# SPEED TO MARKET

***A Newsletter for***
***Job Shops–Niche Manufacturers–Focused Distribution Systems***
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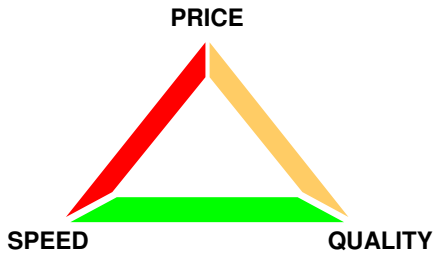
# Avoiding a Death Spiral




**In a job shop environment where business is won or lost on the basis of a quote, key competitive factors are price, quality, and delivery time.** Quality is a given. If your quality is not up to par, then you are out of the game. As *Speed to Market* Readers know, we have discussed how to cut lead-time in past issues, and in the book *Speed to Market: Lean Manufacturing for Job Shops.* For a quick review, read *Changing the Ground Rules: How to Cut Lead Time in Job Shops and Custom Manufacturing Environments* in the February 2004 Issue of the Speed to Market Newsletter.

**Competitive Pricing:** In this article, we turn our attention to pricing. Price, of course, is a function of how much it costs to process a job, and there are different costing systems currently in use. One is to establish costs per hour by individual work centers. A CNC mill, for example, could be priced at $65 per hour, and a manual mill at $45. When a quote is prepared, the estimator determines how many hours he or she thinks are required in each work center. These hours are multiplied by work center rates. Then, materials and any outside or engineering services are added to determine the cost of the job. In some shops, the profit margin is included in the work center rate. In others, it is added to the cost after the estimate is completed. For example, if the estimator determines the cost of a job at $500, a $555 price yields a 10% margin.

**Calculating Burden:** Another approach is to use an average rate for all work centers, assuming that differences will balance out. However, both systems require the rate to include some amount as a contribution to overhead. The overhead portion of the hourly rate is determined by dividing fixed costs by the hours you expect to run during the month.

For example, lets say a shop has fixed costs of $50,000 per month with fifteen employees who work approximately 2,880 hours during that period. Dividing 2,880 into fixed costs equals $17.36 per hour which is the contribution to overhead per hour.

Variable costs would include the cost of labor and payroll taxes (health insurance and other benefits would be included in fixed costs because these do not vary by the number of hours worked). If wages average $18 per hour and payroll taxes are running at 20%, the variable cost per hour would be $21.60. Add this to the fixed costs of $17.36 and you would have an hourly cost of $38.96. If your goal is a 10% margin, the rate you would use for quoting would be $43.29. These figures are shown in Table 1.

| Table 1 | | Table 2 | |
|---|---|---|---|
| Fixed Costs per Month | $ 50,000 | Fixed Costs per Month | $ 50,000 |
| Estimated or Actual Hours per Month | 2,880 | Estimated or Actual Hours per Month | 2304 |
| Estimated Fixed Cost per Hour | 17.36 | Estimated Fixed Cost per Hour | 21.70 |
| Variable Cost per Hour | 21.60 | Variable Cost per Hour | 21.60 |
| Total Cost per Hour | 38.96 | Total Cost per Hour | 43.30 |
| Profit Margin | 10% | Profit Margin | 10% |
| Price per Hour (shop rate) | $ 43.29 | Price per Hour (shop rate) | $ 48.11 |

