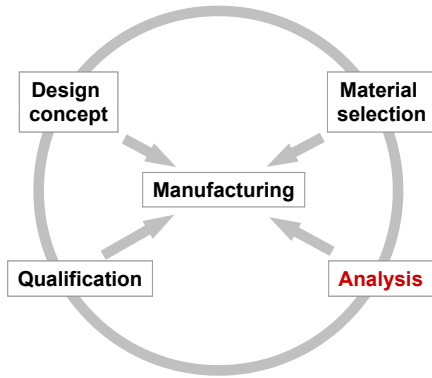




# Product Cycle and Role of Analysis



## Analysis ↔ Design Concept

- Functional characterization to identify critical areas
- Design guidelines
- Design optimization

## Analysis ↔ Material selection

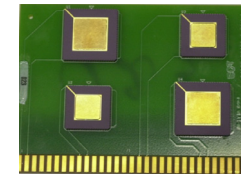
- Effect of material properties on product functionality
- Material compatibility.

## Analysis ↔ Qualification

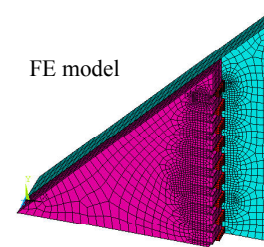
- Virtual qualification.
- Manufacturing process



# Plasticity and Creep Modeling (Thermal Loading)

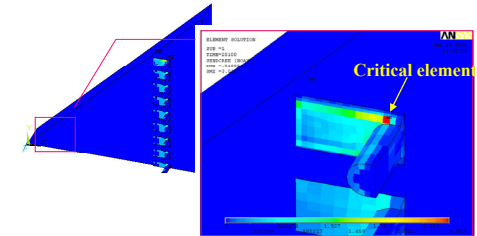


LCCC Assembly



FE model

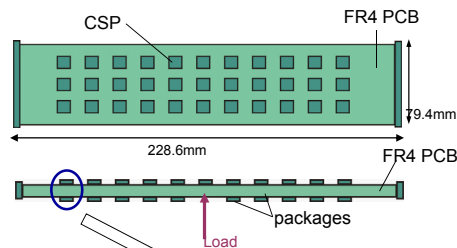
Max. Temp : 75°C  
 Min. Temp : -25°C  
 Ramp Rate : 10°C/min  
 Dwell Time : 15 min@75°C



Contour plot of creep strain energy density after 3 cycles

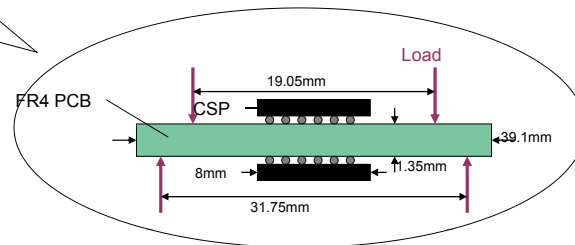


# Mechanical Loading

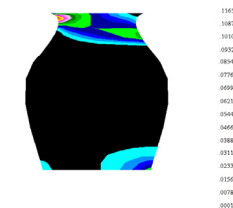
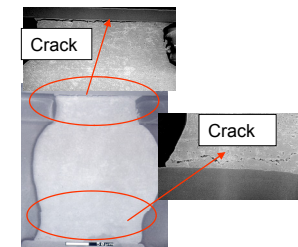
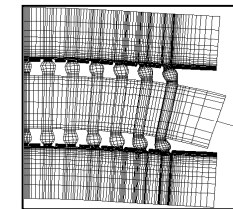
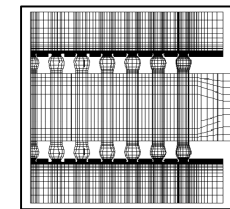


