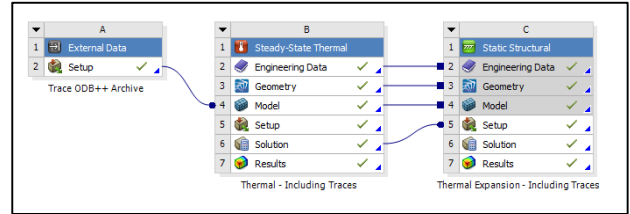


# Thermo-Mechanical Reliability of PCBs

PCB designers know that it is critical to design a board for temperature rise, thermal expansion and external structural loads. The difficulty has always been to capture a board's structural makeup accurately without having an impractical effect on solve time.

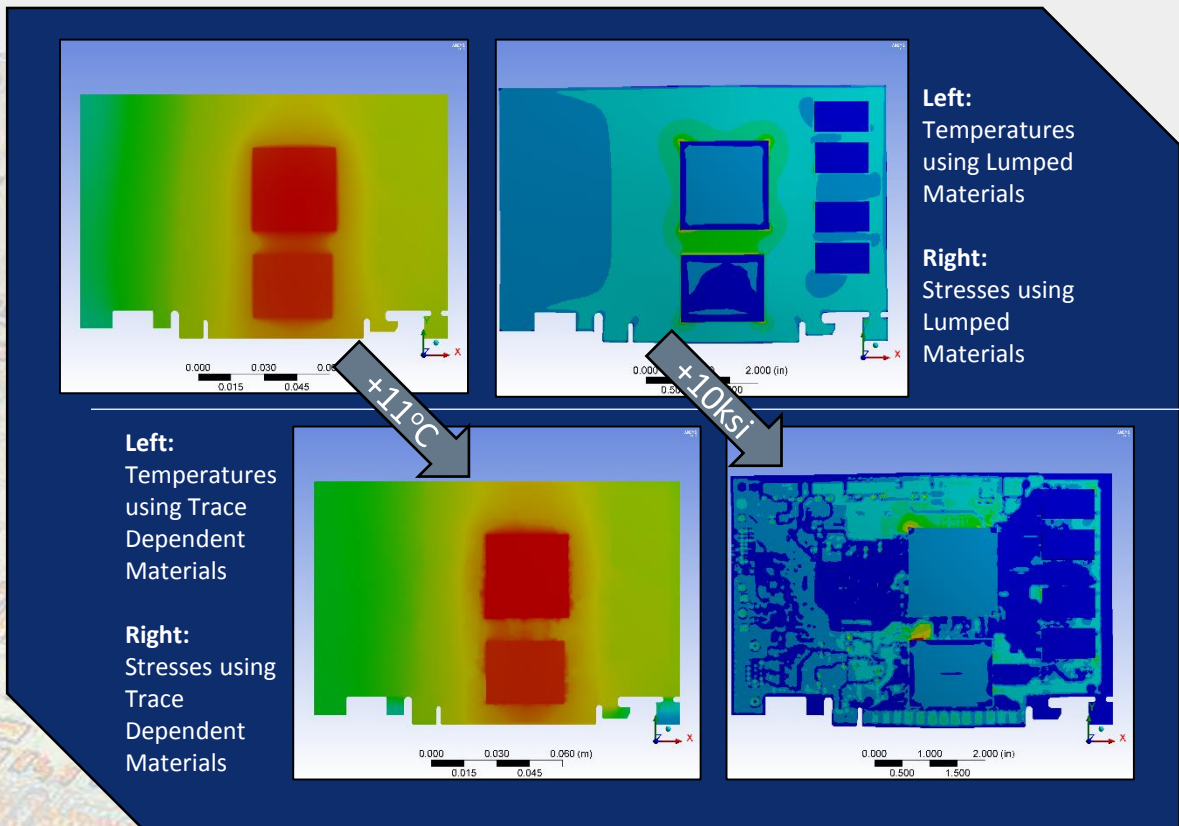


Workflow for importing ECAD trace layout data into ANSYS Mechanical Thermal and Structural Analyses

ANSYS Mechanical has a unique embedded feature that allows engineers to import the trace layout definition of their boards from ECAD and automatically capture the copper density variation throughout each layer.

