



A Review of the New Product Development Process

What Good Is Innovation If It Can't be Manufactured? By Gerard J. Lynch, P.E.

Introduction:

Many of you are technology professionals for global manufacturers in the filtration and separation industry. Others work for small firms looking to get new product to market. This review is offered to help us re-think a successful approach to New Product Development.

Historically, manufacturing in the United States has taken a leading role in product innovation and the development of new products. I am impressed with the endless creativity and conceptual development of our industry R&D groups. New concept development (NCD) and new product development (NPD) are essential to discovery and breakthrough products. Industry leaders use early discovery tools including: technology brainstorming, market trend brainstorming, Delphi interviews, Ideation (a concept of the product development and management association) and other secondary research tools. Their efforts have resulted in most of what we consider common practice products today. These technologies include: cartridge design, membrane technology, tangential separation, centrifugal separation, sedimentation, flotation, and other novel techniques.

Behind every patent for new separation technology is a difficult manufacturing challenge. In the non woven fiber market manufacturing techniques often spark the new filtration technology. Some of these are well documented. Standard cartridge technology launched from manufacturing techniques include: needle felt resin bonded, wet laid fibers, melt blown fibers, spun bonded fibers, ceramics and polymer extrusion technology, etc.. All of these were new manufacturing technologies and are now available as standard product. While the above is interesting, we must resist launching products

just because we can make them. Remember, for every successful product launched there are countless failures. Too often, manufacturers waste major resources and hundreds of thousands of dollars launching new products doomed to fail. Sometimes we spend more time getting something we can manufacture into our catalog than on making things the market needs.

In contrast, marketing driven companies might develop things to customer needs but may neglect to develop manufacturing techniques that allow them to achieve a market acceptable price. I see this often where developers do not define the manufacturing methods until 90% of the product has been defined. When this happens, we create tremendous challenges for our manufacturing engineers. This leads to rushed development and often, very costly manufacturing methods. In fact, many failed new products fail within the 1st year after launch because they could not meet the market price points.

In all of the above scenarios we must stay focused on meeting critical marketing launch dates. The real key to success is to find a balance between what we can make well (sometimes called our core competencies) and what the market really needs.

various locations pulled together by the goals and milestones of the product marketing team leader. These efforts typically follow a standard gate and milestone development cycle starting with Concept Development to Detail Design, Prototyping, Testing, and then to Production.

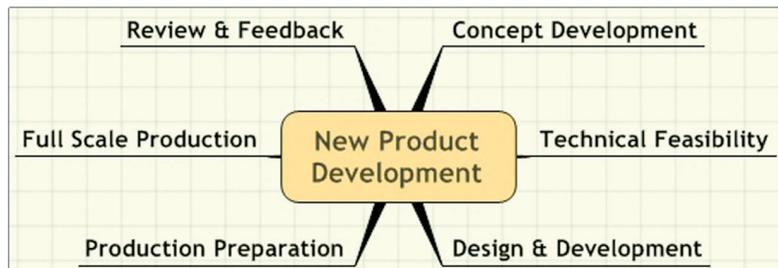
My firm's standard New Product Development review method is shown here:

1. CONCEPT DEVELOPMENT STAGE:

- MARKET RESEARCH
- CONCEPT DESCRIPTION
- PATENT DISCLOSURES
- TARGET SPECIFICATIONS
- TARGET COSTS
- FORECAST BY SIZE & MATERIAL
- MARKET SIZE – EXPECTED SHARE
- COMPARISON TO COMPETITION FEATURES, STRENGTH VS. WEAKNESS
- ID BARRIERS TO NEW MANUFACTURING TECHNIQUES
- ASSEMBLY REVIEW – KEY INSPECTION POINTS, TOOLING & FIXTURES

2. TECHNICAL FEASIBILITY STAGE:

- MARKETING PLAN
- R & D PLAN
- PRODUCTION DEVELOPMENT PLAN
- ID SAFETY ISSUES
- PRODUCTION FEASIBILITY
- PRELIMINARY PRODUCT DESIGN
- PRELIMINARY PRODUCT MANUFACTURING PROCESS
- COST ESTIMATE



New Product Development Control:

Much has been written on the subject of concurrent engineering. Specifically where global manufacturing, procurement and development teams work together in