Assembly Board  
Three-point bending

Unit Package Assembly  
Four-point bending



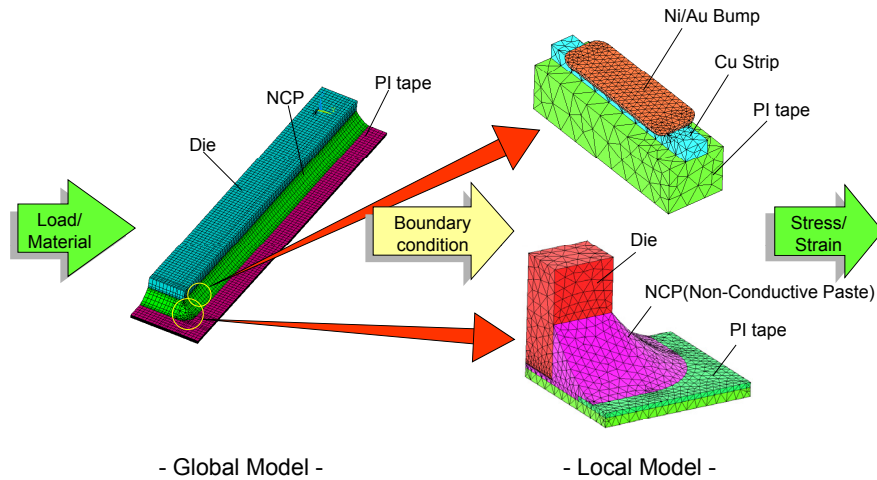
# Solder Deformation Caused by Mechanical Loading



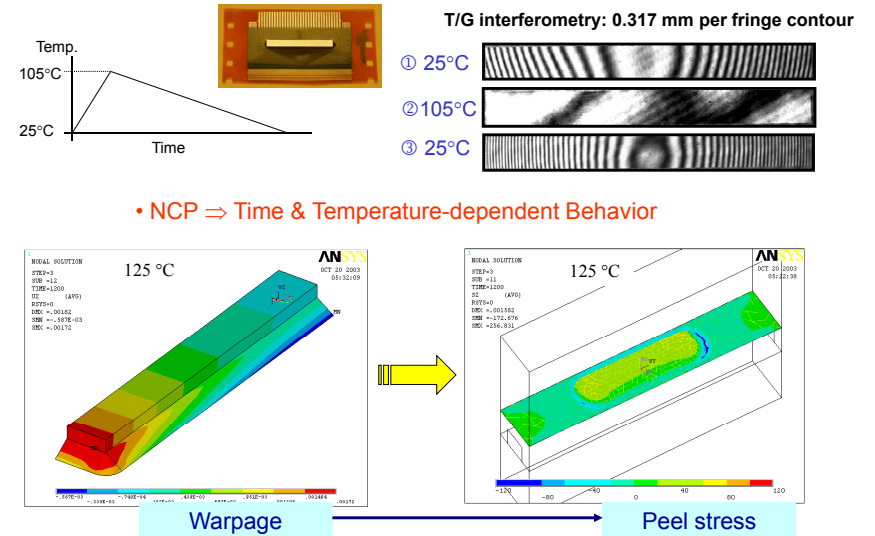
Equivalent strain contour showing the critical site



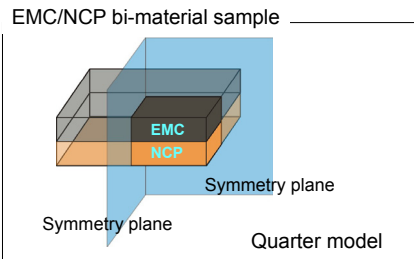
# Global/Local Modeling Approach



# Design Assessment



# Moisture Diffusion Analysis

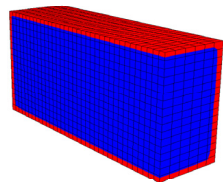


	NCP	EMC
Diffusivity [mm <sup>2</sup> /sec]	2E-6	2.24e-6
Solubility [1/atm]	0.0387	9.19e-3

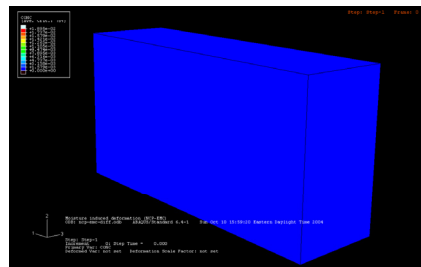
$$C(x, y, z, t) = S \times p(x, y, z, t)$$

C : Concentration  
S : Solubility  
P : Partial Pressure

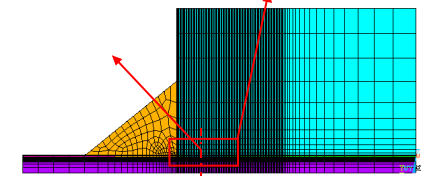
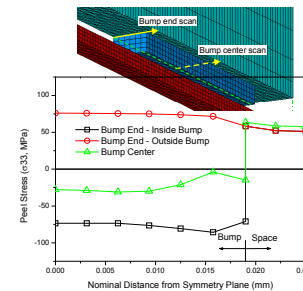
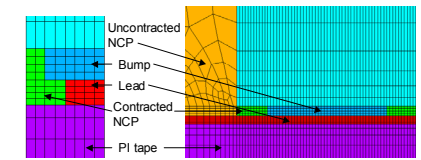
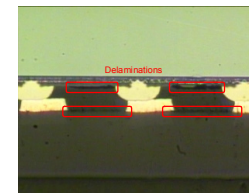
## Boundary Condition



