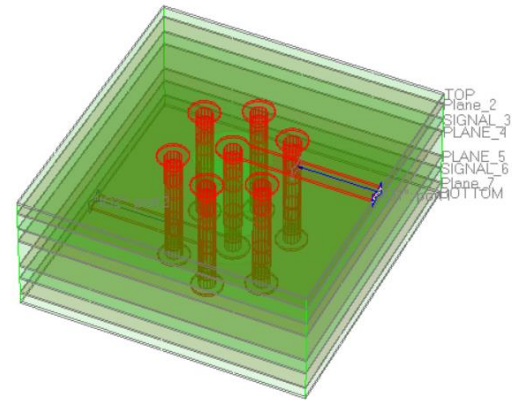


# Wild River Technology Signal Integrity Training

## Simbeor Training for Signal Integrity Engineers



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### Course Description

This class has been developed to bring the student up to full speed on the Simbeor electromagnetic signal integrity software. Questions during the class are encouraged, as we will be taking small bites each session. This class requires several hours/week of commitment to complete the work assignments. The structures included on the Wild River Technology CMP-28 Channel Modeling Platform serve as the basis for most of the course examples and exercises. At the end of the course students should be able to set up and simulate 50 GHz signal integrity critical printed circuit board systems and create meaningful graphs.

### Course Objectives

The key objective is core competency in the usage of Simbeor to 50 GHz and beyond. Upon successful completion of this course, students should be able to demonstrate the following competencies:

1. Know and be comfortable with Simbeor's Graphical User Interface, including the main menu bar, tool bars, and shortcut keys;
2. Understand the Simbeor Solution Tree, its structure, and how to interpret its contents.
3. Have an understanding of the components and methodologies that are used for creating multilayer objects, including materials, stack-up, and geometry definition and editing;
4. Use of Simbeor's wizards and tools to create transmission lines and vias, use of the SiTune tool for optimization of same, and the use of Touchstone Analyzer tool for import and quality analysis of Touchstone files.
5. Know how to construct Simbeor circuits and define simulations to complete an end-to-end interconnect analysis with the linear solver, and know how to output Touchstone and SPICE RLGC model files of the results.
6. Create graphs of simulation results in both time and frequency domain, know how to set up a TDR/TDT, create rational compact models and perform quality metrics of S-parameters and apply tips of jitter analysis.
7. Know how to de-embed a structure in a systematic fashion and how to set up and perform material parameters identification by extracting GMS parameters of 2 line segments.
8. Know how to import geometries from a PCB design file and how to run a de-compositional analysis.
9. Know how to use Simbeor's built-in graphing add-ons for compliance metrics evaluation.

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### Organization

This is a 12 week series of 1.5 hour on-line classes.

### Requirements:

This class requires a minimum 2 hours/week commitment, in addition to 1.5 hour live web presentations.

### Resources

- Solution examples are provided in the Simbeor installation module. If you did not install the solution examples during the regular installation, you can install them by invoking Windows menu item Start > Program > Simberian > Simbeor THz > Install Simbeor Examples.
- If customer requests, the assignments can be reviewed.
- Questions and issues with homework can be emailed to the instructor.

### Course Topics and Assignments

Session	Topic	Manual/Tutorial Suggested Reading
1	De-compositional analysis and the Electromagnetic Simulation Environment, Getting around the Simbeor GUI Intro to Rational Compact Models	Chapter 4 - Electromagnetic Simulation Environment, Pages 68 – 80 Chapter 10 – Input and output files Chapter 11 - GUI navigation and shortcut keys
2	Defining Solutions, Project Materials and Stack-up	Chapter 4 - Electromagnetic Simulation Environment, Pages 81-98 Solutions and Projects, Pages 39–46 Materials and Stackup, Pages 47-48 Chapter 5 – Models of Materials Tutorial 1: How to create a Project with Materials and StackUp
3	Model creation wizards and tools	How to create a transmission line model, Pages 61 – 62 Tutorial 2: How to simulate transmission lines How to create a 3D full-wave model for via-holes, Pages 62-63 Via Analyzer, Pages 192 -201 Tutorial 3: How to simulate via-holes
4	Using the SI Tune tool Import of Touchstone models	SiTune tool, Pages 148-153 Scattering Parameters, Pages 352-362 Touchstone Analyzer, Pages 184-191 Tutorial 4: How to create parameterized models
5	Circuits and Simulations	Circuits and Simulations, Pages 48 – 60 Simbeor Solvers, Pages 61 – 62 Symmetry, Page 287, 358 Geometry meshing, Pages 281-284

