

HyperWorks Improves Development Processes at PSA Peugeot Citroën



Key Highlights

Industry
Automotive

Challenge
Define new process that includes accurate component data

Altair Solution
Use HyperForm and RADIOSS in development process

- Benefits**
- Reduce Development Time
 - Accelerate Innovation
 - Improve Quality and Robustness

Customer Profile

PSA Peugeot Citroën is a world-class automobile manufacturer, made up of two innovative brands, Peugeot and Citroën, and supported by the expertise of its employees. With operations in 160 countries, the Group is actively expanding its sales, having sold 3,188,000 vehicles worldwide in 2009. A responsible global corporate citizen, PSA Peugeot Citroën constantly innovates in the areas of safety and environmental protection to develop and produce cars that meet the expectations of Peugeot and Citroën customers around the world. As an example, 7 of the Group's models have been awarded 5 stars in the New Euro NCAP Rating System. PSA Peugeot

Citroën is Europe's leading manufacturer of low-emission vehicles with approximately 1 million units sold emitting less than 130g CO2/km in 2009.

Overview

When it comes to crash simulations in the automotive development process, PSA utilizes RADIOSS to perform all of its virtual crash tests. To reduce the number of physical prototypes, it is very important to be able to accurately predict the results early within the development process as close as possible to the realistic behavior. When performing full vehicle crash simulations, the accuracy of the simulation results is highly dependent on the input data

PSA Peugeot Citroën Success Story

“We are in the position to predict crash results via simulation much better than in the past. Building on this approach will lead to sustainable time savings and better products for our customers.”

Fabien Breda,

Senior Engineer Crash & Fluid Simulations
PSA Peugeot Citroën

from individual components of the vehicle. By including real thickness strength and strain information from the manufacturing process the full vehicle model, or assembly, shows a much higher correlation to reality. The major challenge is to get stamping results early in the vehicle project.

Typically at this stage of the project the design of the forming tools (die, punch, blankholder) for the components is still unknown or not yet fully frozen. To overcome this critical lack of information PSA used the

one step method available in HyperForm and RADIOSS, two tools from the Altair HyperWorks Suite, to set up a simulation process that includes forming data and therefore leads to a valid numerical model correlating to experimental data as much as possible.

Challenge

Crash simulation plays an important role in the development of vehicles. To get accurate results it is important to have good and

eventually even validated input data for every component in the vehicle.

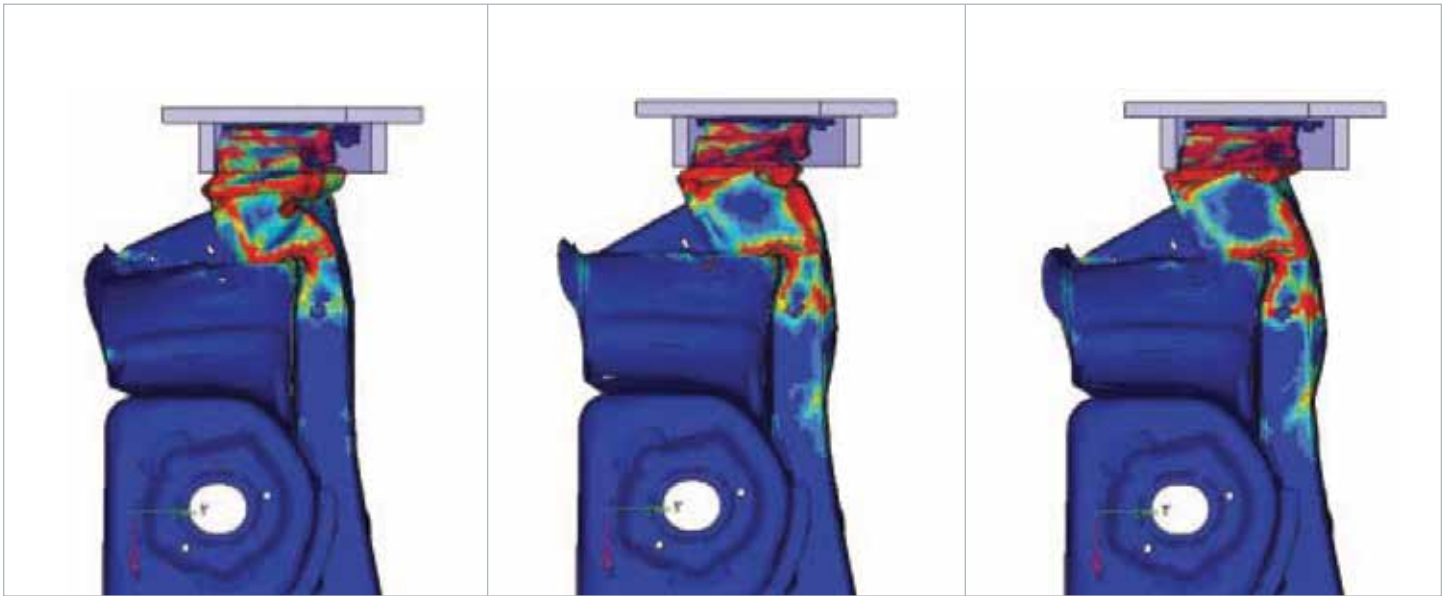
Traditionally the simulation engineer uses idealized component data simply because validated data for the manufacturing process is not yet available. This approach could lead to a different behavior in the actual test than theoretically predicted in the simulation due to components potentially experiencing different stresses, strains and thicknesses and other material characteristics from its manufacturing process. To achieve a higher