Applying vapor pressure to every external nodes



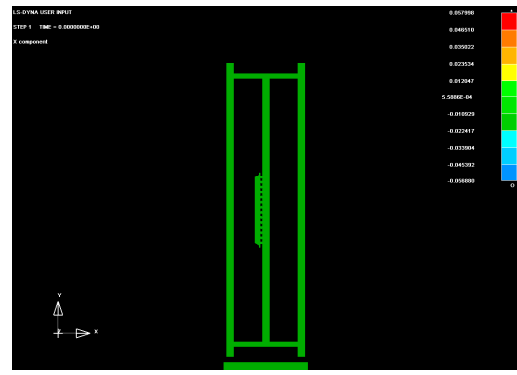
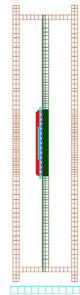
# PCT Simulation for COF



Slice model to simulate delamination at NCP/chip & NCP/PI tape interfaces during PCT (121°C/95%RH/196hrs)



# Simulation of Vertical Drop Test (Dynamic Modeling)

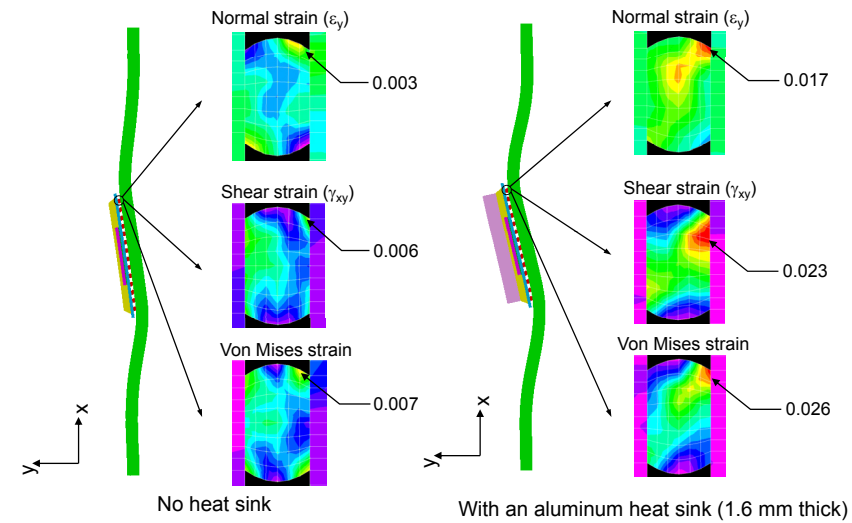


## Model for drop simulation

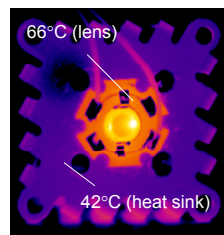
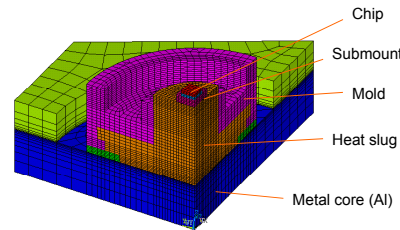
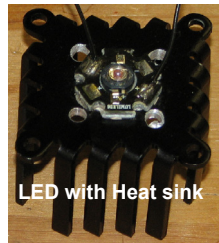
- Free drop from 6 feet height
- Clamped boundary condition
- Rigid chassis



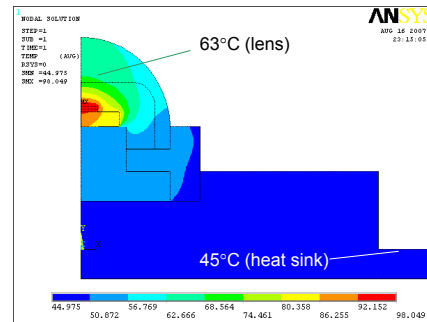
# Vertical Drop Deformation Analysis - Strain Distribution within Critical Solder Ball -



# Thermal Conduction Model (HP-LED)



IR Camera



# Thermal Convection Model - 40" PDP Module-

