SMP Tech, Inc.

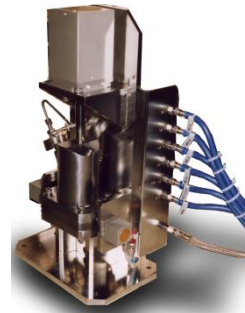**The Ten Steps of Product Development**

At SMP Technology our engineers, designers and manufacturing specialists help you take products through the ten steps of product development. Using techniques and procedures, we have developed to make development manageable, we guide you through Product Definition, Concept, Initial Development, Breadboards, Final Development, Detail Drawings, Prototype, Documentation, Preproduction and Product Introduction. Good design cannot be applied as an afterthought like a coat of paint for cosmetics. It has to be an integral part of the development. That is why SMP Technology defines each product by analyzing its technological requirement before starting to make illustrations or models.

Ten Steps of Product Development

1 Product Definition
2 Concept
3 Initial Development
4 Breadboard
5 Final Development
6 Detail Drawing
7 Prototype
8 Documentation
9 Preproduction
10 Product Introduction

No matter how well a proof of principle experiment functions, it is at least ten steps away from being a commercial product. These ten steps are called product development and they close the gap between the scientist who conceives the device and the salesman who must sell it at a price the market will bear. SMP Technology provides product development, services to start-up and fast growing companies and to established firms that need to supplement in-house capabilities. We have used the 10-step approach to develop medical and scientific laboratory instrumentation, production equipment, information systems, and consumer goods.

Step One: Product Definition

- Marketing analysis
- Preliminary product description
- Investigate patent position
- Preliminary manufacturing costs
- Preliminary development costs
- Generate conceptual drawings of models
- Define hardware and software needs
- Program cost justification
- Define technology requirements
- Evaluate competitive hardware

• 220 Vineyard Court, Suite 100 • Morgan Hill, CA 95037 •
• Phone: (408) 776.7776 • Fax: (408) 776.7772 • Email: design@smptech.com •

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Good design cannot be applied as an afterthought like a coat of paint for cosmetics. It has to be an integral part of the development. That is why SMP Technology defines each product by analyzing its technological requirement before starting to make illustrations or models. While we are still in this early stage, our development team checks out the competition and your patent position so you won't have any nasty surprises. We will give you accurate estimates of preliminary developmental and manufacturing costs, so you can plan realistically.

Step Two: Concept

- Illustrations, Industrial Design and renderings
- Preliminary layouts
- Preliminary logic diagrams
- Estimate software requirements
- Initial selection of OEM, CPU, etc.
- Conceptual models
- Preliminary theoretical calculations
- Establish design approach

Step Three: Initial Development

- Mechanical design layout
- Initial circuit design
- Initial software logic
- Theoretical design verification
- Human factors analysis
- FDA requirements
- Review code requirements (EMI, UL, CE, etc.)
- Preliminary selection of OEM parts
- Define breadboard requirements
- Define milestones and generate budget
- Illustrations, Industrial Design and renderings
- Preliminary layouts

The essence of good design is simplicity. As our engineers and designer prepare illusions and renderings, preliminary layouts and logic diagrams, conceptual models, as well as theoretical calculations their first concern is the consumer. How can the product be made easy to operate, maintain and repair? Our objective is to build a product that is safe and reliable. But, that is just the beginning. We design to minimize noise, vibration, odor and dirt. We also design a product that can be packed, shipped and stored without difficulty or damage.

Step Four: Breadboard

- Design breadboard
- Detail and specify components
- Build breadboard
- Define testing required

- Test breadboard
- Repeat test cycle as required
- Summarize results and update specifications

Step Five: Final Development

- Generate final product specifications
- Define budget milestones, labor loading, etc.
- Complete final layouts
- Complete final circuit design
- Start software
- Final OEM component selection
- Incorporate code requirements
- Electronics space allocation and packaging
- Estimate standard costs and manufacturing requirements

We have to start with the natural form of the machine and its working parts. Most of the time the appearance of the product is the realization of its natural form. In cooperation with your staff, our engineers and designers will rearrange or substitute components to produce a more efficient design. In reality, a functional design will normally improve appearance, reduce manufacturing costs and make the product easier to maintain.

Step Six: Detail Drawings

- Detail drawings
- Specification control drawings
- Schematics
- Complete software
- Assembly drawings
- Specifications and procedures
- Color schemes and graphics
- Verify standard costs
- Document OEM requirements
- Layout PCB's
- Generate artworks design and documentation check

Step Seven: Prototype

- Release documentation
- Design short run tooling
- Provide manufacturing with engineering liaison
- Update design layout and documentation
- Implement software
- Engineering debug of prototype
- Test prototype

Product development involves much more than shape and appearance. The development team must anticipate the problems that the production engineer will find as he manufactures the machine. How difficult is it for him to make a specially machined part and how much will it add to the cost? Can the design be adapted to use an off-the-shelf component? Will the original material cause problems because it is in short supply or hard to work with? Our concern for how the product will be built guides us as we develop the mechanical and electrical circuits and select components.

Step Eight: Documentation

- Final review of prototype and specifications
- Incorporate design changes
- Update software and hardware
- Update artworks
- Final documentation check
- Prepare assembly drawings
- Formalize assembly procedures
- Formal test procedures
- Meet FDA documentation requirements

Step Nine: Preproduction

- Start ECO controls
- Assemble systems
- Debug assemblies
- Test QC components, assemblies and systems

The good designer must also know when to stop. The product must offer more benefits than the competition in a form that the consumer finds comfortable and familiar. The critical point of the design, therefore, occurs when we provide the most advanced technology in its simplest form. We freeze the design at this point to ensure that we don't over engineer the product. Design freeze, however, is not the final step. SMP Technology builds and tests a prototype, incorporates changes in the documentation, prepares formal assembly and test procedures as well as starts the procurement cycles.

Step Ten: Product Introduction

- Conduct long-term testing
- Initiate component test programs
- Submissions to UL, CSA, VDE, CE, etc.
- Incorporate changes as required

By eliminating the need to commit resources for increased staff and facilities, which may never be required again, SMP Technology reduces the financial risks that are inherent in any new product venture. Our services have also proved useful to firms with in-house development capabilities during temporary overloads. To accommodate your company's situation, our technical and manufacturing support is available as to integrate a 10-step development program or individual services.