CalcePWA Software

A simulation-based failure assessment solution for printed wiring assemblies.

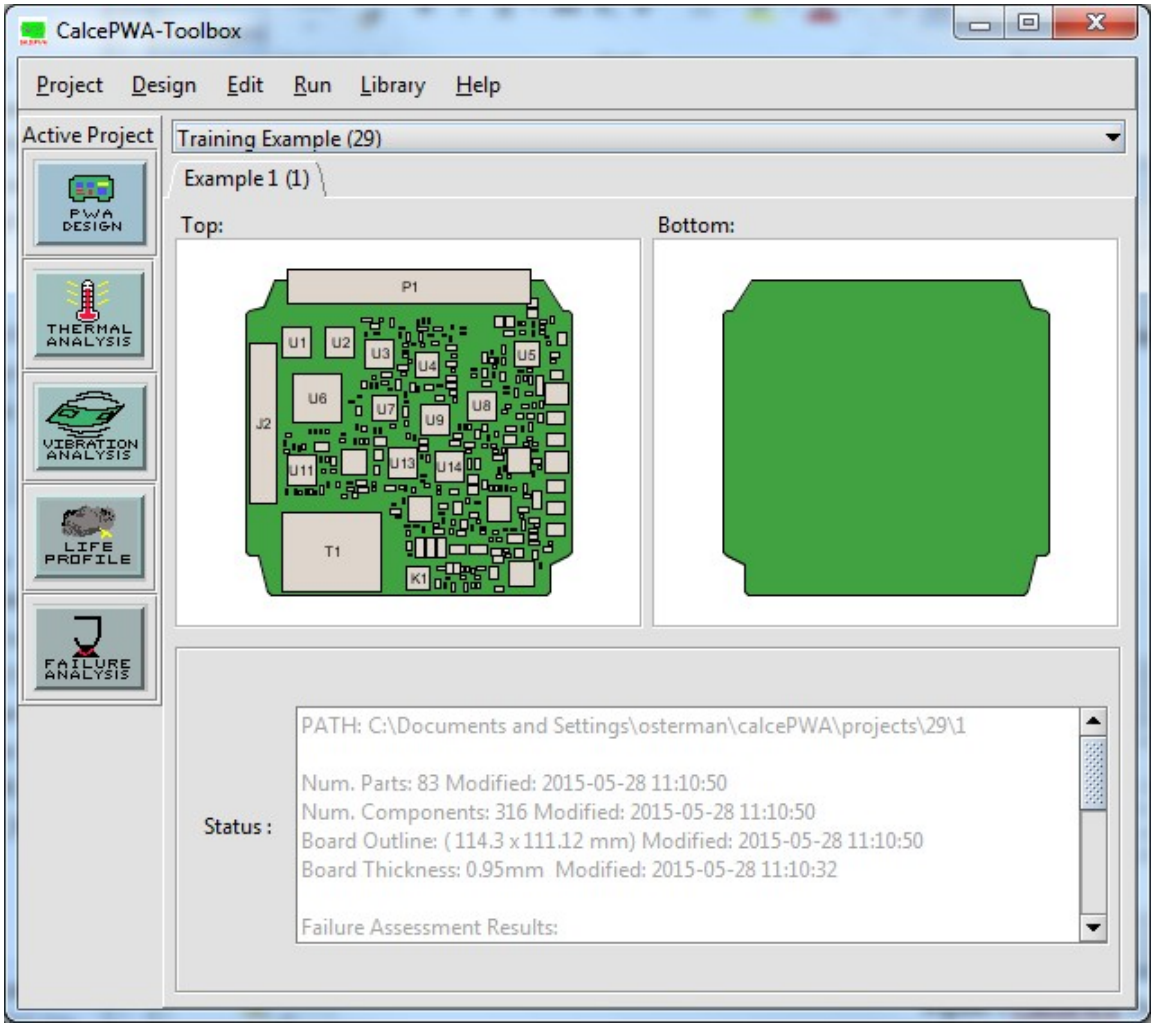

Figure 1 CalcePWA Toolbox

What Is CalcePWA Software?

