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Application Understanding Impacts Cost of Interconnect Solutions

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By Michael Giesler, Application Specialist, 3M | Monday, August 15, 2011



Every day, consumers embrace multiple levels of interconnecting in our activities without thinking about it. Whether it is waking up to an alarm clock, turning on the lights, placing a call on your cell phone, operating your automobile, accessing data on your computer from the cloud, watching TV, or playing a video game, various [interconnect](#) solutions are involved to enable the functionality we come to expect from these devices.

Understanding Interconnect Applications, and Requirements Help Determine Appropriate Specifications

Whether the interconnect is a standard off-the-shelf or a custom component, understanding its application and requirements are essential to establishing the appropriate specifications for the end product. The final product should also meet customer expectations regarding performance, quality and reliability – all with the appropriate cost structure.

Typical interconnect applications vary from micro-interconnecting of integrated circuits to a substrate for [LED lighting](#) and semiconductors, to cabling and cable assemblies that connect data, audio and video components to PCs and servers. The functionality and requirements of the interconnect type varies from application to application to achieve the appropriate and expected reliable operation of the device.

The specifications for the interconnect must be driven by its application and intended end-use where operational environments, industry standards, building codes, regulatory agencies, and government agencies may have an impact. To achieve the most cost-effective solution, it is important to leverage the appropriate specifications from a purchasing perspective; while as a supplier, it is important to design the interconnect to meet the requirements without significantly

exceeding them.

For example, an automotive interconnect for under-the-hood applications needs to meet application-specific requirements relative to chemical and heat resistance. For this particular application, a special plastic resin would be required, and sealing the interconnect may also be involved. These requirements are typically not needed for applications like a consumer-based computer or television. Exceeding the requirements for an application may introduce unnecessary additional cost.

In addition to the functionality of the interconnect component, it is important that there is a clear understanding of how the product should be delivered to its manufacturer. Issues including moisture sensitivity, electrostatic discharge (which can be an “unseen” killer of a component), and expected handling and assembly of the component must be taken into account to help ensure that the offering meets various industry requirements while maintaining its functionality throughout the assembly process.



Barriers to Successful Interconnect Implementation

The importance of aligning the specifications on an interconnect with the intended use or functionality may seem obvious, but there are many instances where the specifications are not in line with the intended application space. This may cause the product not to work as expected or exceed cost targets if the interconnect component is over-designed.

Another dynamic associated with interconnect requirements comes from specifications and standards, some established decades ago to address a specific issue that may no longer be relevant, creating a barrier-to-entry for new innovative interconnects.

For example, plating technology has changed during the past 50 years. Today’s gold plating can be manufactured to be less porous versus the 1960s. If a specification is based on plating thickness only and does not take into account the performance and reliability of thinner gold plating or even newly developed alternatives to gold plating, then the specification may be driving to an unnecessarily higher cost solution. There are also some regulatory requirements in place today that do not take into account the miniaturization of components and the physic-based impossibility of meeting such a requirement.

Appropriate and Applicable Specifications Lead to Optimal Cost of the Interconnect Solution

One of the keys to achieving the optimal cost target is to establish the appropriate specifications to meet the expected application-specific performance of the interconnect. This requires taking into account the numerous stakeholders that have an impact or influence on these specifications. This includes industry organizations like UL, Mil-Specs, IEC, IEEE, ISO, ANSI, ASTM, Building Codes, SAE, IPC, CSA, NEMA, JEDEC, along with government mandates and customer-specific requirements per the design engineer and purchasing.

The key to having the appropriate specifications in place per the intended application with the optimal cost structure is to have:

- A clear understanding of the application-specific requirements necessary to meet the customer expectations relative to performance, quality, and reliability.
- The willingness of the industry standard committees and regulatory agencies to embrace change or modifications to existing standards/requirements based on current suppliers' capabilities and specific offerings along with the current realities of the market environment.

Ultimately, to get to a win-win relative to the appropriate specifications for an interconnect, it will require that the purchasing company, along with the influencing industry, government and regulatory agencies, clearly understands the suppliers' capabilities and offerings and to work openly to implement the appropriate modifications and changes necessary to achieve the optimal cost structure-based specification.

The appropriate specification for the intended application will help to achieve the optimal cost structure while meeting the expected performance, quality and reliability of the customer.

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