

Industrial Product Design: Successful New Products = Listening to Customer Comments + Generating New Product Ideas

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Background

A manufacturer of metal finishing equipment had noticed, over a period of a year, an increase in customer suggestions for product improvements and a gradual decline in sales. The company had been sold to a conglomerate and was pre-occupied with a number of internal issues, chiefly: developing new markets in foreign countries, confirming financial data used to justify the purchase, understanding how they could use the new parent company's sales and marketing resources, justifying their business practices to the new owners, competing with the other units in the conglomerate, and trying to explain and solidify top management's individual job functions. In short, the client was mired in internal politics. In addition, they were projecting revenue short falls.

Their situation was not unusual. Fortunately, they chose to update their product line instead of allowing business declines. The task was embraced by the director of international sales and marketing who believed the fastest approach, yielding the best results, would involve hiring outside product designers.

Their main product was very straight-forward. In engineering, we sometimes call these "elegant" designs because they have simple functionality. I could see why their customers had been happy for so long; the existing product did the job well with little maintenance. Unfortunately, competitors had designed new products and purchased foreign designs to convince their customers that my client was behind the times. I had the opportunity to see the products of the competition and to conduct patent research into their designs. The competitor products could use improvement.

Solution Steps

To design a feasible and effective product an understanding of our client's market was necessary *before* diving into the functional details of the product. A small marketing analysis was conducted by asking our client personnel the following types of questions:

1. Who were their customers? From which industries? Any new industries they wanted to pursue for new sales?
2. Did the product need new features to sell in foreign markets?
3. What were the end users saying about improvements they'd like to see?
4. Were the end users buying competing products? If so, why and how much were they buying? Did they receive lower prices and better functionality?

The client also had distinct ideas about what features the new product should possess. Some of these ideas satisfied end-user comments, others benefited only our client, and still others were suggested to merely "jazz-up" the existing product to make it look "fresh".

Listening to the client's detailed comments was key to understanding what needed to be included in the design. Tarpoff Moore then began generating new product ideas after the design criteria was clearly defined and a team of three was assembled: myself and two experienced mechanical

designers from vastly different backgrounds, one from plant maintenance and the other a manufacturing engineering. Thirteen new product concepts were generated for reusable / refillable product as well as for disposable product in just three short two hour sessions. All thirteen concepts met the design criteria for ease of assembly, interchangeable parts, weight reduction, rugged construction, fabrication expense and patentability. In addition, we ensured most of the designs would generate less noise, be easy to install, and be of a material easily cleaned from the manufacturing environment if the product failed prematurely.

The process of generating design concepts can be laborious. Most companies leave the generation of new design concepts to a handful of people usually the director of engineering or the director of new product development and a couple of trusted associates with proven creativity skills. Some progressive companies include marketing personnel in the concept formation stage but most don't. The general belief is that only a small number of people within a company are creative problem solvers and the rest can only execute plans. For years I have been challenging this belief and have worked out a procedure to include many people in the idea generation phase including those individuals not thought to be creative. The process is simple: gather the marketing / survey data, use technical people who have worked in problem solving jobs, keep the design groups to three or four people meeting three or four times with individual "homework" assignments, employ idea generation techniques like brainstorming and TRIZ, and, above all, have a successful group leader who can feel the dynamics of the group, understand the internal process of generating ideas, keep the group on track by staying focused on the design criteria, and stitch the promising idea pieces into new products.

Results

Several important elements must be present for developing successful new product designs, whether you develop ideas in-house or bring in outsiders who know little about your existing business products. As a veteran problem solver, new product designer and team leader, I build these elements into all my clients' projects. And, I can't think of one client who hasn't been impressed with our results. Here's how I applied them for our client, the manufacturer of metal finishing equipment:

Element No. 1:

For any new product design, always conduct a marketing analysis to identify if there is a market and to identify the features the product must have to capture the attention of the customer.

I surveyed our client extensively on this. They had many people, from managers and personnel in sales/marketing, engineering, and field services that knew exactly why the existing products weren't selling. Most of them had ideas for fixes. However, not one person had a handle on the entire picture. Outside engineering design consultants bring impartial views to the client.

Element No. 2:

Study what the competition is doing as part of the market analysis.

We wanted to know if the competitors' products made sense. Were the customers buying them? Why were they buying them? What can we copy and improve from the competitions' products to win back the customers?

Element No. 3:

Ignore all the internal politics of the customer.

We stayed focused on what the market analysis was saying and built in only those new product features that satisfy customer requirements. We continuously and in detail explained all the new features of each new product idea to *all* our client personnel. We showed them how each new feature satisfied customer complaints and suggestions. We were relentless in this. Our aim was to win most of our client's personnel over to the new product concepts, without showing favoritism toward one person's suggestion at the expense of suggestions from other client personnel. We were amazed at how difficult this task became. At times some client personnel wanted features that improved their job function at the expense of customer satisfaction. We had to balance these

carefully so that the goals of the market research were met. For example, the market survey showed that customers wanted an easier method of disassembly so that worn elements could be changed-out quickly and easily. Unfortunately, one client group wanted to sell duplicate sets of units to the customer while the first set was being returned to their department for refurbishment. This left the customer with expensive and undesirable maintenance that didn't serve their interests.

Element No. 4:

Conduct patent searches on competing products and subassemblies of those products.

This point cannot be emphasized enough. We need to make sure our clients are not infringing on someone else's patent and that the ideas we develop are patentable and truly new.

Element No. 5:

Include full cost estimates for each new product design and include estimates for manufacturing time and maintenance requirements.

An idea sometimes looks good on paper, especially if it's a 3D rendition, but may not meet the cost-benefit criterion of the client. We include cost estimates for all of our designs and walk our clients through each aspect of the cost estimates. Many client specified features, note I said client specified as opposed to customer specified features, carry more bells and whistles than are necessary, driving costs up. We see this more on capital equipment designs than on new industrial product designs, probably because the client will be using the equipment himself and is visualizing what would impress him. However, a sincere cost-benefit analysis drives only those features that are necessary.

Element No. 6:

Form small design teams comprised of technical people, facilitate them with a proven idea generating leader, and cultivate the ideas using a number of different idea generation techniques.

Technical people are by nature problem solvers. Open the team membership to people not normally used in a design team. Use a team leader who knows how to draw out the innate creativity in people and who knows how to integrate elements of ideas to build complete new product ideas.

Element No. 7:

Compile design group reports on the finished conceptual ideas indicating the pros and cons of each new product concept.

Verbally present the results to the managers commissioning the new product studies.

Element No. 8:

Prototype.

Prototype the most promising new product ideas and present them to increasingly higher level managers.

Element No. 9:

Adjust the designs.

Incorporate new knowledge and new ideas to fix problems found during cost estimation and prototyping.

Jump Start the Design Process

Outside product designers, like Tarpoff Moore, are critical thinkers in all aspects. They remain impartial to the flow of client internal solutions. They bring inside industry and outside industry knowledge, are results oriented, and are trying to build real value into the product concepts. Good independents are generally not afraid to say what they think. And best of all, outside product designers jump start the new design process helping to bring their clients closer to realizing new products and new markets.

About the author:

JM Tarpoff, PE launched Tarpoff Moore Engineering, Inc. in 1999 after a successful ten year mechanical engineering design and analysis career with Bechtel Bettis (formerly Westinghouse Electric) in Pittsburgh and a successful two year career in manufacturing / mechanical engineering at P&G in Cincinnati gaining nearly \$2 million in savings from process improvements. The author has been an adjunct instructor of mechanical design courses through the University of Cincinnati's Applied Science College as well as having won numerous patent disclosure and design awards.