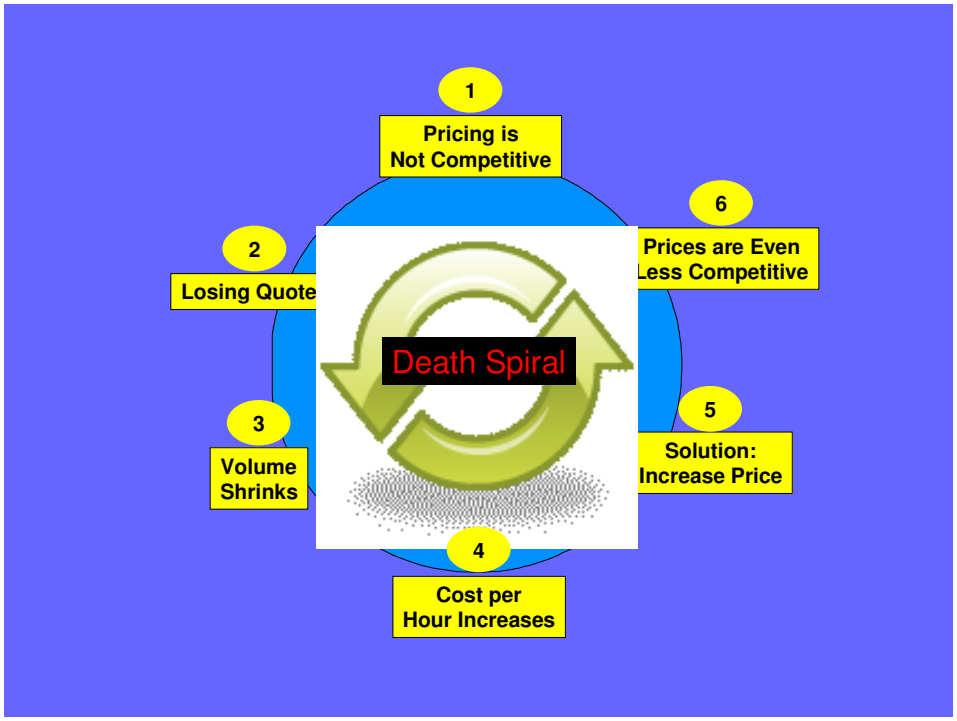
**Note:** There seems to be some confusion about the difference between a markup and a margin. If you are calculating a mark-up, it is a percentage of the cost. A 10% mark up on a $500 order is 1.1 times $500 for a total price of $550. However, if you are calculating a margin, this is a percentage of revenue, and is calculated by dividing the cost by 0.9 (500/0.9 = $555). To check, 55/555 =10% margin.

**Volume Decreases**: When work falls off, fewer hours are worked than planned. As a result, there are fewer hours contributing to fixed costs, so the overhead portion of the cost per hour goes up. Table 2 illustrates what happens when demand falls by 20% and hours are reduced accordingly. Note the hourly contribution to overhead increased from $17.36 to $21.70, and the price per hour increased from $43.29 to $48.11 to maintain the same 10% margin.

**Note:** It's important to recognize that price only apportions demand; it does not create it. This is why job shops don't have department store-type sales. When demand is down (the number of RFQ's coming into the shop decreases), there is less work to go around among competing shops, and it may be necessary to sharpen your pencil during these times in order to get your fair share of the available work. On the other hand, when demand is up, it's often possible to increase margins as price becomes less important than available capacity and short lead times. For more on this, see The Ins and Outs of Job Shop Quoting in the August 2005 Issue of the *Speed to Market Newsletter*.

**Reactionary Pricing:** Reactionary pricing comes about when management reviews the financials and sees a loss. Typically, somebody believes that losses are the result of too low pricing, so it's increased. What can easily happen, especially in a highly competitive market, is that a price increase makes your company less competitive, and reduces volume even further. You are likely to win fewer quotes, and hours are reduced even more. If you don't realize what is driving your costs, and increase your price to cover your losses, you may create what we call a "death spiral" that will gain momentum and ultimately cause you major problems. In fact, it may even put you out of business.

The problem is not that the price is too low; rather, it's that fixed costs are too high for the volume. The solution is to mount a full court press to increase sales, and/or cut fixed costs, or just ride out the down period and take you lumps. The following graphic illustrates the dynamics of a death spiral.




