Quantic EMC – Success Story at Johnson Controls

Scott Mee, Johnson Controls, Inc.

Telematics devices are being developed today to make driving in automobiles safer. These devices provide convenient hands free interface between technology and the human. By using wireless technology such as Bluetooth™ an automatic connection can be made between the user and a cell phone. Combining this RF technology with voice recognition, users can easily place or receive incoming calls over their cellular phone without ever having to take their hands off of the steering wheel.

RF emissions can be a difficult to solve given a PCB that has many high frequency clocks and a 2.4 GHz RF link on board. Being able to simulate the RF performance of a complex device, like a Telematics product, is extremely critical. It helps to accelerate the process of achieving compliance, given the very stringent automotive EMC requirements.

In today's automotive environment, customers are asking suppliers to generate fully compliant (and functional!) products in fewer than 16 months. Simulation tools allow design engineers to evaluate and optimize their first prototype before it is even built. This activity saves weeks of development time that might ordinarily be spent creating layout, building, and testing quick-turn boards.

Omega PLUS, from Quantic EMC, was instrumental in helping us to identify problem areas with our designs. Changes were made to schematic and layout, and the design was re-simulated showing changes in performance, all without ever having to build a board.

Making EMC simulation a part of the design process for complex telematics boards proved its worth in just one revision of the board.

Simulation results showed us that the changes planned for our next revision gave us significant improvements in key areas, while performing the simulation we also identified other areas in the layout that brought emission reductions without sacrificing functionality requirements.

Using a flexible simulation tool reduces board design iterations. Being able to create a "virtual" board change and re-simulate, allows "what if?" scenarios to be played out.

Anyone who has struggled with an emission problem knows that making even small changes to a PCB unaided invites surprises. So, we have found it to be very beneficial to add confidence and predictability by simulating our board changes before building them.

Overall, we were able to provide more confidence for our customer and for ourselves that we would improve the performance objectives.

The case study presented here confirms the value of using appropriate tools – but, always, with appropriate personnel. Electronic design automation software must be seen only as a tool. Put a chisel in the hands of an experienced cabinetmaker and one in the hands of an amateur and you will see the difference in the end product.

Roy Leventhal, Leventhal Design and Communications

I recently participated, with Johnson Controls and Quantic EMC personnel, in an exercise using modeling and simulation a priori and diagnostically to knock down EMI risks with a client and their team.

It was very successful in terms of time, cost and performance vs. the traditional pass regulatory paradigm. The product was cleaner on EMI emissions than the older product - and on a much more compressed schedule. And they didn't have to add an expensive shielding box.

Simulation and modeling tools do not have to be perfect and complete to be of great benefit. You do need to know their limitations. All they have to do is to assist you in the steady application of good design principles, problem solving and the implementation of design intent.

This experience reinforced my belief that the best engineers use a combination of simulation and measurement to meet their design challenges.