

PCB Modeler Extension for Abaqus

A customized Abaqus-based extension that automates the modeling of printed wiring boards

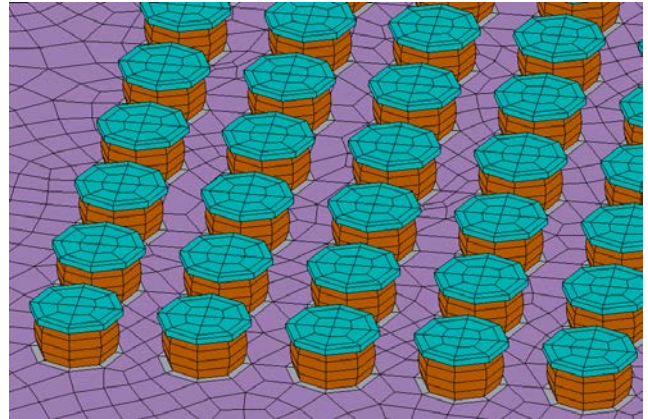
Printed wiring board (PCB) designs are growing increasingly more complex, driving the need for innovative, efficient simulation solutions. The PCB Modeler extension for Abaqus, created by engineers in SIMULIA's Southern region, streamlines the process of modeling and simulating the physical performance of printed circuit boards, thereby decreasing the length of their product development cycles as well as prototyping costs.

Features and Benefits

Our PCB modeler extension is fully integrated with Abaqus/CAE and automates the import and meshing of printed circuit board geometry based on the widely-used IDF (Intermediate Data Format). Numerous geometry filters are available to control geometry creation, such as the size of components to be imported and the diameter of drilled holes to be included. If IDF data is not available, the board and components geometries can be defined manually within the PCB Modeler.

Solder ball grid array (BGA) support for modeling the behavior of leaded and lead-free solder is also featured. Four different solder ball types are supported. The solder balls may be applied to any component on the top or bottom of the board and may be uniformly spaced in a grid pattern or positioned at arbitrary locations defined via a table.

Additionally, many controls such as board and component mesh sizes, solder ball sizes, option to tie/merge components are provided to automate the creation of board and component meshes.



Board with Solder Balls

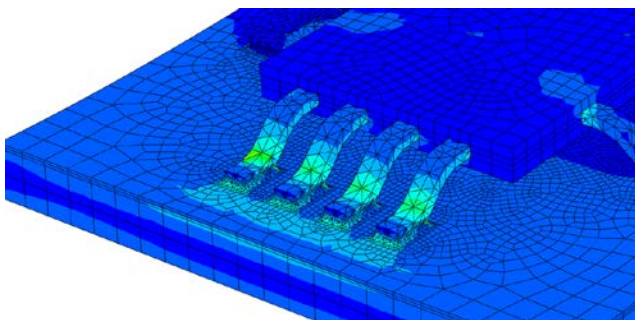
Obtaining PCB Modeler

The PCB Modeler is available for lease through your local support office. The plug-in may be downloaded along with the documentation at

http://www.simulia.com/products/pcb_modeler.htm

Installation instructions are provided in the documentation.

Support for the PCB Modeler is provided by Mike Shubert at the Simulia Southern Region office in Flower Mound, Texas. Please contact or email at 972 221-6500; email michael.shubert@3ds.com.



Analysis of Gullwing Leads

PCB Modeler Features

IDF (Intermediate Data Format) Import

- IDF Version 2.0 and 3.0 supported
- Set unit measurement during import
- Imports board with holes and cutouts, all components, and all component instances.
- Multiple boards can be imported into the same model

Board Features

- Outline and thickness of board can be modified and viewed before board creation
- Holes in board can be activated/deactivated based on diameter
- Cutouts can edited and activated/deactivated
- Solder mask layers can be on top and bottom

Component Features

- Outline of component cad be modified and viewed before component creation
- Mesh controls
- Solder mask layer can be added to bottom of component
- Solder ball grid array (BGA) can added to the component. Outline of solder balls and component can be viewed before creation.
- BGA can be entered as a regularly spaced grid or as a list of arbitrary points entered through a table.
- Leads can be assigned to any edge of a component, spaced uniformly or arbitrarily
- Orthotropic material assignments are supported
- Cutouts can be created on the component and solder balls or leads can be placed within the cutouts
- A component can be imported into the PCB Modeler from an existing Abaqus-part and treated like the built-if (IDF-Based) components. The imported component can be geometry-based or an orphan mesh.

- Instances of components can be independently assigned meshing properties and activated/deactivated
- Instances can be translated and rotated on the top or bottom of the board

Mesh Control Hierarchy

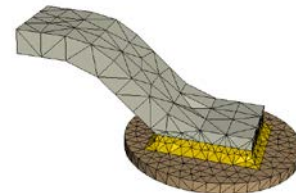
- Instance-level controls overwrite component-level controls, which in-turn overwrite board-level controls:
 - Tie or merge components
 - Component element size
 - Meshing algorithm
 - Element type

Solder Ball Features

- Ten built-in solder ball types can be created and referenced by any component
- Components can have a mix of different solder ball types
- A solder ball can be imported into the PCB Modeler from an existing Abaqus-part and treated like any of the built-in solder ball types. The imported solder ball can be geometry-based or an orphan mesh.

Lead Features

- One built-in lead type, the Gullwing Lead, can be created and referenced by any component



- A lead can be imported into the PCB Modeler from an existing Abaqus-part and manipulated in the same manner as a built-in lead. The imported lead can be geometry-based or an orphan mesh.

Component Instance Features

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