Explaining The ROI Of Compliance Efforts To Your Colleagues

by Kevin Parmenter, Chair, and James Spangler, Co-chair, PSMA Safety and Compliance Committee

In this column, we frequently stress the need to plan for compliance requirements—all types including safety, EMC, energy efficiency and environmental/restricted materials—early in the product design cycle or process. We stress the need to know the requirements and to perform pre-compliance testing as you go through the different design stages. But knowing we should do these things, and getting our companies to agree to do them are different things. So often there is resistance from other members of a design team, or other colleagues in the organization, to take the necessary extra steps to ensure that compliance needs are considered throughout product development. How do we overcome this resistance? A paper presented at the recent IEEE EMC + SIPI 2019 conference[1] provides guidance on how compliance advocates can convince their colleagues in engineering and management of the value, or more specifically, the return on investment (ROI) of addressing compliance needs early and throughout the product design process.

Consultant Sanford Rotter and Jerry Meyerhoff from JDM discuss a range of issues in their paper "Effectively Communicating the EMC Message in Design Teams."[2] Among the challenges in getting design team to address EMC compliance needs are conflicts between EMC requirements and other product design criteria, a lack of experience on the part of the new EMC engineer, differing perspectives and motivations among various design team members, an organizational structure that isolates the EMC engineer, and various challenges relating to communications and relationships among team members.

Although, the paper by Rotter and Meyerhoff focuses on EMC requirements, the same issues and solutions apply broadly to safety and other compliance areas. And while the paper is written specifically to assist EMC engineers, it's equally relevant to power supply engineers since the power electronics is subject to many of the safety and compliance requirements in a product. We often operate from the mains power lines and switching power converters generate a great deal of EMI which needs to be managed. In addition, the compliance and regulatory landscape continues to evolve at a rapid pace. As we have written in previous columns, it's usually incumbent on the power supply engineers to keep informed of the changing regulations.

As noted above, the need to address EMC requirements can be at odds with other design criteria. In their paper, Rotter and Meyerhoff mention the difficulty of balancing compliance considerations against product functionality and the ever-present release dates. So, in light of these and other challenges, how does the EMC engineer persuade the rest of the organization including finance people, the business side and other members of the engineering teams to listen, pay attention and most importantly to act at the start of a product development? That's essentially the question that Rotter and Meyerhoff try to answer in their paper. And it's a challenge that's made more difficult by the pressure to accelerate the design as fast as possible towards the NPI (new product introduction) phase.

From the engineer's point of view, it often seems that conveying technical requirements should be a straightforward and rational process. But experience teaches us otherwise. We can sit in meetings all day long and scream from the rafters that common sense and logic—plus good engineering practice dictates that you must consider safety and compliance at the early stages of any project. But the reaction from other team members will likely be a blank stare because the information is not being communicated in the language the rest of the organization speaks.

Most importantly, the message has to be understood and accepted by the part of the organization that actually decides what really happens. In my own experience, I have observed the necessity of justifying engineering decisions to the business people who run tech companies. As a product of engineering education in the 1980s, I came to realize over time that my engineering training was insufficient. By the early 2000s, I realized I needed a business degree to get anything accomplished because I was operating in an environment where terms were dictated by the accounting and finance people.

As an engineer, your warnings about safety and compliance, if not framed properly, will be received as inhibiting progress and interfering with the company's return on investment (ROI). This is a position you don't want to be in. Often an experienced engineer will articulate a clear thoughtful, rational and compelling case of why the present design plan will not meet compliance requirements only to have other parts of the organization or even other design team members not understand and ignore the simple changes. The end result of this failure to make the simple changes early in the design could be the need for a total redesign later, as the authors of the paper observe.

When a project reaches this point of having to start over, for those who advocated the compliance needs, it can difficult to resist the temptation to say "I told you so". But, we are all adults after all, and laying blame or finger pointing doesn't help to build the communications and trust among design team members, which as Rotter and Meyerhoff explain, are essential to effectively conveying the compliance message.

So how do we save our organizations from themselves so that we make safety and compliance top of mind in the early stages of a design? We have all heard, been told, repeated and otherwise discussed the fact that if you take care of regulatory issues upfront early in the design process it's less costly. However, your finance department and management will want you to *quantify* the cost advantage with demonstrable evidence. In their paper, Rotter and Meyerhoff provide a graph, originally published by Sunpower,[3] that can help you to do so (see the figure).

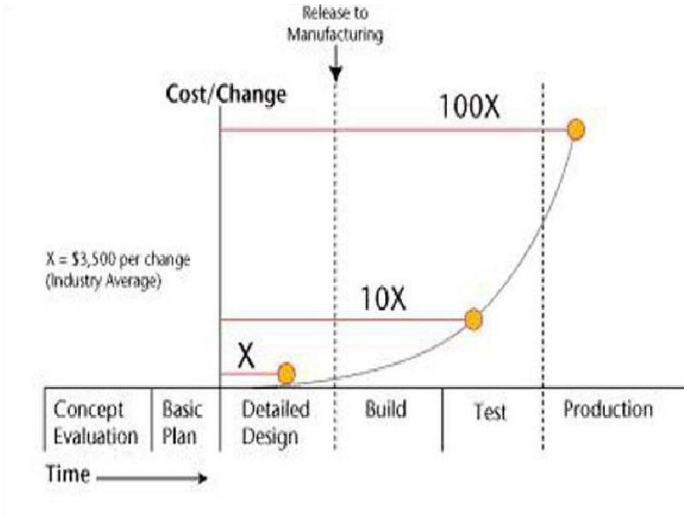

Figure. The cost per engineering change is, on average, $3500 per change early in the design cycle, but becomes orders of magnitude more expensive as the product approaches production. So the ROI of making small design changes for compliance, rather than waiting until after the design is released to manufacturing is clear. Source "Effectively Communicating the EMC Message in Design Teams," EMC + SIPI 2019 Proceedings,[2] originally attributed to Sunpower.)

