

Partnering for Effective Product Development: Lessons for Small Manufacturers

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When David slays Goliath in business today, it doesn't necessarily make the headlines. Small manufacturing companies such as Nucor, in steel, or Gateway 2000, in personal computers, now regularly compete and win against the giants. *Yet* unlike the biblical David, who met his antagonist in single combat, such companies often collaborate with external partners. One small manufacturer that has used this stratagem to compete successfully with the likes of General Electric and Whirlpool is Sub-Zero Freezer Company.

Sub-Zero Freezer, a third-generation family-owned company headquartered in Madison, Wisconsin, has been a market leader for years in the category of high-end, built-in, residential refrigerator-freezers. Over the last decade, however, Sub-Zero has faced competition from several much larger appliance manufacturers – companies such as GE, Frigidaire, Whirlpool, and Amana – that have been invading its niche and threatening its dominant market share. This challenge for Sub-Zero is shared by many, if not most, small manufacturers today: in an era of rapid new-product introductions, increasing technical sophistication in products, and highly demanding customers, a small company must match industry „best practices“ in product design and development with many fewer resources than its larger competitors possess.

For more than 10 years now, Sub-Zero and Arthur D. Little have worked together successfully as partners in product development. Early in 1995, for both technical and strategic reasons, Sub-Zero began to consider a comprehensive redesign of its main line of refrigerator-freezers, known as the 500 series. In planning for the revamping of this bread-and-butter product line (accounting for a majority of the company's sales), Sub-Zero wanted to take on another major challenge: to rethink its entire product-development process. The latter goal was motivated by the company's experience back in 1994, when it had introduced a deluxe refrigerator-freezer line – the 700 series – at the end of a product-development process that had gone over budget.

In tackling these two major challenges simultaneously, our two companies extended our collaboration well beyond the kinds of technical issues on which we had worked together previously, such as using ADL's capabilities in computer modeling and analysis to design and test various configurations for meeting U.S. energy-efficiency standards. This time we had to meet energy and performance needs while satisfying customers' requirements and desires in the design of the new 600 series of Sub-Zero refrigerator-freezers.

But what were those requirements and desires? To test our assumptions in this area, and to learn as much as possible before proceeding, we implemented the quality function deployment (QFD)¹ process aimed at identifying and satisfying the needs of all the stakeholders (both external and internal) in the development of the new product line. In particular, we wanted to use QFD to achieve two objectives that Sub-Zero had identified as crucial: an improvement in the early phases of the product-development process, and a means of preventing the kind of cost overrun that had occurred previously. To this end, we put together a senior product-development team consisting of the President and CEO, the Vice Presidents for Manufacturing and Sales, the Director of Marketing, an industrial designer who has long worked with the company as a consultant, and the authors of this article.

Today, just two and a half years after we began our work together, the 600 series has been field-tested and is about to go into production. Recent customer focus groups (composed of owners of 500-series refrigerators) have responded enthusiastically to the new models, and Sub-Zero has made very significant improvements in its product-development process. Total product-development time for the new line – while equivalent in absolute terms to that for the 700 series – represents a major advance when we consider what the company had at stake in the redesign of such a make-or-break offering. We expect the transition from field testing to production to be much more rapid and efficient than ever before. Sub-Zero will have launched a new product line while sticking fast to market-driven cost targets.

How did our collaboration make these results possible? In working together on Sub-Zero's new product line and an improved product-development process, we learned five important lessons about effective product development, some of them of particular relevance to small companies.

Five Lessons Learned

1. Achieve alignment fast. As anyone with experience of the whole product-development cycle knows, it costs less to make decisions early in the cycle than it does to make the same decisions later. Sub-Zero had concluded from its experience with the 700 series that it needed to ask more questions and to make more of its decisions in the early phases of product development. *Yet* the company was accustomed to a traditional, sequential kind of product-development process in which, for example, Engineering and Manufacturing might not be involved in crucial early decisions about products that they would have to design and produce. To improve the front end of the product-development process, Sub-Zero would have to involve all the functions

from the outset, in what we at ADL call concurrent product-development.

We intended to use the QFD process then partly to bring about the needed alignment within the company as quickly as possible. By providing an objective, fact-based method for identifying and ranking the new product needs of all the stakeholders – internal as well as external – QFD not only allows but demands that every point of view within the company be voiced and given due consideration. In addition to our senior product-development team, we created a project-management team comprising all the functional managers and structured the process to ensure continuous communication both upward and downward. Consequently, by the time we got to the point of drawing up various design options and evaluating them in light of shareholder needs, we had begun a dialogue through which all the functions at Sub-Zero could be incorporated into the product-design process.

One way in which this change in Sub-Zero's product-development approach proved its robustness can be seen in the area of cost-containment. In the course of the QFD process, we learned that, although the 600 series could carry a price increase relative to its predecessor line, the increase would have to be a moderate one. In addition to the fact that Sub-Zero had already identified cost as one of its key product-development issues, customers in a series of focus groups that we convened had proven more price-sensitive than the company had supposed them to be.

This problem was tackled head on when, at our suggestion, Sub-Zero President Jim Bakke set a target cost increase, so that any proposed feature had to be subjected to a cost-benefit analysis, with the sum of any added costs not to exceed a certain figure. This was the first time that Sub-Zero had used such an approach to new-product development, and the results were impressive. Under the constraints imposed by the target cost increase, the company developed the discipline to stick to the target. Such discipline is possible only when a company is aligned from start to finish around a set of clearly articulated, firmly shared goals.

