

Technical Session

This Technical Session addresses the use of *HVE* for motorcycle crash reconstruction. As we made quite clear in the June 2000 Technical Newsletter (see *Newton on Motorcycles*), it is unwise to attempt a mathematical reconstruction of the collision phase of a vehicle vs. motorcycle collision – if your goal is to calculate the speed of the motorcycle. However, there is much that can be done in motorcycle crash reconstruction, and this Technical Newsletter tells you how to use *HVE* to perform such a reconstruction.

HVE includes a number of tools that can be used for studying the pre-impact and post-impact phases of a motorcycle vs. vehicle collision. In our example, we'll use *EDSMAC4*.

To perform the *EDSMAC4* analysis of the pre-impact phase, the general procedures are described below:

Start by adding the vehicles to the case. Use a movable barrier to model the motorcycle. Attach the *MCYamaha650.h3d* motorcycle geometry file to the movable barrier.

Change the default exterior dimensions to create a box the approximate size of the motorcycle. Change the default wheel locations such that the wheels are positioned correctly, using the wheels displayed in the geometry file as a guide. It is important to make the wheel y coordinates as small as possible, say +/- 0.5 inches for the right and left sides, respectively. This approximates a cycle-type vehicle. This approximation does not affect what we are attempting to show in our simulation of the pre-impact phase.

Next, add the *Freightliner* tractor and *Generic Class 4* trailer. Attach the *TLVdsTutorTrlr45Van.h3d* geometry file to the trailer.

Next, add the environment. In our example, we added one of the pre-defined intersection geometry files, *4T4_Intersection.h3d*. Or, you can add your own, if desired.

Next, create an *EDSMAC4* event including the *Yamaha*, *Freightliner* and *Class 4 Generic* trailer.

Set up the event as you would normally, supplying the initial positions and velocities for the *Yamaha* and *Freightliner* (the trailer position and velocity are automatically assigned by *HVE* because it is attached to the tractor). Provide driver controls for

the *Yamaha* (we added pre-impact braking to illustrate the motorcycle driver's response to the tractor/trailer entering the intersection) and the *Freightliner* (we added steering and throttle as required to cause the tractor/trailer to pull out into the intersection and turn left).

Now execute the event. The figure below shows the sequence just before impact.

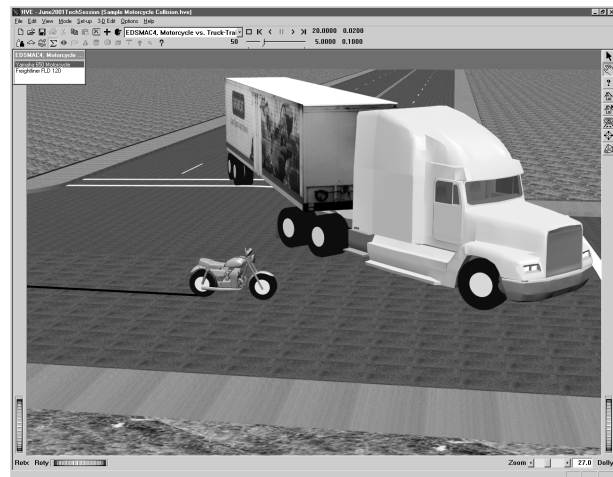


Figure 2: Screenshot of visualization of the pre-impact vehicle trajectories.

Because we used *EDSMAC4*, the motorcycle rider is not included in the event. This is easily remedied using an *EDGEN* event to model the rider (if we had used *SIMON*, we could have included the motorcycle rider directly in the same event!).

That's all there is to it. The above simulation is a simple, straight-forward application of *EDSMAC4* to simulate the pre-collision phase of the motorcycle collision. The key step was to create a motorcycle, starting with a Generic Movable Barrier.

Several additional things can be done to extend and/or enhance the simulation. For example, *EDGEN* can be used to simulate the post-impact phase. *EDGEN* can also be used to illustrate various trajectories for the motorcycle driver after impact. Of course, you can also produce several views of the simulation, first attaching the camera to the motorcycle and then attaching the camera to the truck tractor, to illustrate the view available to each driver.

If you would like to see our final result, check out the movies on our website at www.edccorp.com/products/movies.html.