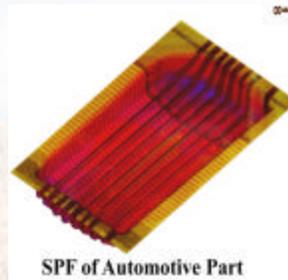
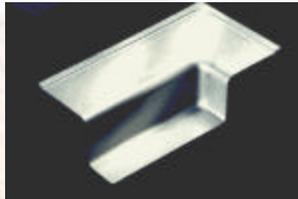
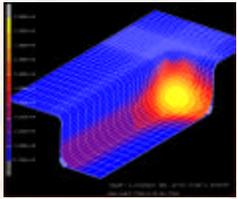




# The Engineering Simulation Initiative

## Metal Forming and Joining

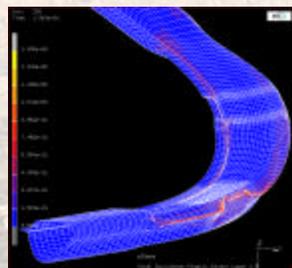
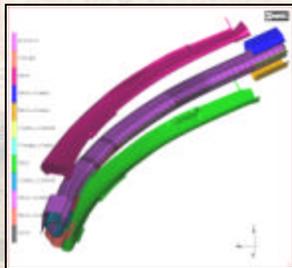
**Superplastic Forming of Aluminum Sheet**  
2000 Winner of Federal Lab Consortium Award  
for Technology Transfer to Industry



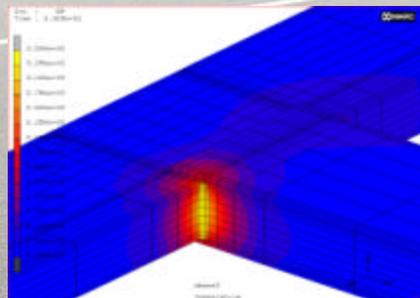
Process modeling and validation

SPF of Automotive Part

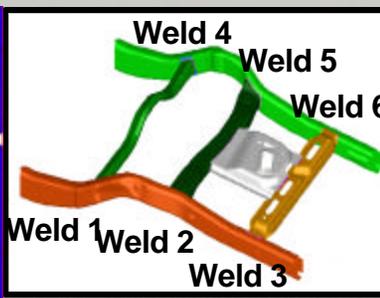
## Hydroforming and Stretchbending of Aluminum Extrusions



