

Comparing the results

The results from the experiments gave the information of the trajectory or the path taken by the pedestrian after the hit. The demonstrations given in Fig 3 & 4 show the two scenarios recreated virtually by BioMx Consulting.

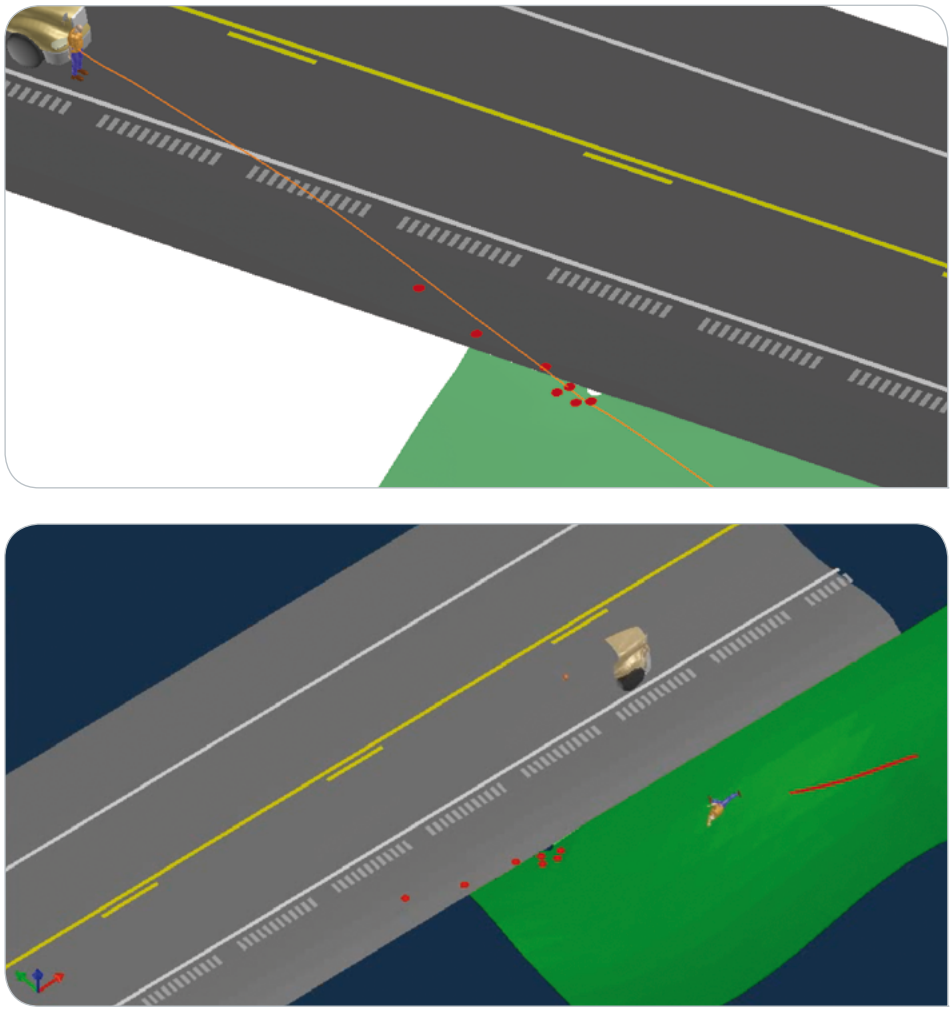
Scenario 2 matched the trajectory pattern of the pedestrian at the accident site. The red points on the side of the road on the demonstrations below are evidence of the person's trajectory, until halting at the red line. Also, in scenario 2, the virtual model of the deformed truck after impact matched the photos of the actual truck following the accident.

This simulation demonstrated that the pedestrian was in the middle of the road at the time of the impact.

The right software

ESI's Visual-Safe MAD was better than any commercial software available to solve such a case. Its ability to bring in CAD models and mesh them, map the road survey, and include a dummy model from third party software, was exceptional. Had there been any inaccurate assumptions, the projections would have been totally different.

With Visual-Safe MAD, interaction with other software eases collaboration. All the graphics, the motion, the results, the outputs, the head acceleration: all of that was done with Visual-Safe MAD.



Trajectory simulation scenario 1 and scenario 2 (Fig. 3 & Fig. 4).

> *"Thanks to ESI's Visual-Safe MAD, we know that's how the impact happened."*
>
> Dr. Sebastian Bawab, Mechanical Engineer BioMx Consulting, Professor Old Dominion University.

ABOUT BioMx CONSULTING

BioMx Consulting offers a wide range of biomechanical services related to injury mechanisms including medical file review and analysis, physical injury analysis and causation, two and three-dimensional modeling and simulation, as well as providing concise verbal and written reports. BioMx Consulting also provides independent peer review of scientific papers and analytical reports pertaining to the origin and cause of physical injury. BioMx Consulting is a privately held independent research and consultation firm with specific expertise in computational biomechanics. The BioMx Consulting principals and technical staff are composed of engineers and scientists with specific expertise in analysis, modeling and simulation of human biomechanical and physiological responses to injury.

ABOUT ESI GROUP

ESI is a pioneer and world-leading provider in Virtual Prototyping that takes into account the physics of materials. ESI boasts a unique know-how in Virtual Product Engineering, based on an integrated suite of coherent, industry-oriented applications. Addressing manufacturing industries, Virtual Product Engineering aims to replace physical prototypes by realistically simulating a product's behavior during testing, to fine-tune fabrication and assembly processes in accordance with desired product performance, and to evaluate the impact of product use under normal or accidental conditions. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping. These solutions are delivered using the latest technologies, including immersive Virtual Reality, to bring products to life in 3D; helping customers make the right decisions throughout product development. The company employs about 950 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris.

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