The calcePWA software is used to perform simulation-based failure assessment of printed wiring assemblies. The software includes design creation and import, thermal analysis, vibration analysis, and failure assessment capabilities. The algorithms implemented within the software are based on existing scientific knowledge assembled through review of textbooks, published articles, and research conducted within the CALCE Consortium. The software is developed and maintained by the Center for Advanced Life Cycle Engineering at the University of Maryland and is freely available.

Capabilities of calcePWA

The calcePWA software provides facilities to create a computer model of a printed wiring assembly. Modeling is facilitated by form-driven interfaces and the ability to create reusable data libraries of material and part data. Model development is also facilitated by import routines for common electronic computer-aided design (ECAD) software used in generating printed wiring board layouts, including

- ODB++,
- Mentor Boardstation - Mentor Neutral Files,
- PADS PCB – Ascii text files,
- Zuken-Recal – CADIF files, and
- Cadence Allegro – IDF files.

Thermal Analysis

Steady-state temperature of individual printed wiring board layers and components can be determined using the calcePWA thermal analysis module. The software allows simulation of conduction, natural convection (vertical and horizontal), radiation, forced convection, and air-cooled cold plates. Thermal analysis is performed using a finite difference approach and control volume theory.

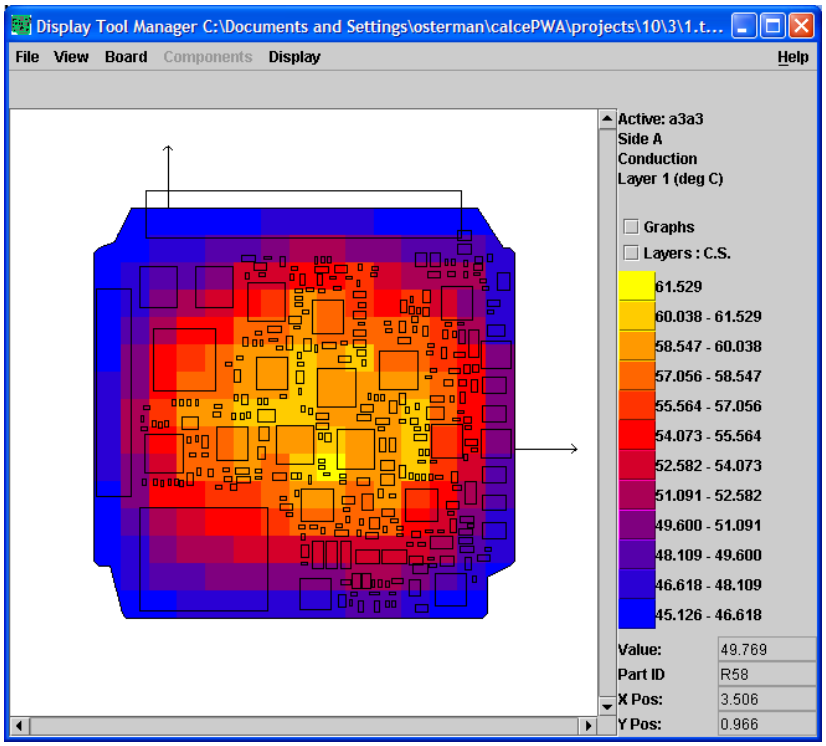

Figure 2 Thermal Analysis Display

Vibration Analysis

Dynamic characterization of a printed wiring assembly including up to the first six fundamental frequency and mode shapes is available through the calcePWA vibration analysis module. The software provides response assessment for random vibration or shock input and determines curvature and out-of-plane displacement of the circuit card. The vibration module provides support for simple, clamped, rotational, and translational spring boundary conditions. The vibration analysis is conducted using a finite element modeling approach with a modified plate element.

