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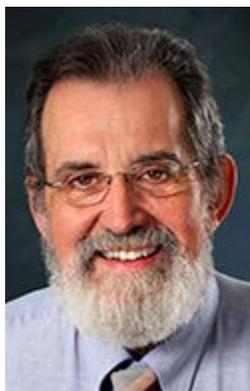
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# Top 5 common mistakes to avoid in power electronics design

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by Tom Colella, Electrocube

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With more than 50 years in the electronics industry, we thought it would be helpful to assemble a *top five* list of the most common mistakes that occur during the design of power electronics systems. This information comes from our observations and yes, some of our own experiences, to assist you in better meeting your customers' expectations and design project requirements. The list is in no particular order.

### Verify assumptions

In order for any design to get underway, assumptions must be made. Often, these assumptions are based upon accepted common knowledge or specific expertise and usually prove out to be correct. However, relying on assumptions

made on partial knowledge or information is a common error. Early in a project, the task of verifying the validity of the assumptions with specialists in that specific area of design must occur. As a group, engineers often think that others expect them to know it all and even pride themselves on their vast technical knowledge. Avoid a common trap. Acknowledge when a little assistance is needed to validate assumptions. If not, it's like telling your doctor what you think s/he wants to hear.

### **Keep design options open**

We all like to be creative, innovative and recognized for our ideas. However, avoid getting so locked into a design that fulfillment of the original concept takes precedent over successfully meeting the customer requirements. If discoveries occur, be willing to change the design to adapt. Recognize it early and adapt quickly. The goal is to produce the best product for the job and win the order – and more business. Design and create the right product to meet the need.

### **Balance quality with lowest justifiable cost**

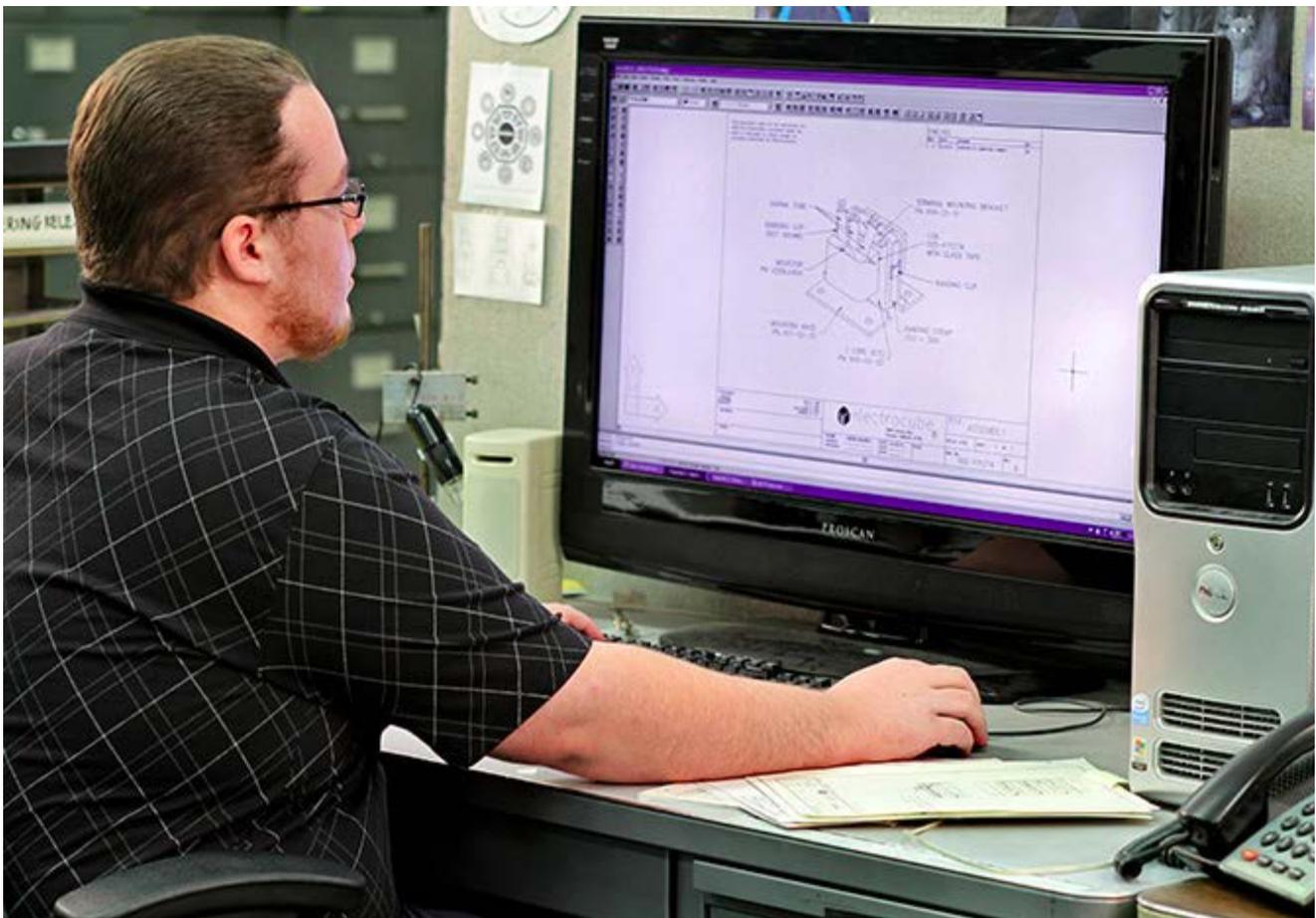
Design engineers are under pressure to control or cut costs. We strive for efficient and cost effective designs, but falling to the temptation to cut beyond the point of good design practices is a mistake. *Penny wise and pound foolish*, comes to mind. Some of the great engineering disasters have occurred because of this mistake. It only takes one weak link in a design to cause a cascade failure of a system. The trick is to determine where costs can be cut without sacrificing the critical –

plus safety margin – quality threshold. Careful examination and collaboration with available technical resources during the design, development and testing phases will result in the most reliable product at the lowest justifiable cost. It is always more costly to rework or replace returned product than designing it right the first time.



### **Fast-track design with consolidated project management**

Today, design projects are fast-tracked. But, that does not mean all project tasks are rushed. It means the same thoughtful, competent effort is applied to each task. However, multiple tasks take place simultaneously. The interdependence of tasks is rearranged and overlapped to shorten the project completion time. This requires proper fast-track project management and monitoring techniques. Under fast-track conditions, mistakes or errors, if not identified and corrected immediately, can spiral out of control in a matter of hours, jeopardizing the entire project. The usual protocol of reporting by exception during the next scheduled project meeting is often *too little too late*. Proper fast-track project management includes a system that mandates immediate and centralized reporting of all milestones reached and problems encountered. The window of opportunity to fix a problem before it creates other, more severe problems is very small. Only near instant awareness by the project manager can avoid disaster. This is the reason the project manager must have access to the current status of all tasks to keep all phases and aspects at a balanced rate.



### **Partner with suppliers**

This is akin to verifying assumptions. To choose a component, without consultation with the manufacturer's technical staff or to move forward with partial performance specifications just to find out later that it will not work as assumed, is an all too common mistake. A component's capability, size, temperature tolerance and/or reliability may often be incomplete or overlooked. In addition, the component's assembly and operating conditions often changes, more so than originally assumed. If

the component has no safety margin, it can fail. Working with the component suppliers early in the design process will assure awareness of the latest available specifications and technology, as well as the best component choice available for the application. The help is free. Why not use it early and often?