

Tijuana Bronze Machining

As time goes by, it becomes clear to me that our competitors are crazy. Pumps are a major product in a big market for all of us, but with the prevailing price cutting mentality no one will be able to sell pumps profitably as long as we all are forced to match each others' lower prices. I guess we should be grateful that competitors don't play the same foolish game in valves and flow controllers. Even with the 12 1/2% price increase, we don't see any new competition in flow controllers.

- Herb Alpert, President

THE COMPANY

Tijuana Bronze Machining (TBM) was established by Alpert in 1984 when he purchased a moribund commercial machine shop on the California coast south of San Diego. He had sensed an opportunity in a conversation with the president of a large manufacturer of water purification equipment who was dissatisfied with the quality of bronze valves available. He formed a partnership with Les Paul, locally famous for the high-quality bronze boat fittings he manufactured for the fishing fleet along the Southern California and Baja Coast. Alpert had recently retired from the United States Air Force, where he had a long record of administrative successes. The two then selected Mary Ford, an accountant with manufacturing experience, to join them.

Paul was quick to analyze the nature of problems other manufacturers were having with water purification valves. Since the tolerances needed were small, maintaining them required great labor skill and expensive machine controls. Within weeks of forming the company, Paul and his shop crew were manufacturing valves that met or exceeded the needed specifications. Alpert negotiated a contract with one purification equipment manufacturer, and revenues soon were earned.

Knowing that the same manufacturing skills used in machining valves could also be used in manufacturing pumps and flow controllers, TBM created an engineering department and designed new products for those markets. Valves did not fully utilize available capacity. Pumps were known to be an even larger market than valves, and flow controllers were often used in the same fluid distribution systems as valves and pumps. Moreover, by specializing in bronze, the company could exploit Paul's special knowledge about working with that material.

Raw forgings and castings purchased from foundries were precisely machined and assembled in TBM's new modern manufacturing facility. The same equipment and labor were used for all three product lines. Runs were scheduled to match customer shipping requirements to eliminate finished goods inventory. The raw material suppliers (foundries) had agreed to just-in-time deliveries, and products were packed and shipped as completed.

THE PRODUCTS

Valves (24% of company revenues) were created from four bronze components. Paul had designed machines that held each component while it was machined automatically. Each machinist could operate two machines and assemble the valves as machining was taking place. The expense of precise machining made TBM's valves too expensive to compete in the nonspecialized valve market. All monthly production of valves took place in a single production run, which was immediately shipped to the single customer upon completion. Although Paul felt several competitors could match TBM's quality in valves, none had tried to gain market share by cutting price. Gross margins had been maintained at a standard 35%.

Pumps (55% of revenues) were created in a manufacturing process similar to that for valves but with a little less precision. Five components required machining and assembly. The pumps were sold through seven industrial products distributors. To supply the distributors, whose orders were fairly stable as long as TBM met competitive prices, the company scheduled five production runs each month.

Pump prices to distributors had been under considerable pressure. The pump market was large and specifications were less precise than for valves. Stan Getz, TBM's sales manager, felt since the company had no design advantage in pumps it had no choice but to match the lower prices or give up its market share. As a result, gross margins on pumps in the latest month had fallen to 22%, well below the company's planned gross margin of 35%. Alpert and Ford could not see how competitors could be making profits at current prices.

Flow controllers (21% of revenues) regulate the rate and direction of flow of liquids. As with pumps, the manufacturing operations for flow controllers were similar to those for valves. More components were needed for each finished unit, but less labor was required. This product had been added to the line because it helped fill excess machining capacity. In recent months, TBM had manufactured 4,000 flow controllers in 10 production runs. The finished flow controllers had been distributed in 22 shipments to distributors and some end-use customers.

Getz was trying to understand the market for flow controllers better because it seemed to him TBM had almost no competition in this market. He had recently raised flow controller prices by 12 1/2% with no apparent effect on demand.

THE MEETING

After the latest month's results had been summarized and reported, Alpert got together with Paul and Ford to discuss possible changes in their operations. The meeting had opened with his statement at the beginning of the case concerning competition in pumps versus flow controllers. Alpert had a copy of the product profitability analysis (Exhibit 1) on his desk.

Les Paul commented on the pumps situation. "It really is amazing to me that our competitors keep reducing prices on pumps. Our manufacturing process is better than theirs and I truly do not believe we are less efficient or less cost effective. Furthermore, I can't see what their motives can be. There are a dozen manufacturers of pumps. Even if several competitors were to drop out of the market, there would still be enough competitors that no monopoly or oligopoly pricing could be maintained. Maybe the competitors just don't realize what their costs are. Could that be, Mary?"

Mary Ford: That does not seem likely to me! Cost accounting is a well-developed art, and most competent managers and cost accountants have some understanding of how product costs can be measured. In manufacturing businesses like ours, material and labor costs are pretty easily related to products, whether in the design stage or after manufacturing. So, if anything, our competitors must be making some different assumptions about overhead costs or allocating them to products in some other way. Or, as you said Herb, maybe they have stupidly forgotten that in the long run, prices have to be high enough to provide margins that cover corporate costs and produce a return to owners.

