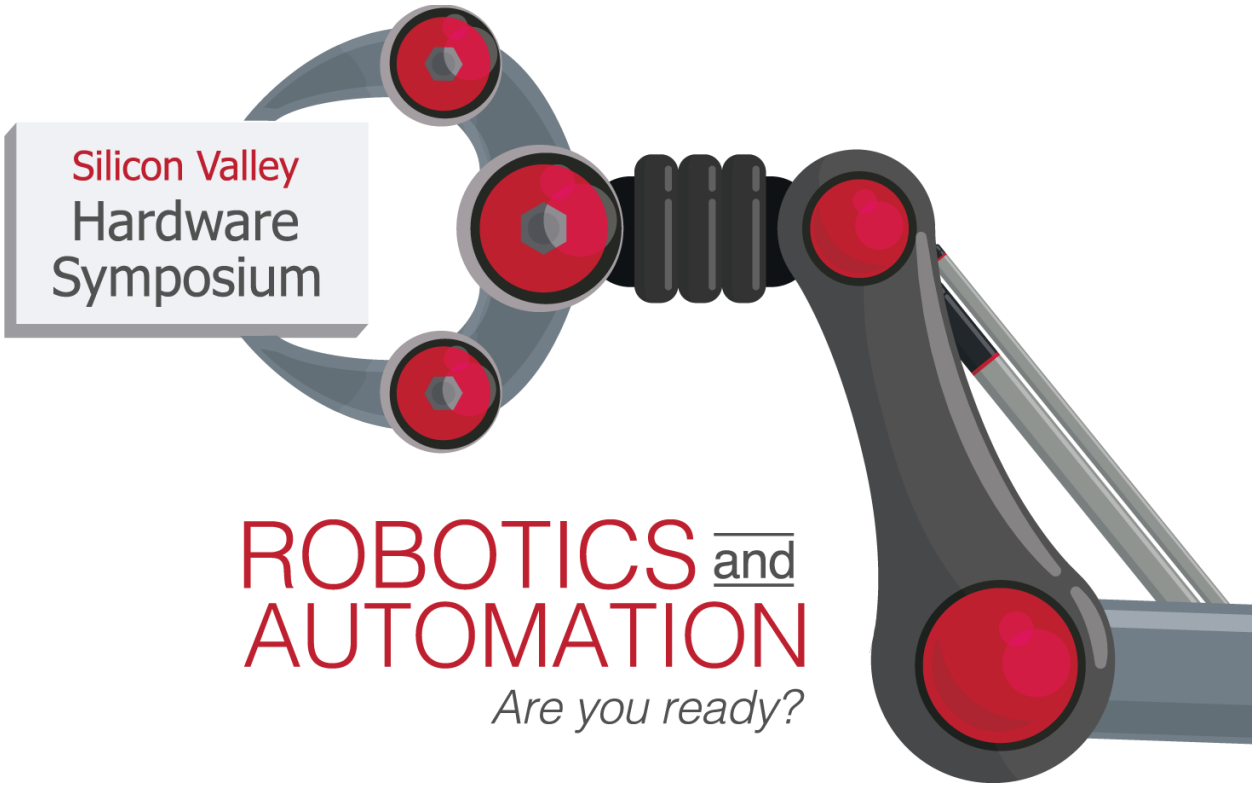
Expert Tips from the 2018 Silicon Valley Hardware Symposium

Part 2



Expert Tips from the 2018 Silicon Valley Hardware Symposium

Part 2

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About Product Realization Group (PRG)

Product Realization Group is an electronic hardware focused project management firm based in Silicon Valley. Our consortium of seasoned experts can help seamlessly transition your electronic hardware product from concept to scale. We pride ourselves on being your go-to source for prototype design and build, operations and manufacturing insights, and marketing consulting. Visit us at: www.ProductREALIZATIONGroup.com

About the Silicon Valley Hardware Symposium

The SV Hardware Symposium is an annual summit that brings together the best of Silicon Valley's professionals dedicated to the creation of hardware products. Professionals from the areas of product development, user experience, sourcing, engineering, testing, sourcing, manufacturing, and supply chain management come together to keep their fingers on the pulse of the industry, hear from keynote leaders and panelists, and preview breakthrough new products.

