

Computational Analysis of the ASIS Crash Test with Hybrid III 6-Year Old ATD and Roof Rail Mounted Side Airbag and Seat Back Mounted Torso Airbag

Todd J Hullfish^{1,2}; Aditya Belwadi, Ph.D.¹

¹Center for Injury Research and Prevention, The Children's Hospital of Philadelphia
²Drexel University, Department of Mechanical Engineering and Mechanics

Background and Objectives

- Side Impact crashes involving pediatric occupants have a 30% incidence of fatality compared to 17% in frontal impact scenarios (Arbogast et al. 2000)
- Side Airbags (SAB) were introduced in the mid-1990s as a means of injury mitigation for adults in the front seats
- Roof rail mounted curtain SAB is seen as an effective method for head protection
- 27 per 1000 children ≤15 years in outboard seating positions were exposed to deploying SABs
- Head/torso SABs are standard in 89.3% of 2012 model year vehicles and are optional in an additional 4.5%
- The goal of this study is to gain insight into the injury causation scenarios for children exposed to a deploying side curtain airbag

ASIS Crash Testing

ASIS, or Advanced Side Impact Simulator/System, is a crash test mechanism designed to simulate side impact crashes of varying angles and speeds without the use of a full car by moving four separate components in the door structure.



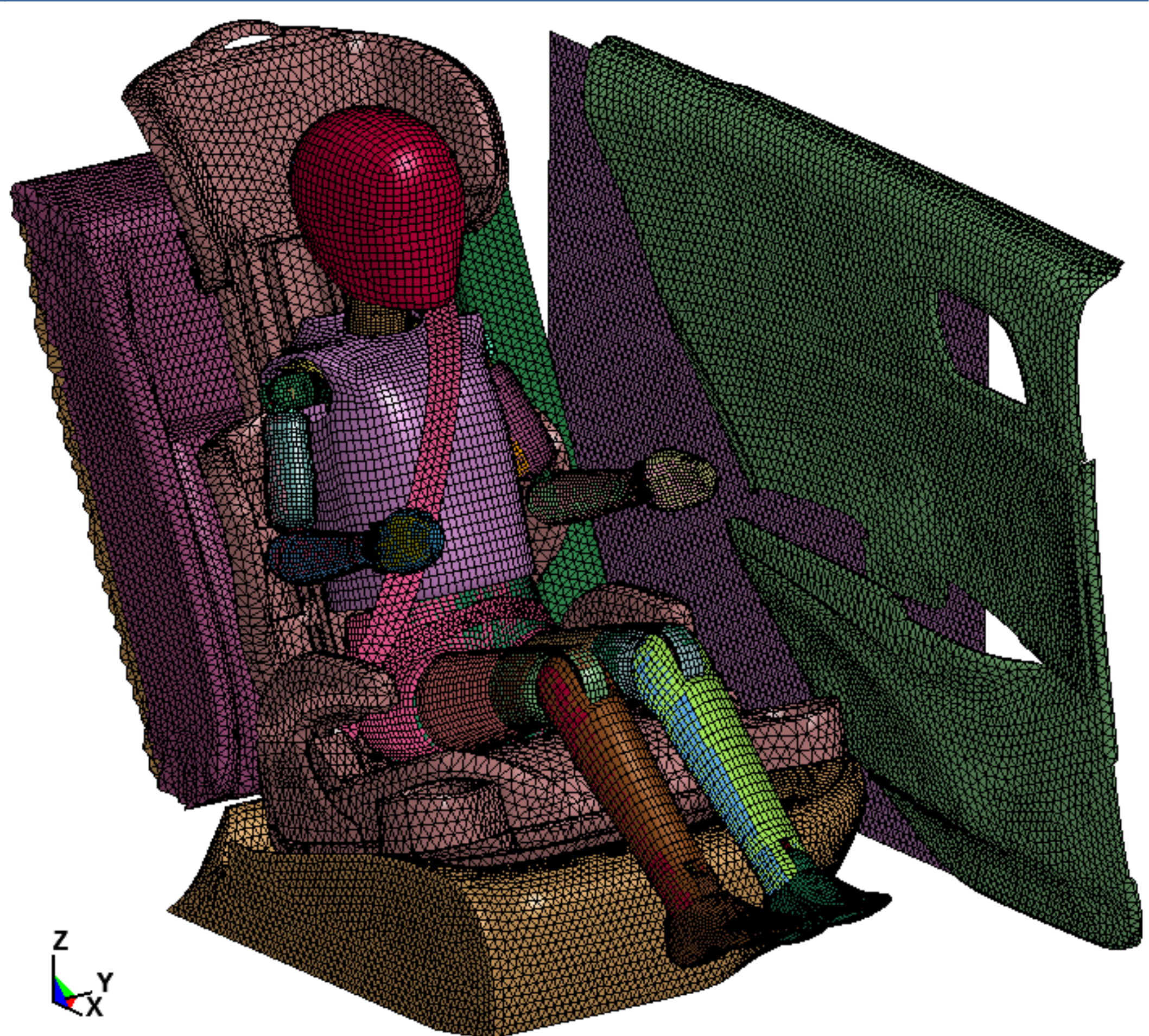
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Computational Modeling

