Brainstorm: New Product Development

What is the primary consideration when developing a new product?

Keith Teichmann, ITT Interconnect Solutions, www.ittcannon.com [1]

Several fundamental questions are paramount when developing a new product, whether it be for a broad range of applications or a niche market. One such question is what new product or technology will potentially obsolete or replace an existing solution and open a new market? For example, with the development and widespread adoption of WiFi, the requirements for RJ45 connectors in network and infrastructure applications are being impacted.

Yet another new product consideration involves the innovations surrounding manufacturability. This places greater demand on material science. For instance, single crystal turbine blades in jet engines and their associated annealing processes have driven increased longevity in gas turbine components. As such, we are developing connectors under similar assumptions with more exotic materials, such as chromel, alumel, inconel, tellurium, and composites for thermal coupling through a contact system. These materials provide greater life and are capable of higher mating and unmating cycles.

Finally, are there new (or even existing) standards that call for connectors that meet the designated specifications? MIL, ESA, and DIN are just a few of the governing standards for the military, aerospace, and railway markets, respectively, and we are constantly developing new and unique connector technologies to suit these requirements. Better yet, what shifts in technology will drive new standards, as yet unrealized in our targeted markets?

The trick for all of these questions is anticipating these changes and pre-positioning innovative products to capitalize on these shifts.

Peter Jeffery, CoActive Technologies KDM, www.coactive-tech.com [2]

The primary consideration when developing a new product in the handheld/portable electronics market is to design a solution that can be developed into a scalable, high volume mass production from the outset. This typically requires a great deal of advanced work with the customer’s design engineering department, exchanging ideas for the product’s cost targets and specifications, and the ability to develop rapid prototypes as the customer’s design cycle is ramping up. For continuing customers, this often involves adapting an existing product to meet a new application, or enhancing a particular specification (size, luminance, current rating, etc).

Developing a product capable of being scaled for high volume production leads to a device that features reliable performance for the consumer, while at the same time offering robust, reliable integration throughout the entire supply chain. In the case of light guide foils, for example, scalable, high volume mass production leads to an increased number of benefits for the customer, including brighter, more even illumination of the keypad. Efficient illumination is also a primary concern in the reduction of component count, maximizing battery life and reducing the overall cost of the consumer device, which is critical in the consumer marketplace. The focus on robust integration also reduces the 'total time to market' for the device, yet another critical factor in today's competitive consumer electronics market.


John Knight, Knight Electronics, www.knightonline.com [3]

The primary consideration when developing a new product is financial sensibility. To many product designers, this is one of the last things they consider, but in every case of successful design for us — at the contract manufacturing and cooling and thermal management levels — we have identified a problem(s) to solve, a need or a potential need, and then recognized the market available to us for the specific solution. We then consider many alternatives to the new design that would potentially provide advantageous and/or disadvantageous results, as well as cost comparison to solve the particular problem or need.

For example, is our solution a novel one? Meaning, is there anything else available like it or can anyone else copy it quickly? Similarly, is it an application that demands a viable second source, therefore not protecting us as the sole solution provider? Finally, do logistics factor into the overall feasibility of the design project, thus impacting financial sensibility?

Then and only then can the second step of product design work start, with the primary overarching consideration being cost versus benefit to ensure that the product is a viable and marketable solution. Assuming that this financial litmus test is passed, functional design can begin.

**Paul Nickelsberg, Orchid Technologies, www.orchid-tech.com** [4]

Our main concern when designing new products is design elegance. By design elegance I mean the achievement of the most economical and effective electronics design possible. Achieving design elegance is working toward implementation simplicity while still meeting the technical objectives of the product requirements. An old friend once put it this way - I strive to take the tension our of my designs.

By this he meant, that in every design there are areas which as a designer one knows did not come out so well, or seem to complex, or appear error prone, or may simply just meet specification. Taking the 'tension' out of a design means to constantly look over the design for areas that are unsatisfactory and correct them. Simplify them. All the while being aware of the part's relationship to the whole.

If one is constantly working toward elegance and taking the tension out of the design, then one arrives at creative, well reasoned, lasting solutions.

**Ron Demcko, AVX, www.avx.com** [5]

The goal is to supply the highest quality device in terms of reliability and performance parameters with considerations to size and weight.

A key to achieving these requirements is understanding dielectric and electrode losses within a technology and creating a new product from it. The design and development methods employed to obtain low loss, high reliable components for low power battery circuitry and large-scale power differ greatly.

In regards to low power battery circuitry, design efforts here actually have two main product goals.

Large value capacitors that can be utilized in parallel with batteries to provide peak power demand to the circuit load. In doing this, battery life between charges can be extended as well as the number of charge cycles increased. Common products in this area are double layer capacitors/supercapacitors or tantalum capacitors. In either material system solution the objective is to maximize the capacitance, minimize leakage current and ESR, and minimize the case size as much as possible. High reliability is obtained through ultra pure material systems, conservative design rules and tight process control.

Ultra low loss passives are the other main product goal. An example of low loss passive components in the RF world is that of high Q dielectrics that can be used in very efficient RF designs (thereby potentially reducing the number of stages used in a design). Another might be a high directivity low loss coupler used to measure output power and reduce power to optimize battery life. In both cases the development of high quality thin film dielectrics and metallization was required.

Two very relevant examples of low loss components developed and still evolving rapidly would be transient voltage suppressors made in a multilayer varistor (MLV) structure and Niobium Oxide capacitors. In both cases, a new component technology was created by the introduction of new material systems and manufacturing processes. MLVs have evolved into ultra low loss bi-directional voltage suppressors that act as EMI filters in their off state. More importantly, off state leakage can be driven into the sub nano amp region.

Niobium Oxide capacitors are an example of what a new material system might offer from a reliability point of view. This technology commonly offers a unique high resistance failure mode, which will still allow circuitry to function, even if a niobium oxide capacitor were inadvertently driven into failure.

In energy conversion and high power capacitors, reliability and performance concerns are exponentially magnified by the potential catastrophic consequences of a 3kv SMT capacitor shorting or as 940uf / 6kv capacitor blowing. Unique development efforts in both areas have eased designers concerns. The introduction of a conductive epoxy layer beneath the final tin termination on high voltage capacitors has resulted in the elimination of virtually all board flexure failures.

In the case of high voltage/high value power film capacitors research into internal fuse technology has created a high power capacitor that does not short – its failure mode is a gradual minimal drop in capacitance.

Passive component reliability and performance are keeping up with the requirements in the fast paced design world. New material systems and processes are constantly being brought on line to address designer’s next generation needs.

Links:
[1] http://www.ittcannon.com/
[2] http://www.coactive-tech.com/
[3] http://www.knightonline.com/
[4] http://www.orchid-tech.com/
[5] http://www.avx.com/