2. Be flexible. Not everyone on our senior product-development team greeted the new process with open arms. For the company's own senior managers – particularly those from Engineering and Manufacturing, who were used to receiving clear-cut directives and then just getting on with the job – the new approach to the early phases of product development could be frustrating. The process of computer modeling, for example, produces many hypothetical configurations and tradeoffs to be evaluated from every stakeholder's point of view. Besides having to adjust to this time-consuming, tentative, and exploratory way of proceeding, our whole team had to contend with a sense that all the bottom-up and external input that the QFD process entails was somehow lessening the team's control.

In view of all this change and uncertainty, team members' willingness and ability to be flexible proved critical to the success of the effort. We also discovered how difficult such flexibility can be to achieve. While everyone embraces concurrent product-development in theory, in practice people may act out of habit. After all, it's a lot simpler and easier to be told what to do than to help figure out a whole new way of doing things.

As we also learned, however, the ability to be flexible in the product-development process leads to definite, measurable results. If one downside to concurrent product-development is a certain amount of frustration, the upside is that you get a better overall process, not to mention a greatly improved product. For instance, the computer modeling and rapid prototyping we performed in the early phases of our development of the 600 series eventually allowed a reduction in costly temporary tooling – a development that, in turn, has significantly cut the time from field testing to production. It is also helpful to design a process that enables you to change your mind. We discovered this when, having opted for a simpler, less expensive halogen-lighting system than the one Sub-Zero had used in its 700 series, we were able to back away from halogen lighting altogether when the new system proved unreliable.

3. You may not know as much as you think.

Nothing better illustrates the importance of flexibility than the fact that you may not know as much as you think you do. Really paying attention to stakeholder needs can require difficult, even painful, adjustments. Sub-Zero Freezer had become a market leader in its category by means of the superior quality, styling, and reliability of its products. As a result, the company thought that it knew what its customers wanted. We began our design of the 600 series on this assumption, adding new features and styling that we thought a redesign of Sub-Zero's major product line sufficiently warranted.

As part of our QFD process, we then convened a series of focus groups for various clusters of external stakeholders: customers, the kitchen designers and architects with whom Sub-Zero's customers typically work, and distributors. Senior management received a shock when, as we sat watching and listening to customers react to our models of the new product line, we found these customers roundly rejecting our design. They looked at our proposed new features and replied unequivocally: „We like some aspects of the older model much better.“ We also learned from these focus groups, as noted above, that prospective customers for the 600 series were more price-sensitive than the company had assumed.

More than at any other point in our new product-development process, this was a time for senior management to show its mettle. The focus groups had „burst a few of our balloons,“ as one of our team members now puts it. Suddenly everyone on the team was experiencing the frustration of having to go back to the drawing board when we wanted to move forward. *Yet* the team swallowed hard and – even though it would eventually cost us three months’ time – sat down to rework our design in light of customers’ objections. Had we not taken this painful step, Sub-Zero would have gone to market with a product that customers would probably have rejected.

4. Be prepared to change the way your team interacts. Although Sub-Zero was experimenting with a new product-development process, this was not the first time that all the senior managers at the company had worked as a team. On the contrary – since Sub-Zero, after all, is a small company – members of the senior team had worked together many times before and felt that they knew a lot about one another’s personalities, viewpoints, strengths, and weaknesses. As part of the redesign of its product-development process, however, the team wanted to see if it could find a different and better way of working together.

The QFD process seemed well-designed, in theory, to meet this particular objective. By requiring that all the internal stakeholders in a new product express their opinions so that these can be discussed and evaluated on an objective basis, QFD tends to level the playing field for groups – such as our senior product-development team at Sub-Zero – in which some individuals are naturally better or more forceful than others in stating their views. *Yet* because the process demands a degree of participation, frankness, and cooperation to which our team, for all its experience in working together, was unaccustomed, it is hardly surprising that we had to carefully feel our way into it.

Looking back on our experience now, we can see that our team has, in fact, learned a new way of working together, one that both resulted from and resulted in the other successes that we achieved here. For example, Sub-Zero’s Vice President for Manufacturing says today that early in the process, concerned about appearing too negative, he had withheld some of his reservations about design options that others were proposing. But as the process unfolded, gave rise to genuine dialogue, and resulted in clear improvement of the product, he became more appreciative of its benefits. This kind of development helped the team operate with genuine consensus and reach agreement faster than it had in the past.

5. Be methodical. This lesson subsumes most of the others that we learned and is especially relevant to small companies. Small companies often take unstructured approaches even to such major processes as product development. They tend to see techniques such as QFD as overly complex, gimmicky, slow, and generally irrelevant to their problems. Sub-Zero had actually run focus groups before, but not as thoroughly or systematically as in using QFD. In the past, if someone on the product-development team liked a new feature, into the product it went. With everyone in senior management wearing lots of different hats, it was hard to keep the team focused and moving forward on an agenda.

In today’s environment, no small company that wants to compete with larger rivals can afford not to be methodical about product development. However, no amount of methodicalness can substitute for the vision, creativity, and inherent resourcefulness that a small manufacturer needs to develop successful new products. Inadequate knowledge of the customer, uncontrolled costs, delays in getting the product to market – these are some of the pitfalls that small manufacturers face if they fail to prepare thoroughly for battle with the giants. The benefits of learning a systematic approach to product development, such as QFD, are bound to extend into virtually every other process and domain within the organization.

¹ *John M. Collins and Arthur D. Schwoppe, „Integrated Product Definition: Using QFD for the Business of Product Development,“ Prism Fourth Quarter 1994.*

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