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6	End-to-end interconnects analysis with linear solver, Outputting model files	Results section, Pages 140-143 Tutorial 5: End-to-end analysis of a simple data channel Multilayered circuit section, Pages 99-123
7	Plotting S-parameters Time-domain analysis (TDR/TDT)	How to compute time-domain response matrix, Page 56-60 Time-domain response matrix, Pages 363-364 Multiport model file processor, Pages 306 – 308 Tutorial 6 - Time-domain analysis of a simple data channel
8	Plotting eye diagrams, Geometry import and auto-decomposition	Eye Analyzer, Pages 154-156, How to import geometry from Allegro PCB file, Pages 46-47 Document - <b>Simbeor Board Analyzer</b> , available at Simberion.com, in Downloads, Documentation Section
9	Material parameters identification, Roughness estimates	Web site paper: <b>Broadband material model identification with GMS-parameters</b> , found in the Simberian web site AppNotes page.
10	Test fixture de-embedding, Analysis to measurement correspondence	Extraction of test fixture S-parameters and de-embedding, Pages 298-305
11	Advanced 3DML circuit design and simulation for pre-layout analysis	
12	Customer requested	

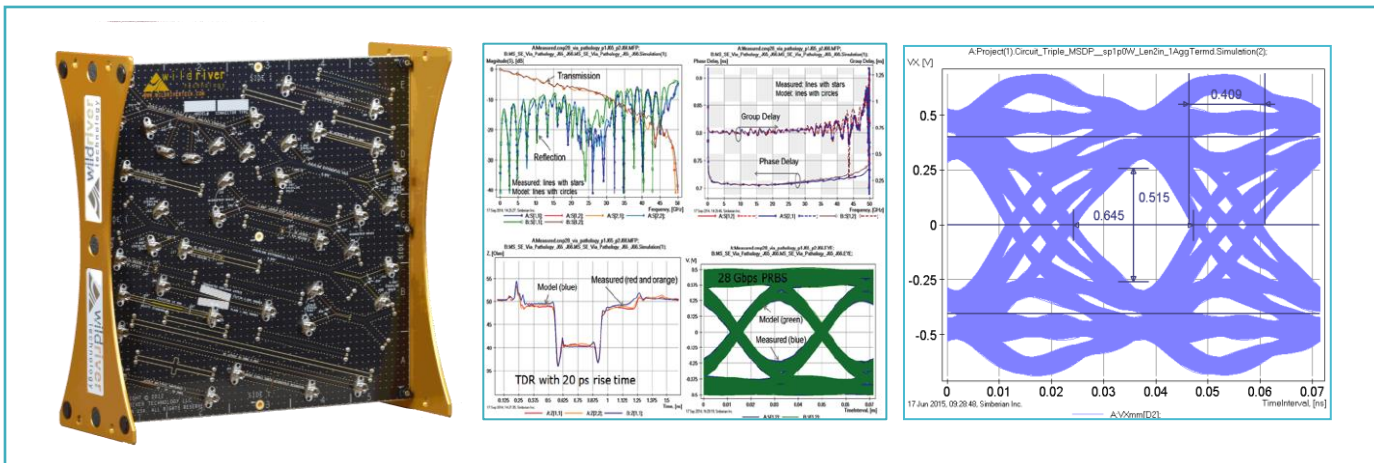


Figure 1: Channel Modeling Platform CMP-28 is used for exercises, actual measurement to simulation correspondence is address for time, frequency, and eye diagrams.

### Due Dates for Assignments:

All assignments should be completed by the next session.

### Readings

The book

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### **Simbeor Training for Signal Integrity Engineers**

the class is the latest version of the Simbeor Manual. Download the Simbeor Manual in PDF form from the Downloads page on the Simberion web site.