On the other hand, if you don't raise your price when volume falls, you will soon find yourself in a loss position. Table 3 shows what happens when demand falls by 20% and you maintain your original pricing of $43.29. The margin falls to zero. Of course, this works the other way around as well. Look what happens when demand increases by 20% and you maintain your original price. Table 4 shows the margin increases to 18%.

| Table 3 | |
|---|---|
| Fixed Costs per Month | $50,000 |
| Estimated or Actual Hours per Mon. | 2304 |
| Estimated Fixed Cost per Hour | 21.70 |
| Variable Cost per Hour | 21.60 |
| Total Cost per Hour | 43.30 |
| Profit Margin | **0** |
| Price per Hour (shop rate) | $ 43.29 |

| Table 4 | |
|---|---|
| Fixed Costs per Month | $50,000 |
| Estimated or Actual Hours per Mon. | 3546 |
| Estimated Fixed Cost per Hour | 14.10 |
| Variable Cost per Hour | 21.60 |
| Total Cost per Hour | 35.70 |
| Profit Margin | 18% |
| Price per Hour (shop rate) | $ 43.29 |

**Strategic Pricing:** Now the question becomes, should you reduce your price to secure even more work as demand increases, or increase it to improve margins? Can you turn the dynamics of the death spiral around and create a growth cycle? These are tricky questions and beyond the scope of this article as there are a number of factors to consider. What we are trying to show here is that costs and margins are very sensitive to volume and the number of hours worked, and it is necessary to monitor this relationship closely to avoid reactionary price increases.

**Analyzing the Volume-Cost-Price-Profit Relationship**: At Delta Dynamics, we developed a *Job Shop Pro Forma Model* we use to calculate costs, adjust prices and margins, and forecast financial performance. It's easy to use, and we recommend running it on a monthly basis.

| *Job Shop Pro Forma Model* | | |
|---|---|---|
| **Only Change Blue Numbers** | | |
| **Fixed Cost per month** | **$ 50,000** | |
| **Estimated or Actual Hours per month** | **2,880** | |
| Estimated Fixed Cost per hour | **$ 17.36** | |
| **Variable Cost per hour** | **$ 21.60** | |
| **Profit Margin** | **10%** | |
| **Taxes** | **0%** | |
| **Total Cost per hour** | **$ 38.96** | |
| **Price per hour (shop rate)** | **$ 43.29** | |
| | | |
| **Income Statement** | | |
| Revenue | **$ 124,676** | **100%** |
| Labor Cost | **$ 62,208** | **50%** |
| Fixed Cost | **$ 50,000** | **40%** |
| Amount left for all other expenses | **$ 12,468** | **10%** |
| **All Other Expenses:** | | |
| **Overtime Premium** | **$ -** | **0%** |
| **Other** | | |
| **Income Before Taxes** | **$ 12,468** | **10%** |
| Taxes | **$ -** | **0%** |
| **Net Income** | **$ 12,468** | **10%** |
|  | | |

The working version of this model enables our clients to plug in their fixed and variable costs, the number of hours they expect to work in a month, set a desired profit margin, adjust prices, and forecast revenues and profits. Clients can check these calculations at the end of the month with actual hours, and use this information as a basis for the next month. This enables them to become increasingly accurate in their forecasts, and to avoid knee-jerk price increases in reaction to losses detected on the income statement. For the sake of simplicity, we did not include materials and outside services in this version of the model. We are making the assumption these are sold at cost, and so are a wash. If higher, it's gravy.

**Summary:** In job shops, cost per hour is highly sensitive to changes in volume, and the roller coaster nature of demand in these types of businesses wreaks havoc with standard costing systems. Reactionary price increases can lead to becoming less and less competitive, a dynamic we term a *death spiral*. It's critical for management to keep a close eye on the volume-cost-price-profit relationship. We know from experience that most shops do not go though this exercise to determine their costs and pricing often enough. Our recommendation is to perform an analysis of these factors on a monthly basis. The *Job Shop Pro Forma Model* is a valuable tool for this purpose.

If you would like to run your numbers through this model, give Vince Bozzone a call at 248-333-0482. We are offering this free service to Speed to Market Readers and the job shop community for a limited time