10 Ways to Reduce Time in Product Development

As markets gain momentum, the biggest challenge for many original equipment manufacturer (OEM) design teams is meeting tight product development timelines with smaller internal teams.

So, how can product development teams reduce time even when internal resources have been cut? Here are 10 areas on which to focus:

Tip #1 – Use Open Source Designs as Problem-Solving Tool

Integrating open source hardware or manufacturer's reference designs are great tools for cutting design steps. However, some reference designs can be incredibly complex and may compromise the uniqueness of your original design. Instead of incorporating the entire design, use it as a roadmap for identifying best practices to solve issues that may be present in your design. Look for areas likely to cause issues such as thermal or noise concerns. For example, does the design offer a good solution for BGA escape routing or better options for dealing with high frequency routing concerns?

Tip #2 – Look for Highly Integrated Chips

More and more chips that combine multiple functions are arriving. For example the TWL4030 power management chip, from Texas Instruments, has power functions as well as stereo audio in/out, power on reset and a few other features relevant to complex systems. If you're designing with FPGAs and need an MCU, take a look at the soft MCUs that can be configured into the FPGA to reduce parts count and layout time. For ZigBee, Bluetooth and other wireless protocols, consider modules instead of individual components. Doing so can not only reduce layout time but can significantly reduce complex RF debugging. Fewer chips also mean lower assembly costs and with fewer discrete parts troubleshooting should be easier.

Tip #3 – Look for Processor Families vs. Processors

Many vendors provide multiple options of a single microcontroller or FPGA. Selecting a chip with a range of pin compatible product family options above your desired level of product functionality opens the door to alternate choices should lead-times on your preferred component stretch out. An example of this is: the microchip PIC16F876A, PIC18F2320 and PIC18F2321 have six total variants that are pin compatible other than a few exceptions in peripherals. The NXP ARM LPC1100 family has a number of pin and code compatible packages that can be swapped given supply issues.

Pin-for-pin compatibility has some great advantages: a design can easily upgrade from one processor to another in the family without any hardware changes reducing hardware development time. Additionally, a "common platform" can be used such that the same board is being used across multiple designs which will increase driver/software re-use.

Tip #4 – Stick with the Next Generation

No, this tip doesn't involve a weekend watching Star Trek reruns. Stick with the next generation version of components you are familiar with. New generations of support chips may have greater levels of integration, are smaller and may have fewer external discrete support components required. This reduces the amount of time in layout, test and debug, freeing your team for weekend SyFy channel marathons. Plus, it helps support component commonality and next gen parts are more likely to be around throughout the lifetime of your design which improves the morale of your Purchasing and Finance personnel.

Tip #5 – Consider Pre-Designed Modules

If you are designing a product that incorporates technology your team has not previously designed, consider using a pre-designed module. For example, there are a number of pre-designed modules that add GPS or wi-fi functionality. Taking it to the next step and adding pre-assembled modules saves even more time. The use of pre-assembled modules can allow for the addition of functionality even if your team doesn't have the design expertise, as is often the case with RF functionality.

Tip #6 – Fill Technical Resource Gaps on Your Engineering Team

A good prototyping partner can be an extension of your technical team. When filling gaps, consider your team's technical weaknesses compared with supplier capabilities. Is on-call component engineering or DfM support an option? For example, having access to experience dealing with very small componentry and next generation advanced packages can be the difference between a week-long migraine headache vs. a prototype that works. Good prototype houses see a far greater range of technical challenges than your team will likely see. Leveraging this shared expertise can cut your product development time and cost.

Tip #7 – Align Your Documentation with Your Supplier's Preferred Formatting

While there are a number of good systems out there that can "translate" your electronic files to desired outputs at the production house, the garbage in, garbage out rule still applies. Gaps in information take time to identify and correct. The most common documentation issues are incomplete bill of materials (BOM) part numbers and incorrect or ambiguous orientation of polarized parts. It's not uncommon for a BOM to represent rev 1.1a of a design while the PCB is for rev 1.1b. Take the time to ensure that all last minute changes are incorporated. Understanding your supplier's preferred documentation structure and content eliminates days of non-value-added follow-up activity.

Tip #8 – Look for Good DFM/DFT Expertise

Your prototype supplier should be able to provide design for manufacturability/testability (DFM/DFT) guidelines or a helpline to assist with component footprints not in your CAD library, best layout options for odd form components or other resources that can be tapped to speed your internal layout efforts. For example, PCB fabricator Sunstone Circuits offers PCB123, a schematic and pc board layout CAD

system that has built-in design rules. PCB123 has an extensive library for NXP components which can save significant time early on in the layout process.

Tip #9 – Ask for Ideas

The days of prototype suppliers simply building boards are long gone. Part of the service at most good prototype houses is helping organize and rationalize the product development process. Don't be afraid to ask your prototype supplier for ways you can work with them more efficiently. Tap their engineers for ideas on better layout or component selection. Just as you would have involved an in-house manufacturing department early in the design review process, don't wait until you have the board design complete and parts selected to start the prototype assembly process when using outside service providers.

Look for free resources, as well. Blogs such as the Screaming Circuits blog, white papers, articles and design guidelines are just a few of the resources out there to help your team avoid making time-consuming costly mistakes. Check your prototype suppliers' websites to see what free resources are offered in this area. Join open source communities and read, listen and contribute.

Tip #10 – Listen to Advice

Good prototype houses don't want to make money on your inefficiencies. If they identify ways you can save money and time by changing your process, take their advice. Our white paper, *The Top 10 Issues that Cause Bad Prototypes* is one way we help educate our customer base. We also offer specific recommendations when we see issues developing in individual projects. While changing your process may seem like added work you don't have time for, setting up a robust partnering process with your key prototype suppliers will reduce both your workload and product development time.

The Screaming Circuits blog http://blog.screamingcircuits.com/ regularly discusses the issues listed here in greater detail. Feel free to visit and learn more.

Screaming Circuits (www.screamingcircuits.com) is an industry pioneer in the online quick-turn prototype pc board assembly market. Located in Canby, OR, the company offers assembly, prototype and short-run production pc boards in as little as 24 hours for short runs with such advanced technology as 0201 passives, QFNs, micro BGAs, package-on-package and flex assembly. Screaming Circuits is a subsidiary of the Milwaukee Electronics Corporation, which also offers full service contract manufacturing through facilities in Wisconsin, Oregon and Mexico, and design services through its subsidiary, MEC Innovation.