

The Paradigm Shift in Design Assurance and Reliability Prediction

½ Day Course

ABSTRACT

The foundation of a reliable product is a reliable design. However, PCB designers are finding that assuring the reliability of their design is becoming increasingly complex as failure can be induced by multiple drivers. In addition, predicting reliability is becoming problematic as MTBF calculations can tend to be inaccurate and a physics-of-failure (PoF) approach can be time-intensive and not always definitive.

A critical aspect of all three activities (design assurance, MTBF, PoF) is component stress analysis and stress derating. Due to the manual calculations required, these activities have been constrained by time and money. Companies have responded to these limitations by performing component stress analysis only once in the new product development (NPD) process, limiting the scope of component stress analysis, or simply making assumptions so as to provide input into MTBF spreadsheets.

This course will present to circuit designers and reliability practitioners new tools that automate the component stress, stress derating, and MTBF processes. The resource reductions provided by these tools demonstrate that these analyses no longer exist outside the boundaries of viable business models. Cases will be presented showing that comprehensive stress analysis is both critical and realistic and the results from this activity open the door for greater adaptation of PoF-based reliability prediction. It will be shown that customers should expect full stress analysis from their suppliers and suppliers will be made aware that this is no longer an unreasonable expectation.

OUTLINE

- Introduction to Reliability and Design
- Reality of Predicting Reliability in Electronic Designs
- Component Stress Analysis and Stress Derating
 - Case Study: Field Failures
- fiXtress Stress Calculator
 - Simplification and automation of Stress Analysis, Derating, and MTBF Calculations
 - Benefits of fiXtress over SPICE models
 - Uses standard data sheets
 - Can handle large PCBs with thousands of components
 - Uses standard parametric data to import design information
- Components Library
- Stress Derating Curves
- Specify External Sources and Loads
- Final Data Specifications
- Circuit Simulation
- Stress Analysis Results
 - Reviews stresses on all parts
 - Identifies parts that exceed manufacturer's ratings and/or specified derating curves
- Exceeding Derated or Rated Values
- Component Stress Analysis: MTBF Case Study
 - Manually: time-consuming and costly
 - fiXtress: can save time and money
- Conclusion