The simple, automated workflow allows users to accurately capture the true thermal conductivity and stresses that arise in a board to the various localizations and spread of copper material versus dielectric.

The example below compares the solution of analyzing a multi-layer PCB with single lumped materials versus incorporating the trace mapping and the copper density variation. It is clear that there is a significant difference.



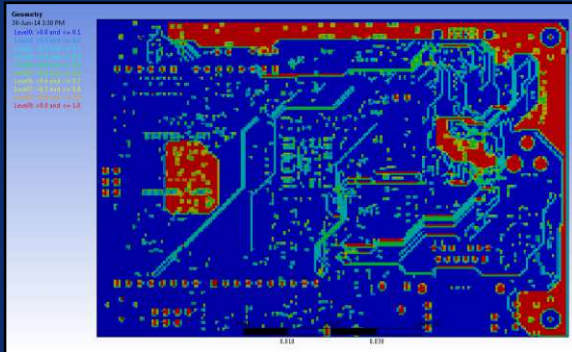
**Left:**  
Temperatures using Lumped Materials

**Right:**  
Stresses using Lumped Materials

**Left:**  
Temperatures using Trace Dependent Materials

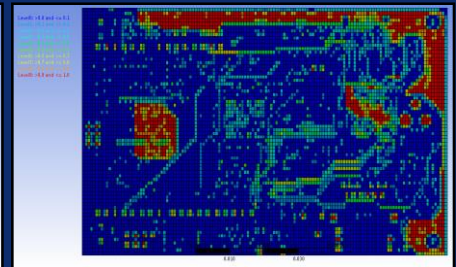
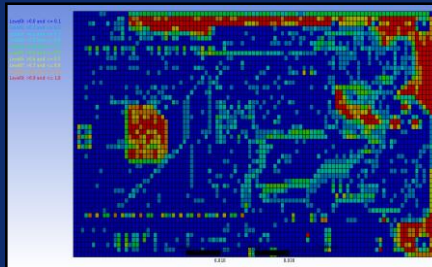
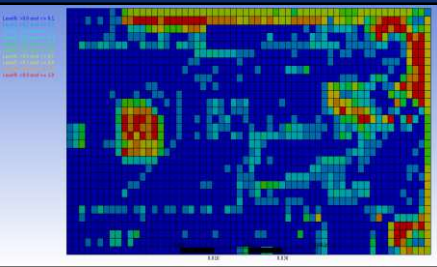
**Right:**  
Stresses using Trace Dependent Materials

# Thermo-Mechanical Reliability of PCBs



## Copper Density Map: 0-100%

Left: Original Imported ECAD Traces  
Bottom Left: Coarse Refinement  
Bottom Middle: Medium Refinement  
Bottom Right: Fine Refinement

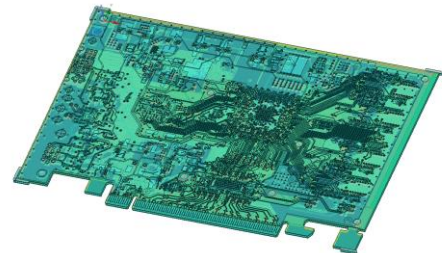


Based on board complexity and operational conditions, engineers can refine the trace mapping to capture more or less of the trace distributions as outlined in the pictures above.

Once trace mapping is complete, engineers can perform any structural or thermal analysis including static, transient, modal, vibration, etc.

ANSYS will read in ODB++ ECAD files directly without any conversion necessary. ANSYS SpaceClaim is then able to generate board extents, traces and surface mounted components.

**Tools** – ANSYS Mechanical, ANSYS SpaceClaim



**For detailed information or for a demo of this application please contact PADT at [info@padtinc.com](mailto:info@padtinc.com)**



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