The "5 Tips" Series is a collection of accessible wisdom created from subject matter experts at the recent SV Hardware Symposium. The decades of knowledge, lessons learned, pain experienced, and success achieved from experts are being shared here.

5 tips for Rapid Prototyping

Brought to you by: Fictiv www.fictiv.com

TIP #1: Know your design intent

There is a plethora of materials and processes you can use in prototyping. Take the time to understand the benefits and drawbacks to get parts that will meet your requirements, whether functional or cosmetic. Find a prototyping house that has many options, and ask them what they recommend. Technologies are always changing, and they should know the best solution for your near-term needs.

TIP #2: Partner with your suppliers early on in the design process

The design for manufacturing (DFM) feedback you receive on part geometries helps in keeping the costs of printing or machining low. Incorporate this feedback to help keep your project within budget for prototyping and beyond. Suppliers can help you not only in the short term for prototyping but in the long term for scaled manufacturing. Design your product with both in mind so that any edits that need to be done between prototyping and production are minimal and quick to accomplish. This saves both money and time.

TIP #3 : Have the long-lead and complex parts designed earlier

Risks of your project or program running overtime can be mitigated if your suppliers can start producing these parts first, in time for assemblies. It often helps to make a pareto chart of the longest lead items and focus your activities around their initial procurement, even if the design is not completely mature at that point. There is some risk that you order parts that are not optimal, but the risk is minimal if you have good specs available.

TIP #4: Tour your rapid prototyping shops

It is very difficult to keep up with the ever-changing rapid prototyping technologies out there. For example, there are machines that do both printing and machining within the same system. These types of machines may make an entirely new class of prototype available to you in a rapid and accurate way. Shops are often very willing to share their technology solutions with prospective customers.

TIP #5: Hardware is hard! It'll take several iterations to get the right product.

Evolutionary improvements can now happen very quickly with RP. Daily or weekly prints that can confirm design direction OR cause you to deviate are extremely valuable. Pursue knowledge and don't be afraid to fail in the early stages of development.

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5 tips for Mechanical Fabrication

Brought to you by: MegaRoller, Kevin Kingston - www.megaroller.com

TIP #1: Know Your Files

When quoting or building a new plastic or sheet metal project know your CAD files well. Making changes to tooling and/or parts should never be your plan A or B. Check and recheck your details.

TIP #2: Consider the Details

Developing drawings with all the details will make life easier as your project progresses. On the injection molding side we look for the obvious things like texture specs, material, color, and the like. Examples of the common details that clients miss do not specify include areas that should be polished, an insert map or callout, pad printing or silk screening artwork, or location and tight tolerance areas.

TIP #3 : Don't Start Until You Are Ready

Sounds easy, but, in today's world everyone wants to kick off their project even if all details aren't worked out. Take the time to step back and do that last rapid prototype before you pull the trigger on tooling. For sheet metal enclosures/components, try to make a couple of test units first and save the decorated/painted units for a second run. If you need a painted unit for demonstrations or show, communicate to your investor or demo audience that the unit s=is an appearance model or working model and save the production for later. If you absolutely want to order production units before you are 100% ready, order them, but ask for an unpainted/coated first article to check your geometry before moving forward with the balance.

TIP #4: Consider All Options When Decorating Your Product

In today's world there are many options for the decoration of a new project. Work with your designer to explore your branding options, and pick the one that will work now and for the future. For both plastics and sheet metal, consider the standards such as silk screening, pad printing and laser engraving. Labels, name plates, membranes and overlays are also options when you want your project to speak for itself.