## Modeling of Distortion in Large Welded Structures



Weld modeling



Weld design

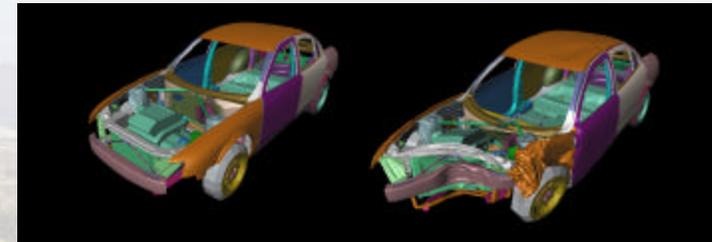


Welding experiments

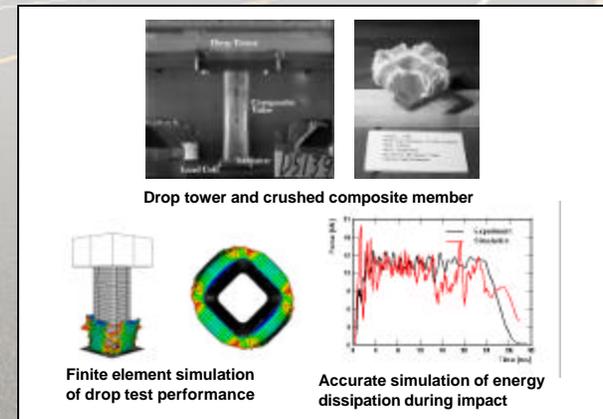
## Crashworthiness



Crash modeling and testing of a sport utility vehicle



Crash modeling of an ultra-light steel automobile

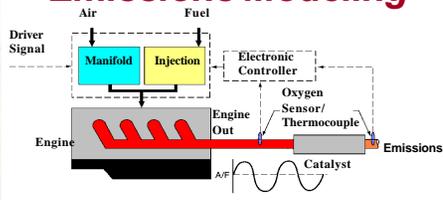


Testing and computer simulation  
of composite crashworthiness



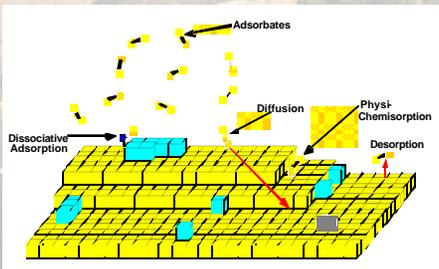
# The Engineering Simulation Initiative

## Emissions Modeling



## Catalysis Simulation

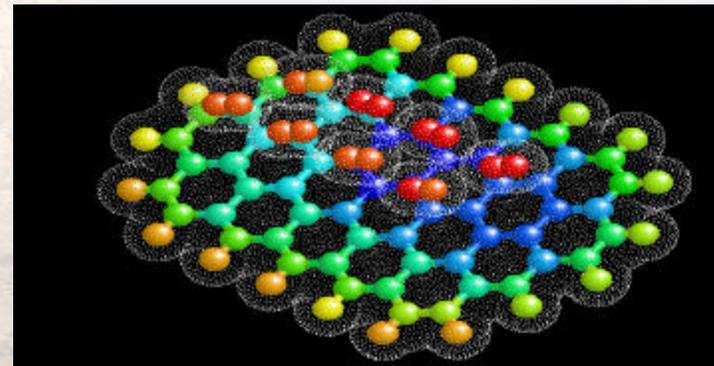
- Chemical kinetics
- Porous media flow
- Conduction heat transfer



## Computational Chemistry Modeling of Interfacial Phenomena

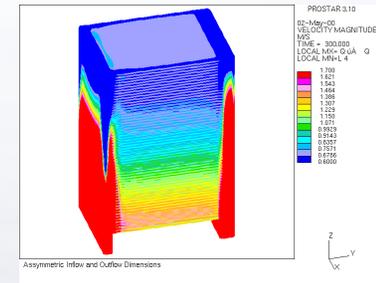
- Fuel cell electrochemistry
- Solar energy conversion
- High efficiency batteries

## Fuel Storage Modeling

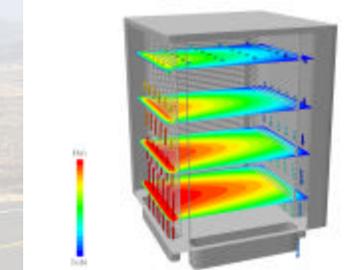


Atomistic simulation of methane and hydrogen storage materials such as graphite nanofibers, nanotubes, and platelets.

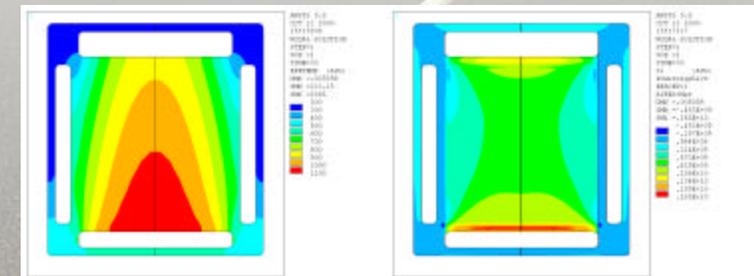
## Fuel Cell Modeling



Flow in fuel cell stack



Temperatures in fuel cell stack



Temperatures and thermal stresses in fuel cell interlayer