# Comet® / LS-DYNA® Application Brief

## Automated Impact Analysis

### Comet Automates Impact Analysis

The world can be a bumpy place. Manufacturers must often take into account "transient shock events" in order to assure customer safety and the continued proper operation of their product. There can be a large number of analyses to run when impact considerations are key to a design. These virtual tests consume much resource in terms of model preparation and validation. Often, fewer than desired trade studies are run because of shrinking design windows. Comet software enables you to capture your expert knowledge to create templates of the virtual tests. This brings a high degree of automation and reusability to running these standard impact simulations, which enables better design decisions and much higher engineering productivity. Focus your valuable engineering resources on the tough design challenges, not the routine work that can be handled with Comet automation.

### Pedestrian / Vehicle Impact



The European Experimental Vehicles Committee (EEVC) and the International Organization of Standards (ISO) have both devised standards that aim to minimize pedestrian injury in the unfortunate event of impact with a moving vehicle. Test methods are recommended for the following impact scenarios:

- Head to hood
- Head to cowl
- Upper leg to leading edge of hood
- Head to A-pillar
- Head to windshield
- Lower leg to bumper

Of course, manufacturers must also ensure structural integrity of the vehicle during normal operating conditions. Balancing these requirements can turn into a time consuming iterative process. Comet is ideal for automating the LS-DYNA finite element analyses that engineers use to evaluate these conditions.
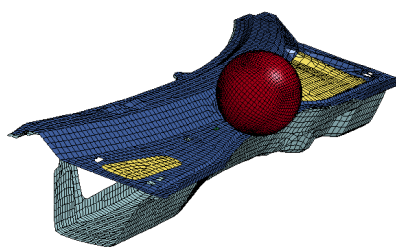


Here is a finite element model of a simulated head impactor contacting a vehicle cowl. The head impactor reports the Head Injury Criteria (HIC), a standard measure of injury to the human head.

### Other Automotive Applications

Automotive suppliers are interested in impacts with other parts of a vehicle as well. Examples include errant shopping carts hitting body panels, a vehicle's suspension reacting to bumps and potholes, and a wheel impacting a curb.



Left: photo of rim damage after curb strike. Right: results of a simulated curb strike.

On the following page, a car's side mirror is analyzed by LS-DYNA in a pendulum test. Comet Intelligent Templates automate the process of

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creating the finite element model and submitting the analysis to LS-DYNA. A single template can even accommodate many different geometry configurations.
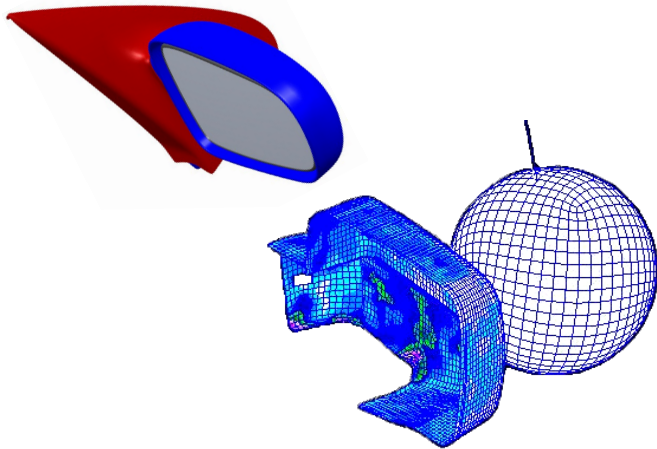


## Other Industries

Analyzing impacts is important in many other industries besides automotive. Drop tests are performed to ensure that packaging will protect a product during shipping. Cell phones are tested with a simulated impact with the floor. And in sporting goods, manufacturers continually aim for improvement where bat meets ball, helmet meets helmet, and, in this example, driver meets golf ball. Comet and LS-DYNA can be used to automate the simulation of tens or hundreds of iterations as engineers and designers determine the optimum design.
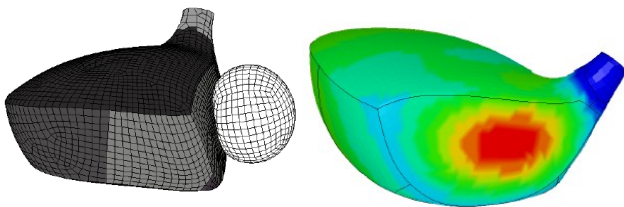


LS-DYNA predicted deformations of golf ball and club head.

Comet Solutions, Inc. provides software and services for CAE process automation.

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