- SCHEDULE
- MARKET FOCUS
- DEVELOP TEST PLAN
- DEVELOP PRODUCTION PLAN

3. DESIGN & DEVELOPMENT STAGE:

- ID CRITICAL MATERIALS
- ID CRITICAL PROCESSES
- PROOF OF PERFORMANCE
- DESCRIPTION OF ROUTINGS, MACHINES & MATERIALS
- COSTED BOM
- FLOW CHART ROUTING
- ASSEMBLY DRAWINGS
- DETAIL DESIGN DRAWINGS
- QA/QC TESTS
- OIM WARNING LABELS
- FINANCIAL REVIEW

4. PRODUCTION PREPARATION STAGE:

- LEAN MANUFACTURING REVIEW
- TESTING & VALIDATION
- SUPPLIER REVIEW
- QUALITY REVIEW
- COMPLETE FIRST PROTOTYPE
- TEST RELIABILITY
- INSPECTION DRAWINGS
- SPARE PARTS PLAN
- BOM RELEASE
- SALES DRAWINGS
- PROMOTIONS, BROCHURES, PRICE STRUCTURE
- REVIEW FINANCIAL
- CUSTOMER TEST SITES

5. FULL SCALE PRODUCTION:

- RELEASE ECN
- TRIAL RUN MANUFACTURING
- ROUTINGS
- MPS UPDATE
- STOCK TRANSFER
- APPROVAL OF FINAL PRODUCTION PLAN
- APPROVAL OF FINAL MARKETING PLAN

6. REVIEW – FEEDBACK:

- QUALITY REVIEW
- CUSTOMERS' COMMENTS
- DESIGN CHANGES, SHOP CHANGES, ECNS

In this new product development process, 90% of the cost of a product is fixed by the end of the design phase. By this time in the process the direct material, direct labor and product specific capital equipment costs are set in place whether we fully realize it or not. The ability to control costs is greatest during the concept development stage. Getting manufacturing and suppliers involved early is key to managing these costs.

Another issue to consider, especially in medium and small firms is how many new product programs we can reasonably expect to launch with the same team. In manufacturing we have various MRP and

ERP tools for capacity planning but not for new product development. Therefore, we rely on the project manager to keep a timeline schedule. Due to the time constraints placed on most managers the project timeline is usually not maintained in real time or robust enough to identify work overloads, especially where shared resources are used. It is smart to assign a project scheduler to these efforts to keep on top of commitments and increase our chance of hitting promised due dates.

Also, before committing to new product development projects, world class firms develop a simple but useful rating system. Often it is based on a risk corrected net present value potential. In other words, take the 5 year projections of several project possibilities and assign a risk factor to each. This risk factor tries to quantify our expected chances for success.

By the time we get to this point in the process, we have reviewed many scenarios and financial projections but in the end we still need a leap of faith to get started.

Designing For Manufacturing and the Achievement of Target Costs:

Finally the development team gets its marching orders and starts on a product program. The marketing leader prioritizes the customer requirements and gives the team target costs. That is, what direct material and direct labor costs must our new product meet in order to be profitable? The design team now begins to develop strategies and methods of design for manufacturability within the target cost budget.

While reviewing the customer benefits and features developed by marketing, remember that not all customer requirements are created equal. Break the list of requirements into 3 columns: must have, good to have and would be nice to have. Keep these in mind as you develop your concept ideas. These criteria define your major cost drivers.

Also, it is imperative to develop a preliminary bill of material with

estimated costs early on in the program. These should be maintained and updated every time a change or feature is added. Knowing the approximate costs of your product on an ongoing basis will allow for more productive milestone meetings. I call these reality checks. These should be held frequently especially in the beginning stages of development.

Summary

A best practices survey of High Performance New Product Development showed the following world class benchmarks:

- 48% of today's revenues are from products introduced in the past 5 years
- Time to market leaders use time driven processes to hit launch dates in under 18 months.
- 50% of the firms surveyed spend upward of 5% of revenues on new product development.
- Lead Times in New Product Development processes are improved by applying Lean Manufacturing Values Stream Map analysis techniques.

While most approaches to new product development have similar aspects, each must be tailored to best meet the firm's particular needs. One point that is critical to success when evaluating new products is to make sure you move toward projects that are best supported by your existing distribution channels.

Good luck and good hunting!

Jerry Lynch is President of Sigma Design Company, located in Springfield NJ. Founded in 1962, Sigma Design has developed hundreds of new products and specialty manufacturing equipment. Sigma Design Company is a technical resource for The National Institute of Standards and Technology's Manufacturing Extension Partnership Program (MEP). Focusing on small and medium sized firms, Sigma's MEP activities include new product development and the implementation of Lean Manufacturing plant and administrative improvement projects.