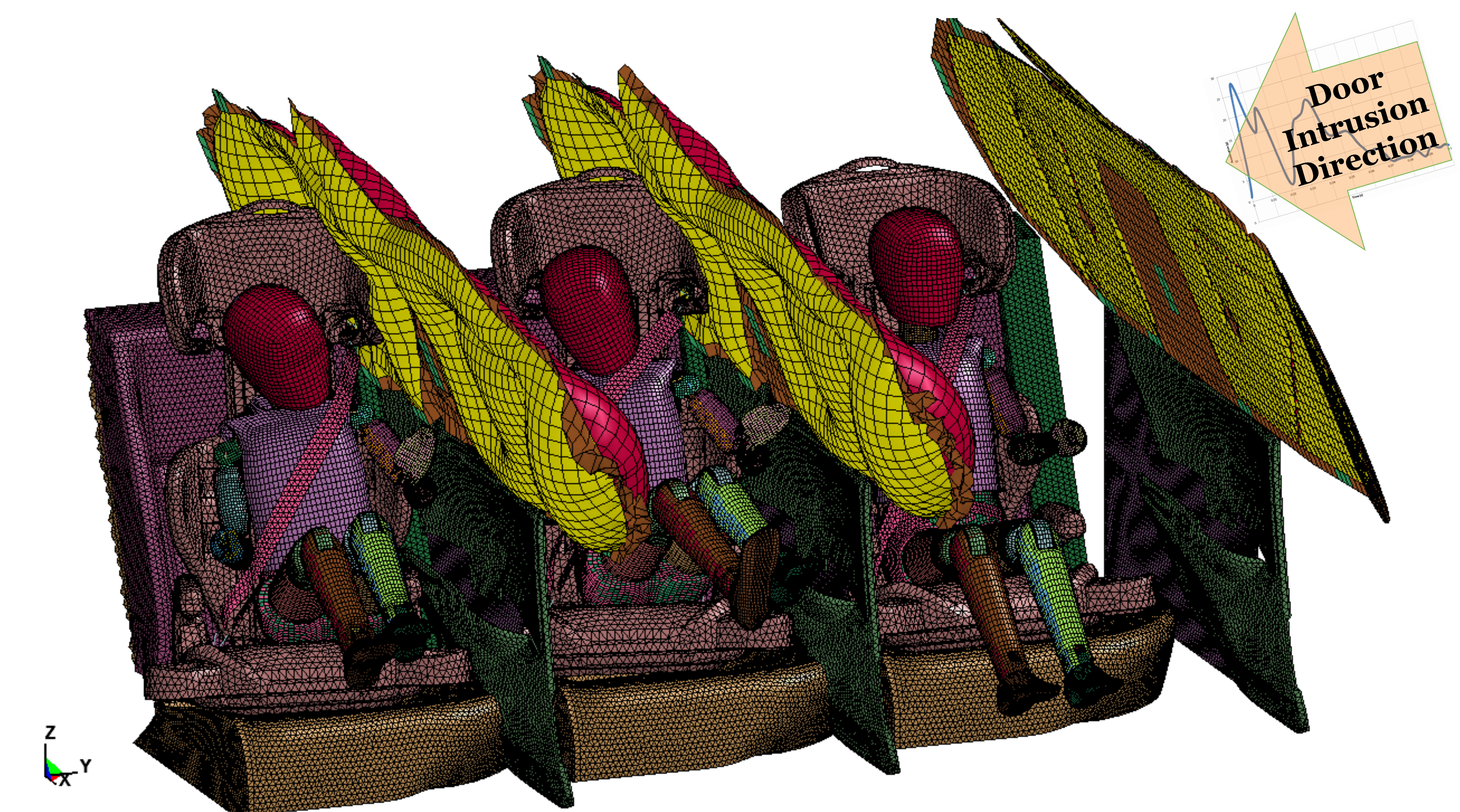
ASIS Crash Test Environment

- In order to simulate the ASIS crash test in a computer environment accurately in a reasonable amount of time, a simplified component model is assembled.
- Model consists of the foam seating structure, intruding door structure, Child Restraint System (CRS), and Side Airbag in some scenarios.
- The Hybrid III 6-Year old ATD (Anthropomorphic Test Device, commonly referred to as a crash test dummy) is placed in the CRS and restrained via a 3 point lap/shoulder belt routed through the seat.



Simulations

Computer simulation (via Finite Element Analysis) using the acceleration-time history of the side door recorded from the ASIS crash test as inputs to the model.



Results

- Model Outputs: Head acceleration (linear and angular), chest acceleration and deformation, kinematics of ATD and CRS.

