Where will your design live?

Ron Moore, Director, Field Technical Programs, Avnet Electronics Marketing Americas

Industrial applications cover a broad range of solution types. Depending on whom you ask, the industrial market segment can include military, scientific and commercial solutions. Though these segments run across a broad spectrum, there are some common themes that a design team must confront regardless of which area their particular application is focused on. One of the key areas is the environment.

When you think of “industrial” what type of environment comes to mind? Is it noisy vibrating factory floor, an exposed pole top in the dead of winter, a desk in an office, in an aircraft at 30,000 feet above ground -- or even several miles above the Earth? Each of these environments has notable challenges, from vibration to temperature variation and atmospheric pressure. It would be relatively easy to simply design the most rugged device imaginable, at the tradeoff of significant cost. That of course isn’t practical. They key is how can a designer can account for the effects of the environment on the design with the full knowledge they won’t (typically) be responsible for the installation or routine care of the application.

Many years ago as an FAE, I called on a company that made heads-up displays for helmets in attack helicopters. In my naiveté, I had discussions with the design team on using industrial-grade temperature devices in the design. One of the team members politely pointed out that should the temperatures reach the industrial range for the interior of the helmet, the pilot would be, well, deceased. Obviously they had more than a surface-level understanding (as I did) of where and how their design was going to be used. The limits were not in the silicon of the chips or the metal and plastic of the helmet, but in the human pilot. Designing the most effective system within those limits (with effective guard band of course) was their objective.

There will always be mitigating or exacerbating environmental factors that can affect design decisions. Some obvious ones (like the temperature envelope), and some not-so-obvious ones (like the limits of the human body) that help strike the

balance between ruggedness and cost – need to be accounted for. In an office environment, perhaps this isn't issue. In a factory setting, perhaps only parts of the design are exposed to vibrations. If SEU (single event upset) is a concern, can the software be designed to detect and correct those events which could help in the design of the shielding and thus improve reliability? Where practical, taking the time to experience and the environment that the system will live in can yield insights that don't exist in the specification.

Taking the time to understand not only the project they need to deliver, but the world in which it will ultimately operate, will deliver premiere results that effectively balance function, reliability, and cost.