In this figure, you can see that when EMC, safety and environmental materials issues are considered early in the design cycle they are much less costly to change. If they are done before release to production, the average cost to change is $3,500 per change event. In fact, this goes for any design change yet for the sake of this discussion we are referring to changes needed to meet safety and compliance requirements.

Use the information in the figure to gain support of senior management and the rest of the design teams early in the process to advocate and gain buy-in for the safety and compliance specifications as part of the marketing requirements documents (MRDs) and as part of the product spec. I would even suggest that you *over-communicate* the figure graphic with your teams. Doing so will boost your credibility and show the rest of the team members including senior management "WIFY"— what's in it for you. Everyone wants to be part of a successful winning program and project and in today's environment that can only be done when the product passes all necessary regulatory issues and is able to be sold into its intended market while meeting or exceeding the market's and customer's needs.

Getting the compliance requirements incorporated into the MRDs and the product spec is just a beginning. As the product development process continues you'll need to communicate with your design team the status of conformance as it's just as important as any other attribute of the design. Test and verify conformance to the required standards early and often and emphasize to management and the rest of your team that you cannot launch the product until it meets all the required standards. Penalties for not doing so are more onerous than ever before. Realize that if you can quantify these penalties, that may also help you to communicate the ROI of your compliance efforts.

As the authors of the EMC + SIPI paper[2] explain, establishing good communications with other team members is crucial in conveying regulatory requirements. Establishing a dialogue to define the needed standards and communicating them on a routine basis during the full course of the product development process is critical to a

successful NPI. I have seen too many cases where the requirements "can" gets kicked down the road for the sake of product expediency or engineering is over-ruled by a "driver" type A personality somewhere in the organization. This is often someone on the business side trying to meet their metrics only to discover later they cannot launch the product on-time due to non-conformance. Then delays and expenses mount.

Ultimately, you should know going into the final compliance tests that you are going to pass based on the pre-compliance work that has been done all during product development for safety, EMI-EMC and materials–environmental global compliance. Missing a new product launch window is a big price to pay for not paying attention to the three areas of product safety and compliance that permit your product to be shipped anywhere in the world.

I would recommend that you review the paper by Rotter and Meyerhoff as well as the rest of the papers and presentations from the IEEE EMC+SIPI 2019 conference. These materials are available for free to IEEE EMC society members[4]. If you are not already a member, you can join and instantly have access to all the papers.[5] If you have any problems accessing the papers, contact John Rohrbaugh.[6]

While EMC may not be your main focus, if you are working in power electronics, EMC requirements are for the most part unavoidable. Finding practical, timely information on EMC requirements and how to meet them is not trivial. Whatever problems you're encountering in addressing your EMC needs, chances are the EMI and EMC experts who participate in the IEEE EMC + SIPI conference have faced these issues before and are dealing with any new challenges that are coming along. Consequently, the EMC + SIPI proceedings are a great source of useful information for those in the power electronics field.

References

1. IEEE EMC + SIPI 2019 conference.
2. "Effectively Communicating the EMC Message in Design Teams" by Sanford Rotter and Jerry Meyerhoff, IEEE EMC + SIPI 2019, available online to IEEE EMC society members.
3. Sunpower Electronics.
4. IEEE EMC+SIPI Conference proceedings.
5. IEEE memberships and subscriptions catalog.
6. John Rohrbaugh, publications chair for EMC + SIPI 2019.

About The Authors

Kevin Parmenter is an IEEE Senior Member and has over 20 years of experience in the electronics and semiconductor industry. Kevin is currently director of Field Applications Engineering North America for Taiwan Semiconductor. Previously he was vice president of applications engineering in the U.S.A. for Excelsys, an Advanced Energy company; director of Advanced Technical Marketing for Digital Power Products at Exar; and led global product applications engineering and new product definition for Freescale Semiconductors AMPD - Analog, Mixed Signal and Power Division.

Prior to that, Kevin worked for Fairchild Semiconductor in the Americas as senior director of field applications engineering and held various technical and management positions with increasing responsibility at ON Semiconductor and in the Motorola Semiconductor Products Sector. Kevin also led an applications engineering team for the start-up Primarion.

Kevin serves on he board of directors of the PSMA (Power Sources Manufacturers Association) and was the general chair of APEC 2009 (the IEEE Applied Power Electronics Conference.) Kevin has also had design engineering experience in the medical electronics and military electronics fields. He holds a BSEE and BS in Business Administration, is a member of the IEEE, and holds an Amateur Extra class FCC license (call sign KG5Q) as well as an FCC Commercial Radiotelephone License.

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For many years, he worked as a field applications engineer (FAE) for Motorola Semiconductor, On Semiconductor, Cirrus Logic, and Active Semiconductor, assisting customers in using semiconductors. He published numerous application notes and conference papers at a variety of conferences: APEC, ECCE, IAS, and PCIM. Topics included power factor correction, lighting, and automotive applications. As an FAE, he traveled internationally giving switch-mode power supply seminars in Australia, Hong Kong, Taiwan, Korea, Japan, Mexico, and Canada.

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For further reading on power supply-related safety and compliance issues, see How2Power's special section on Power Supply Safety and Compliance.