

Design for Profitability: Does the design team know what the target is?

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A distributor of RF components approached a manufacturer of RF integrated circuits with a request for a custom switch. This would be a one time buy of 1 million pieces over the course of 4-5 months. Marketing was aware that the function was worth \$0.50-\$1.00 on the open market. Where did the target cost for the design team need to be set? There would be no “next year.” There was no “making it up on volume.” This was a one shot deal to make money...or not.

Wait a minute. There is a target cost for the design team? We have heard for a number of years about design for manufacturability, testability, reliability, maintainability, and so forth. All are worthy characteristics to include in the design process and trade off analysis. A characteristic that receives far too little attention is Design for Profitability, for which the other “-ilities” may be necessary, but are not necessarily sufficient. Without the ability to sell your latest and greatest product at a profit, the technology, elegance of the solution, and manufacturability will be for naught. The company is on a “going out of business” path.

“Profit is no problem; we’ll just mark up the cost”

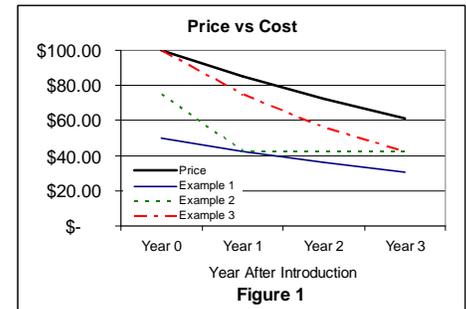
Only in government cost plus fixed fee contracts is there a direct relationship between cost and price. Otherwise, the only relationship between cost and price is how much money the company keeps. The price is ultimately determined by the customer. Your product either delivers sufficient value to your target market to justify a given level of expense, or there are no sales. A good example of insufficient value for the price is the original Iridium satellite telephone. For the originally targeted market (cell phone users), the phone was heavy (almost a pound), large (about the size of a brick), and the service was expensive. For the population in general, and even for the hardcore tech junkies, there was no additional value over the normal cell phone service for probably 99% of the potential users. Iridium, LLC declared bankruptcy in 1999. The true advantage materialized if a user was truly in the middle of nowhere (e.g. in the ocean, desert, Himalayas, etc.). This is exactly the market targeted by the reincarnation of Iridium Satellite, LLC. The value offered exceeds the cost, bulk, and price. Hence, the real question needs to be: “If the target customer is willing to pay \$x, what cost is required to deliver the required profit margin?”

The margin required to deliver a profit varies with the structure of the company. As an illustration, a high tech company with an active R&D program will spend 10-15% of sales on R&D in the steady state. Sales, general, and administrative expenses are another 10-20%. Therefore, in order to deliver 10% profit after tax, a gross margin of roughly 40-50% is required. The tricky part is: the price is a moving target. Particularly in the high tech arena, customers expect the price to go down each year for the same model.

“So, where is the target?”

The obvious answer to “Where is the target?” is 50% or less of the price on the day of introduction. What to do next is the challenging issue. A comprehensive, forward looking cost model is an excellent tool to chart an appropriate course. A cost model allows the designer and the manufacturing team to plan appropriately timed introductions of technology or process improvements to keep up with anticipated price erosion.

Figure 1 illustrates several scenarios. The Price curve follows a 15% per year erosion. Example 1 is the cost curve to maintain 50% gross margin from the day of introduction. To maintain pace with the price erosion and sustain solid margins, the product release plan can anticipate when a move from a single chase plastic mold to a multiple chase mold is appropriate, or a move from a machined housing to a die-cast housing. Raw material or purchased part prices will drop with increased volume, but the cost projection against a target is necessary to determine if the effect is sufficient, or if alternate suppliers of a different approach may be required.



In the case of a start-up company, the factory may not be loaded with ongoing production. In this case, it may be appropriate to follow a variant of Example 2. In this case, the product is introduced at financial break-even, and drops to the 50% gross margin point in Year 1. This drop is typically comprised of overhead absorption as volumes increase, yield improvements, manufacturing technology changes as given in Example 1, or a combination. Subsequent years can follow the same path as Example 1. The cost model is still an important tool to conduct the analysis.

Too frequently, something like Example 3 occurs. The product is introduced at 0% gross margin (or worse!) to “get it out there.” A chase then ensues to increase margins and show a profit. The slope of Example 3 is a 25% improvement in cost per year. By year 3 the margin is still only 31%, in spite of an incredible investment of energy. Furthermore, if a product can’t make money when it is freshly introduced, has a performance edge, and has minimal competition (assuming it isn’t a “me too” product), it is highly unlikely to make money when the competition jumps in.

“What about a cost reduction redesign?”

Redesign is rework, and rework is waste. If a product has a very long life cycle, a redesign may be necessary to continue to follow the price curve down. Unfortunately, most products destined for consumer use have a relatively short life cycle. Assigning a design team to redesign a product that didn’t hit the margin goals is going to do one of two things: incur additional cost to have a dedicated team, or divert resources from the introduction of the next generation product. The cost of resource diversion is significant, being comprised largely of opportunity cost. Delay of next generation product

introductions leaves a window open for competition. I maintain that the desired course is to introduce a product with healthy margins and move on to introduce the next product with healthy margins.

“But, I can’t get there on Day 1!”

There may be a host of reasons why the ideal situation cannot be achieved on Day 1. However, it is possible to know the steps that will be taken to get on track, and that is a valid output of the design team. Relying on luck, volume, or “the learning curve” is tantamount to driving blindfolded. You might arrive at your destination, but the odds are against it! A comment about the so called learning curves: they are an empirical description of observed results across various industries, and may have utility in very long range projections. The reality is that there is a tremendous amount of work that must take place to achieve the results described by the learning. A well known example of a learning curve is “Moore’s Law,” which describes the increase in integrated circuit density over time. The investment required to maintain the pace described by the curve is billions of dollars per generation! It’s definitely not luck. In the short term, it is more productive to know what actions are required, why they are required, and when they are needed so that the organization is executing a plan rather than searching for solutions. Again, a good, forward looking cost model with realistic assumptions is central to developing the plan.

Give that team a something to aim at

Having a challenging goal in front of the design team frequently precipitates new ways of looking at solutions to a specific design challenge. Achieving cost targets is at least as important as achieving technical specs. Now, let’s return to the introductory example. The gross margin target for the integrated circuit manufacturer was 50%. The target cost was set assuming that the best price obtainable was \$0.50. Therefore the cost target was \$0.25 for the product. This aggressive target forced the team to compress the size as much as possible, to streamline the testing as much as possible, and to choose an assembly contractor with an appropriate cost point. The end result was a circuit that met the cost target. When the company accepted their customer’s best and final offer of \$0.70 each, the customer was happy, and they were making 64% gross margin! Had they targeted a \$1.00 price, the gross margin would have been an anemic 30%.

To have an aggressive target forces different thinking. To have cost reduction plans outlined at product introduction allows smart execution. To have a series of healthy product introductions yields a healthy company with a bright future. As baseball sage Yogi Berra said: “If you don’t know where you are going, you might not get there.”