FINETUNING

2-Day Hands on Workshop - Signal Integrity / Power Integrity Design

Date: To be decided once we have minimum participation
Time Duration: 9:00am to 5:00pm
Location: To be decided as per customer request

Course Description

This 2-Day workshop addresses the following key areas: Practical hands on how to **"Signal Integrity / Power Integrity Design** using a CAD software tool.

Theory session will be followed by examples using a CAD software tool

Today's high-speed digital designers require EDA tools that accurately model RF and microwave effects, and that analyze not only signal integrity, but also the power integrity, and EMI/EMC of serial and parallel chip-to-chip data links. A prime example is signal integrity on serial links.

The 2-days training using CAD software provide the most complete chip-to-chip data link analysis for standards such as Infiniband, PCI Express, RapidIO, DDR, HDMI, and Ethernet.

The training allows design engineers to:

– Analyze complete chip-to-chip data links by co-simulating individual components, each at its most appropriate level of abstraction: link-, circuit- or physical-level.
– Import S-parameter accurately into transient simulation.
– Generate ultra-low bit error rate (BER) contours in seconds not days.

These capabilities result in dramatically reduced product design cycles.

CAD Software tool has solutions that put the applicable simulators, libraries, and capabilities into the hands of highspeed digital engineers. Provides essential RF and microwave design capabilities in a highly productive enterprise schematic design environment. Fast linear simulation, comprehensive filter and passive circuit synthesis.

Transient Convolution and Channel Simulation Element: Advanced time-domain Element that includes Transient Simulator (SPICE transient analysis including HSPICE and Spectre compatibility modes), IBIS Model Library, Convolution Simulator (creates time-domain models from frequency domain data), Channel Simulator (includes bit-by-bit and statistical modes, eye diagrams and BER contours, IBIS AMI).

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Interconnect Toolbox Element: The Interconnect Toolbox Element enables you to optimize your PCB stack up and design transmission line geometry. It also provides a high accuracy via design simulator which helps you to design a parameterized, impedance-matched via transition (single-ended and differential).

Layout Element: Comprehensive physical design environment specifically geared for high-frequency circuit development, including artwork import/export for ODB++, DXF, Gerber/drill, IGES and GDS-II formats.

SIPro Signal Integrity EM Analysis Element: SIPro provides signal integrity (SI) analysis of complex high-speed PCBs, enabling you to characterize loss and coupling of signal nets, and ultimately extract an EM-accurate model that can be used in the Transient and Channel Simulators.

PIPro Power Integrity EM Analysis Element: PIPro provides complete power integrity (PI) analysis of your power distribution network (PDN). Simulation engines include DC IR drop analysis, Thermal and Electro-Thermal DC analysis, PDN AC impedance analysis, Bill of Materials optimization for decoupling capacitors, and finally power plane resonance analysis.

Momentum G2 Element: 3-D planar electromagnetic (EM) simulator used for passive circuit analysis. Also includes modules for animating current flow in conductors and slots, circuit optimization and analytical modeling.

Key Benefits of CAD software
- Complete, integrated set of fast, accurate and easy-to-use system, circuit & EM simulators enable first-pass design success in a complete desktop flow
- Application-specific Design Guides encapsulate years of expertise in an easy-to-use interface

Who should attend?

Digital hardware design Engineers / Scientists interested in pursuing High Speed digital design Students pursuing Masters / PhD with interest in DSPs, FPGAs, SoCs circuits and systems

By taking this course, you will better understand

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PIPro Power Integrity EM Analysis Element: PIPro provides complete power integrity (PI) analysis of your power distribution network (PDN). Simulation engines include DC IR drop analysis, Thermal and Electro-Thermal DC analysis, PDN AC impedance analysis, Bill of Materials optimization for decoupling capacitors, and finally power plane resonance analysis.

Learning Objectives

- To use **Transient Convolution Simulator** accommodates not only lumped element models but also the distributed transmission line, S-parameter, and EM models that are essential to model high-speed PCB traces. The Transient Convolution Element is unique in that it is not simply a high performance point tool, but a set of capabilities integrated into it. You can combine channel-, circuit-, or EM-level models – each at the appropriate level of abstraction – into one simulation. Multicore processor support and a new, highcapacity sparse matrix solver achieve a three-fold simulation speed improvement for traditional transient simulations and make this the industry's fastest signal integrity circuit simulator.

- To use **Channel Simulator**, that eliminates need for long, transient simulations. It takes advantage of the fact that the traces, vias, bond wires, connectors, etc. of the channel are linear and time invariant ("LTI"). This fact lets you avoid the brute force approach of running the transient solver at every time step. You can determine ultralow BER contours in seconds not days. This enables very rapid and complete 'what if' design space exploration.

- To use **Broadband SPICE Model Generator**, to convert measured or simulated S-parameter models to lumped equivalent or pole zero representations. Lumped equivalent representations can be used with various types of SPICE simulators. It also gives you the ability to enforce passivity during broadband SPICE model extractions

- To use **Multilayer Model (MLM) Library**, model up to 40 metal layers and 80 coupled lines. It offers an alternative trade off in simulation speed versus accuracy compared with the Momentum Planar EM simulator. The models run faster than Momentum, but Momentum takes post-layout routing into account. The effects of impedance, loss, crosstalk, and delay are modeled with the 2-D cross-sectional electromagnetic field solver that underlies this library, for achieving pre-layout channel modeling

- To use **Transient Convolution Element** featuring powerful jitter analysis capabilities for jitter decomposition, achieving excellent correlation between simulated and measured jitter components and BER measurements.