TIP #5: Plan Your Packaging Scheme Early

As you design and build your project plan the packaging and protection scheme far in advance. Although the packaging industry is considered quick turn, every product from consumer to industrial has special requirements that need to be addressed. Start gathering your requirements early and know the facts so you can pass along all information needed to your packaging partner. For industrial projects consider overall weight, geographical shipping locations, special shipping fixture requirements, drop tests and handling requirements, just to mention a few. For consumers, consider your pop development, retail packaging, sub cartons, master cartons, warning labels and more.

5 tips for PCB Fabrication

Brought to you by: Royal Circuit Solutions, (831) 636-7789, www.RoyalCircuits.com

TIP #1: Understand cost drivers of PCB fabrication and assembly

Some of the biggest drivers of cost in circuit board manufacturing are **complexity** (number of layers, buried & blind vias, minimum hole and trace widths), **turn-time**, and **quantity** (panel utilization)

TIP #2: Choose components with procurement cost, assembly cost, and rework ability in mind

Generally thru-hole components are significantly more expensive to place due to the manual labor required to place and solder these parts on to the board. Choose majority surface-mount components, and pick sizes that you as the engineer are able to rework yourself down the road. This saves you a lot of time and money overall.

TIP #3 : Understand your manufacturer's standard build specification, and design within those whenever possible

Most manufacturers will have a set list of specifications from which no extra cost is incurred outside of quantity and turn-time (includes everything from minimum trace width, minimum hole diameter, max layer count, available substrates and surface finishes, etc.). Talk to your fabricator about these, and try and run them in your own CAD DFM-check prior to sending files in.

TIP #4: Run a DFM check with your manufacturer's capabilities in your own CAD package prior to sending in files.

Running a DFM check with your manufacturer's capabilities will save you a lot of time in up-front engineering manufacturability feedback that may take your manufacturer hours to days to review and get back to you -- often times something as simple as a hanging trace that had no physical impact on your design at all!

TIP #5: Take advantage of first articles whenever possible

Some manufacturers offer a first article service, a process in which only a few of your boards are assembled, fully or partially (for free!). This allows you to quickly get enough boards for your bring-up process, perform a sanity check and make minor changes (or halt production) like component changes, saving you time in rework and potentially bad or dead boards.

5 tips for Mechanical Development

Brought to you by: Fusion Design, Mark Brinkerhoff, www.fusiondesigninc.com

TIP #1: Concept quickly and prototype often!

Early on, get your ideas in sketch form and make crude prototypes that demonstrate your thoughts. Fail fast and often like Thomas Edison did. Learn fast.

TIP #2: Keep a record of your path to success.

As you evolve your design, save a digital copy of each step so that you can remember the process and the learning that it brings.

TIP #3 : Feedback, Feedback, Feedback

Start development with solid requirements using Marketing Requirements Documents (|MRD) and Product Requirements Documents (PRD). Make these living documents with revision control. Stay in line with the needs of the marketplace by gathering feedback from prospective customers for every major feature.

TIP #4: Do the hard stuff first

If there is a seriously challenging aspect in your design, pursue it's solution first. Doing the easy part first can be misleading in both budgeting and scheduling aspects.

TIP #5: Design with prototype, pilot production and volume production in mind.

Products that ultimately will be high runners, are often designed three times. The first time is for prototyping. The second time is for short runs. The third time is for volume production. Why not design with all three in mind? For example, divide the housing of a plastic product into the volume arrangement right away. Add details like draft and ribbing as the production volume increases.

5 tips for Microcontroller Design

Brought to you by: Microchip Bob Martin, Wizard or Make, www.microchip.com

TIP #1: Device scalability

This applies not only to memory sizes in pin compatible packages but over devices families in pin and code compatible packages. Most microcontroller vendors ship multiple memory loads with the same peripheral mix in the same package. Start with the largest memory size and then work your way down.

The same peripheral / memory selections should also be available in pin / package compatible devices offering higher speed or higher performance core.

TIP #2: Clock speed isn't everything

Some microcontrollers provide advanced peripherals that communicate and interact with each other without needing to get the processor core involved. These features not only make code size smaller but can really improve low power performance. Math intensive applications will benefit more from a 32 bit running slower that a 8 bit core running at full speed.

