



World-class Noise, EMI, and Signal Integrity seminar in Munich

Azitech ApS hereby invites you to a unique PCB seminar focusing on Noise, EMI, and Signal Integrity. Your instructor for this event will be the famous PCB specialist - Rick Hartley - from USA. His recognition inside the PCB industry is one of a kind. Rick Hartley, who retired from L-3 Avionics, is the principal of RHartley Enterprises, through which he consults and teaches internationally. This is a "must-attend" event!

SEMINAR DESCRIPTION

Knowing how to design circuit boards to contain and control energy (fields) and knowing how to mitigate and control the effects of high speed devices is the key to successful design of low noise circuits.

This 2 day seminar by Rick Hartley is a crisp focus of the issues PCB Designers and Engineers need to know to prevent signal integrity issues, EMI, crosstalk and grounding problems in high speed digital and mixed signal designs.

This will be Richard Hartley's first time in Munich. He has dedicated the past 40 years to PCB's and circuit development with emphasis on control of noise - in both Digital and RF circuits. This is truly a great experience to learn from the best and network with people from the industry.



VENUE

Novotel München, Germany
18.-19. May 2022
€ 1200 excl. hotel
€ 1500 incl. hotel (2 nights)



SIGN UP

You can sign up at:
[Azitech.dk/Events](https://www.azitech.dk/Events)
if you have any questions or want more information please call Nina Andersen at tel: +45 69 66 33 18 or write an email to na@azitech.dk

WHAT YOU WILL LEARN

This 2 day seminar will give you:

- Skills to lower the EMI signature of your system.
- Techniques that will improve the chance of your PC boards working the first time - all without noise or EMI problems.
- Learn the exact causes of noise and signal integrity problems, exactly why it happens and how to prevent it from occurring.
- Learn not only what to do, but 'why' the techniques always work.
- And much more!



Agenda

Day 1

08.30: **Sign in**

09.00-10.30: Recommended reading, Impact of frequency & what drives it, Frequency- Analog vs Digital, Essentials of grounding, Noise- what is it, why it occurs, where energy travels in circuits, Impact of proper Grounding on Noise and EMI, Transmission lines and return current paths.

10.30-10.45: **Tea break**

10.45-12.15: Proper PCB plane assignment, Common misuse of planes, Noise & signal attenuation, Routing and reflections, Propagation time and velocity, Lumped vs distributed length lines, Transmission line impedance, No Cost impedance control, Impact of Nearby traces on impedance.

12.15-13.15: **Lunch break**

13.15-14.45: Reflection mode switching, Routing & termination styles, new thoughts on Line Termination, Best line routing styles, Impact of Long Ts in routed lines, Proper DDR routing, Vcc and Ground bounce, Signal attenuation factors, Impact of trace corners and vias.

14.45-15.00: **Tea break**

15.00-17.00: What is Cross Talk, Backward & forward cross talk, Realistic cross talk levels, Guard traces- Good or bad? Differential Pair basics, Differential Impedance, Diff pair crosstalk, Tight vs Loose coupling of lines, Length Matching of Differential pairs, Differential pair line termination.

19.00: Networking dinner

Day 2

09.00-10.30: Basic types of EMI, Antenna basics & PCB radiators, Control of Common Mode energy, Energy feeding plane edges, Basic component placement issues, Routing to control EMI & Noise, Impact of routing layer changes, Mixed analog & digital PCBs, Islands in Power planes, Impact of connector pin assignment.

10.30-10.45: **Tea break**

10.45-12.15: Power distribution Goals, Importance of Low PDN impedance, Inductance of Via and Planes, Impact of capacitor location, Decoupling PCBs with routed power, decoupling 4 Layer PCBs, Decoupling High layer count PCBs, Impact of IC design on delivery of power, Analog decoupling, Ferrites in power bus.

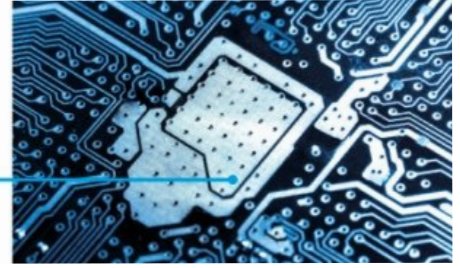
12.15-13.15: **Lunch break**

13.15-14.45: PC Board Stack-up basics, Boards to avoid at all costs, very good 4- & 6-layer boards, Excellent High layer count boards, I/O filtering, Setup and routing of I/O, Metal vs plastic enclosures, Slots in metal enclosures, Shielding of cables, Impact of I/O connector location, how many cables in the enclosure.

14.45-15.00: **Tea break**

15.00-17.00: Multiple PCBs in the system, Issues when using Chassis as a Heatsink, Proper Switch Mode power supply layout, Layout of SMPS to control EMI, Critical circuit loops including Feedback, Proper Grounding of Switch Node, Secondary methods to control EMI, Inductor types and proper mounting.

17.00: **Evaluation and certificate.**



I hereby invite you to Azitech's seminar with Rick Hartley.

Here at Azitech, we believe the content of this seminar is very important for most PCB designs today. It is also important to be able to develop competitive products where the quality of the PCB design stands the distance. By managing noise, EMI and signal integrity from the start, you achieve better quality in your design from the beginning, faster time to market and development savings.

Here is just a brief overview of the invitation:

- **EVENT:** Control of Noise, EMI & SI Seminar (2 days)
- **CONTENT:** Why proper circuit grounding is important for all PCB designs
- **PRESENTER:** Rick Harley
- **DATE:** 18th of May to the 19th of May 2022
- **TIME:** 08.30 - 17.00 PM CEST

Here is Rick's description of what you will learn at the seminar

Knowing how to design circuit boards to contain and control energy (fields) and knowing how to mitigate and control the effects of high speed devices is the key to successful design of low noise circuits. This 2 day seminar with signal integrity guru, Rick Hartley, is a crisp focus of the issues PCB designers and engineers need to know to prevent problems with noise, EMI & signal integrity. Moreover, you will learn how to deal with cross-talk and grounding problems in high speed digital and mixed signal designs.

The seminar will be held over 2 days, at the Novotel in Munich on the 18th and 19th of May 2022. A networking dinner will be held the first evening of the seminar.

Price

- 1200 € for seminar incl. dinner.
- 1500 € for seminar incl. dinner and 2 nights.
- When you sign up for the seminar, you will receive a 1 month free Polar software license (Speedstack and Si9000e Field Solver).