- To use **IBIS I/O models** IBIS (I/O Buffer Information Specification) is an industry-standard specification for modeling input and outputs of digital circuits. Semiconductor vendors may create IBIS models for their parts and distribute them for use in any IBIS compatible simulator. IBIS simulation provides faster simulation as

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compared with equivalent-circuit SPICE models. Using IBIS models, the nonlinear effects of integrated circuit I/O buffers can be modeled faster and more precisely, using vendor-supported information. Recent advances include the addition of the algorithmic modeling interface (AMI) for vendor-specific IC models of SerDes signal processing blocks like pre-emphasis, equalization, and CDR.

- To use **EM Simulators,** a Momentum is a 3-D full-wave electromagnetic (EM) simulator used for accurate interconnect analysis. It accepts arbitrary laminar design geometries such as PCBs and packages that consist

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of multi-layer traces and vias. Accurate EM simulation enables signal integrity designers to improve interconnect performance and increases confidence that the product will function as simulated after fabrication. Momentum RF is a the quasi-static mode of the Momentum that reduces simulation time, compared with the regular microwave mode without sacrificing accuracy. Quasi-static mode is particularly applicable to the case where the wave propagation across the structure is practically instantaneous. In contrast, microwave mode takes the finite wave propagation speed into account and should be used when the wavelength of the highest frequency under consideration is smaller than the largest dimension of the structure. Electromagnetic/circuit co-simulation with layout components breaks down the barriers between electrical and physical analysis domains. "Look alike" layout components allow you to create custom symbols that can be used in the schematic design view. Once artwork and ports are defined, the user can generate a layout component with the click of a button.

Although Momentum is principally used for multilayer geometries it does also have a bond wire and via models that adds only one unknown per bond wire or via. Momentum also has the same frequencydependent dielectric and conductor surface roughness capability as the MLM library mentioned above. Unlike previous generations of power integrity tools, Momentum make no assumption of solid power/ ground planes can analyze PDNs with heavily perforated planes. The SI/ PI Analyzer wizard lets you set up simulation in a snap using a net-based connection-oriented approach which is more efficient than the traditional polygon-by-polygon method. PI workflow lets you combine an EM based PDN model with lumped element models for the voltage regulation module (VRM), the chip power model (CPM), and de-coupling capacitors (decaps).

Workshop Sessions & Schedule (To be determined)

Topics, Day-1	Time
	900-1030
Tea Break	1030-1045
	1045-1300
Lunch Break	1300-1345
	1345-1500

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Tea Break	**1500-1515**
	1515-1630
Interactive Session	**1630-1700**
Topics, Day-2	**Time**
	900-1030
Tea Break	**1030-1045**
	1045-1300
Lunch Break	**1300-1345**
	1345-1500
Tea Break	**1500-1515**

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	1515-1630
Interactive Session	**1630-1700**

Speaker

Bhupinder Singh received his Master's Degree in Microwave System Design from IIT- Kanpur, India. He has extensive experience in product design and development both in India and abroad. In his 27+ years of experience, he has designed, developed and tested numerous RF system / subsystem used by Govt, Military, and Cellular, VSAT industry.

He is currently Director-Technical at RF Specialities and Finetuning Academy LLP.

Previously he worked as a scientist at DRDO-Aeronautical Development Establishment, Bangalore, from 19912001. Later, he was leading R&D team at HFCL, DMC-STRATEX in NZ, Blackbay in NZ, Technical Head-Telecom R&D at Astra MWP, Eminent Technology, Italy.

He is an advanced user of Simulation tools like ADS, SystemVue, EM Pro, MWO-AWR, ALTIUM and ACAD. He is skilled at using Spectrum Analyzer, NW Analyzer, Vector Signal Analyzers, signal generators.

Finetuning Academy LLP is focused in RF circuit, system and MMIC design training services. Delivered advanced and basic trainings using RF design software tools, by Industry Experts with over 25+ years of Experience from ISRO, BEL, DRDO.

RF Specialities (RFS) is one of the leading companies in the design, development, servicing and maintenance of RF Equipment in India. RF Specialities is a leading supplier of customized RF Systems/ subsystems to Govt., military and commercial market. Boasting of a state-of-the-art RF laboratory at Bangalore and backed with experienced & well-trained manpower, it provides unique and cost-effective solutions in the shortest turnaround time for the satellite, broadcasting, telecom and military industry.

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How to Register?

Please fill out registration form and email the form to support@finetuningrf.com

Registration Form

2-Day Hands on Workshop - Signal Integrity / Power Integrity Design at Bangalore

1. Name of the Participant:
   (In BLOCK Letters only)

2. Company Name:

3. Contact Phone number:

4. Email id:

Optional information

5. Years of work Experience:

6. Briefly describe your work experience:

7. Areas of interest:

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8. Topics of interest:

9. Simulation Tools familiar with:

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