TIP #3 : Development environments

The microcontroller under consideration should have a rich choice of development tools both in IDE and hardware programming / debugging support. Active developer communities are invaluable sources of help and a good sign that the device family is active. A large selection of third party tools also suggests that developing with a certain device is covered from all angles. Open source development environments and low cost / free development tools from the microcontroller vendor also suggest that good developer support is available in the community at large.

TIP #4: IoT Security is not an afterthought

Anything connected to the cloud needs security, not only in the transport layer, but also in the application layer. Make sure that the microcontroller vendor has a well thought out solution for security implementation that's agnostic to the device.

TIP #5: Low power, datasheets and common sense

Low power numbers published in datasheets tend of course, to reflect optimal examples in use cases that never are practical. Independent benchmarks like EEMBC ULP Mark™ can provide a more realistic picture but low power designs are very application dependant. Make sure that the hardware design allows for proper isolation of the main system blocks to allow for more granular power measurements. Static power consumption measured by holding the microcontroller in reset is a good starting point

5 tips for Electrical/FW Development

Brought to you by: Voler Systems www.volersystems.com 408-412-9175

TIP #1: Communication, the Most Overlooked Aspect of Design

The biggest challenge with a design project is communication. To be successful, on time, and on budget, requires a lot of communication among the design team and with others outside the design team. The communication must start with a detailed set of requirements that take away any uncertainty about what is to be designed. It needs to continue with weekly meetings to review technical challenges, the schedule, and the budget.

TIP #2: Value Project Management

Project management is not valued as much as design in most of Silicon Valley, yet a good project manager will keep the project on schedule, on budget, and help make the resulting product easy to manufacture. The project manager's most important tool is communication.

TIP #3 : The Voice of the Customer in Design

When creating the requirements for a product, it is critical to get the voice of the customer. This usually comes from the marketing department in the form of Marketing Requirements. In a startup it may come from the CEO. It has to be someone who understands the pain of the customer that the product will address.

TIP #4: Firmware Requirements Are Hard to Write

Even software engineers often have trouble writing good firmware requirements. To do so you need to describe what the device will do. Describe it in terms of inputs, processing, and outputs. Include specifics like quantities and speeds. It is not important to describe the type of processor, for example, only what the processor will do.

TIP #5: Focus Early on Technical Risks

Focus early on the risky parts of your project. Identify the risks by reviewing the requirements and identifying what is hard to do. Resolve the risky things first. They may force you to make major changes that affect everything else. You may need to build prototypes to determine if you can achieve what you want. Sometimes a project is found to be impossible because the compromises required are not acceptable to the customers. Make sure you find this out before spending a lot of time and money.

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5 tips for FDA Compliance

Brought to you by: Springborne

TIP #1: Start early

Begin thinking about compliance on day one! It can save you a lot of extra work afterwards. Imagine if you were to do your bookkeeping only just before tax filings were due. You would end up paying a lot more and also possibly missing some key pieces of information. More importantly, your financial process may be completely out of control and you would not know. The same reasoning applies to compliance requirements that mandate your product development and operations to be controlled.

TIP #2: Take a life cycle view

Compliance is not an event; rather it is a process. If your product is regulated, bake compliance into all your development and operations.

TIP #3 : Stay lean

Try to establish compliance activities at a level appropriate to your business stage. Do not over-interpret the requirements. While the principles are common, compliance requirements are definitely not meant to be one-size-fits-all. Be particularly wary of adopting process documentation from other businesses.

TIP #4: Take a risk-based approach

User-risk considerations are a key factor in determining appropriate level of effort for compliance. It is critical that you understand all facets of user risks associated with your product and process. This will help establish a rationale for what gets controlled and the manner in which that happens.

TIP #5: Leverage compliance to create true business value

There is a rationale for every compliance requirement that is ultimately targeted towards creating better customer value. In designing a compliance process, try to understand the rationale, and always ask yourself how the requirements might be aligned with your desire to create customer value. Take an approach that clearly connects the dots to your business mission.