RADIOSS Crash Model



Reference Design: 0,008 Sec Simulation Time



Different Deformation Patterns (Reference, Without and With Blankholder) at 0,008 Sec Simulation Time

correlation of simulation results with real life test data, a new process needs to be defined that includes accurate component data in the early phases of the development process.

Solution

To set up a new crash simulation process PSA included forming simulation and its data into their crash simulations. Using HyperForm and RADIOSS even the forming process of the vehicles components could be simulated before a prototype is ever built. The stamping results from the forming simulation was included in the crash simulation. Therefore the engineers could include actual stress, strain and true thicknesses data of each key component into the crash model instead of using idealized component information.

The new simulation process was broken up into several steps. First the engineers used selected parts from a crash model to simulate the stamping process

with HyperForm. Using HyperForm it was possible to get good results for the forming parts. The results are then exported and included into the RADIOSS crash model by using standard options within HyperWorks. With this process the crash engineer can manage the initialization of the forming process, at a very early phase of the project, without any additional information on the forming process other than the extracted part from the crash model itself. Finally the crash simulation showed a very good correlation when compared with the test data.

Results/Benefits

The results received with the OneStep method correlate much better with the test results and transfer calculations done by PSA than using the simple drawing results. The HyperWorks Suite, including the tools HyperForm and RADIOSS, offers one product family for all simulation and analysis tasks that occur within the development process of a car. With simulation many of the

necessary development iterations can be handled virtually, therefore companies save on physical prototypes and are able to study more variants at the same time.

The introduction of the new simulation process using the HyperWorks suite from manufacturing of single parts to crash simulation of the full vehicle model, helps to:

- Reduce development time
 - Accelerate innovation
 - Maximize return on software investments
 - Improve quality and robustness
- to play a lead role in helping wheel design evolve with new materials to meet new weight and performance criteria.

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About Altair

Altair empowers client innovation and decision-making through technology that optimizes the analysis, management and visualization of business and engineering information. Privately held with more than 2,000 employees, Altair has offices throughout North America, South America, Europe and Asia/Pacific. With a 28-year-plus track record for high-end software and consulting services for engineering, computing and enterprise analytics, Altair consistently delivers a competitive advantage to customers in a broad range of industries. Altair has more than 3,000 corporate clients representing the automotive, aerospace, government and defense, and consumer products verticals. Altair also has a growing client presence in the electronics, architecture engineering and construction, and energy markets.

About HyperWorks®

Performance Simulation Technology

HyperWorks is an enterprise simulation solution for rapid design exploration and decision-making. As one of the most comprehensive, open-architecture CAE solutions in the industry, HyperWorks includes best-in-class modeling, analysis, visualization and data management solutions for linear, nonlinear, structural optimization, fluid-structure interaction, and multi-body dynamics applications.

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