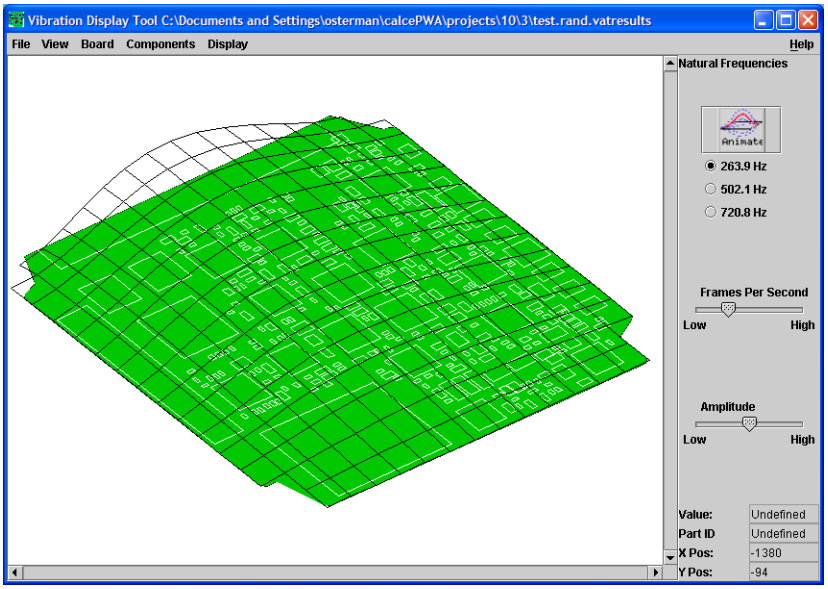

Figure 3 Vibration Analysis Display

Failure Assessment

Failure assessment is conducted on a user-defined printed wiring assembly and user-defined life cycle loading conditions. Based on the hardware and the loading condition, individual failure sites are identified and time-to-failure is estimated. This assessment is conducted based on a defined set of failure mechanism models that have prescribed input requirements extracted from the design and loading data. Failure mechanism models include

- Package-to-board interconnect failure due to temperature cycling, vibration, and shock; and
- Plated through hole (PTH) failure due to temperature cycling.

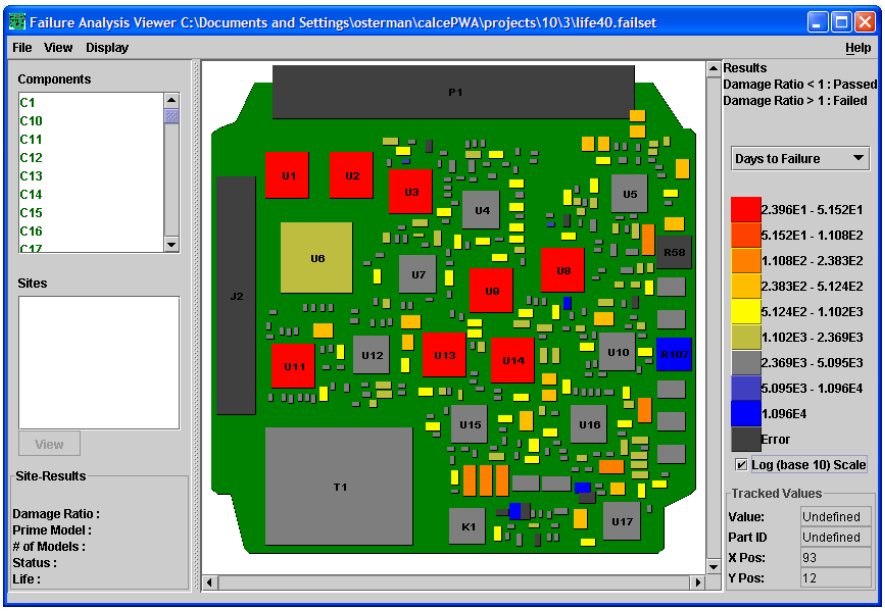

Figure 4 Failure Assessment Display

Supported Computer Hardware and Operating Systems

CalcePWA is designed to run on modern computers and workstations running Microsoft Windows 10.

More Information

For more information regarding the calcePWA software, please visit the CALCE Software web site:

https://calce.umd.edu/calce-sara-software

or contact

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