Herb Alpert: Mary, I know that you have explained to me several times already the choices we could make in allocating overhead to products. In fact, last month you almost sold me on what you called a "modern costing approach," which I rejected because of the work and cost of the changeover. I also worried about the discontinuity it might cause in our historical trends. But maybe I need another lesson to help me understand what is happening to us. Could you try once more to explain what we do?

Mary Ford: I would be happy to try again. We have a very traditional cost accounting system that meets all of our needs for preparing financial

reports and tax returns. It is built on measurements of direct and indirect costs and on assumptions about our production and sales activity (Exhibit 2). Each unit of product is charged for material cost based on the prices we pay for components, and for labor cost based on the standard run labor times priced at \$16 per hour. We allocate the total overhead cost assigned to production on the basis of production-run labor cost.

Herb Alpert: All this sounds familiar to me. But remind me again about the choices we discussed earlier.

Mary Ford: Well, one choice advocated by some would be to forego the overhead cost allocation altogether. Overhead costs could be charged each month as period expenses. Product profitability would then be measured at the contribution margin level, which is price less all variable costs. In our situation, the only short-run variable cost is direct material. The big danger here would be that we would forget that all overhead costs have to be covered somehow, and we might allow our prices to slip.

Les Paul: Yeah, Stan Getz' mentality would make that kind of "direct cost" accounting dangerous. He would be looking for marginal customers willing to pay marginal prices based on marginal costs. From the outset, we have succeeded in part because we insisted on trying to maintain a 35% gross margin *including* allocated manufacturing overhead.

Mary Ford: The last time we discussed this, Herb, I showed you revised standard unit costs based on a more modern view of the proper way to allocate costs. I put the revisions together to better allocate overhead based on activities. First, I identified material related overhead (the cost of receiving and handling material), and allocated that to each product line based on the cost of material. The justification for this change is that material handling does not have any relationship to the labor cost of machining. Second, I took set-up labor out of the total overhead and assigned it directly to each product line. This is a small amount, but the cost of set ups also has no relationship whatever to the total labor cost of a production run. Finally, I substituted machine

hours for labor dollars as the basis for allocating the remaining factory overhead. It seems to me that machine hours better reflect the use of our most expensive resource (machines) and should be used to assign overhead costs to the products.

The results of this revision made sense to me and may contain a clue about why competitors are chasing lower prices in the pump market. The revised standard cost for pumps is more than \$4.00 below our present standard and would show a gross margin percentage of 27% compared to our current 22%. Maybe our competitors just have more modern cost accounting!

Les Paul: I've been thinking about this a lot since last week when I attended an "Excellence in Manufacturing" conference in La Jolla. One presentation was about "Cost Accounting for the New Manufacturing Environment." I couldn't follow all of the arguments of the speaker, but the key seemed to be that activity, rather than production volume causes costs. In our operations, it is things like receiving and handling material, packing, shipping, and engineering orders that cause overhead, not labor or machine hours.

If I understood what this speaker was advocating, it was that whenever possible, overhead costs that cannot be traced directly to product lines should be allocated on the basis of transactions. Transactions cause costs to be incurred. A product that required three times as many transactions as another product would be allocated three times as much of the overhead cost related to those transactions. Or, said another way, a product that causes 3% of the total transactions for receiving components would be allocated 3% of the total receiving cost. At a basic level, this seems to make sense to me.

Herb Alpert: But, to cost products that way has got to be more expensive because it's more complex. Also, who keeps count of transactions?

Mary Ford: It can't be too hard. All overhead allocation is somewhat arbitrary any way. We could experiment with estimates to see how the product costs might be affected. The product costs for material, direct labor, and set-up labor will be the same as for my revised unit costs. To allocate

overhead costs, we just need to estimate how many transactions occur in total and which products cause them.

Herb Alpert: OK. Mary, you and Les get together this afternoon to put together the activity estimates you need. Get back to me as quickly as you can. Maybe we can figure out why the competitors think they can sell pumps so cheap.

LATER

After lunch, Paul and Ford met and discussed transactions and effort related to each type of overhead cost. The result was the overhead cost activity analysis shown in Exhibit 3.

QUESTIONS

1. Use the information in Exhibit 2 to calculate the product costs per unit for valves, pumps and flow controllers that are reported in Exhibit 1. Show your calculations.
2. What is your estimate of the current "contribution margins" for the three products. Show your calculations and explain them.
3. Use the information in Exhibit 2 to calculate the revised product costs mentioned by Mary Ford on page 3.
4. Use the information in Exhibits 2 and 3 to calculate product costs for valves, pumps, and flow controllers under an "ABC" approach (Activity Based Costing).
5. If, in the following month, quantities produced and sold, activities, and costs were all at standard, how much higher or lower would the reported *net income* be under the ABC system than under the present system? Why?
6. Prepare a table which compares product profitability across the three products under the three product costing systems. Which system do you favor? Why?
7. Use the information in the ABC analysis to re-evaluate the "JIT" purchasing policy regarding flow controllers. Show your analysis. What is your conclusion?
8. What recommendations do you have for management? Why? Be specific. Support your recommendations with explicit analysis. ■

EXHIBIT 1
Product Profitability Analysis

	Valves	Pumps	Flow Controllers
Standard unit cost	\$37.56	\$63.12	\$56.50
Target selling price	\$57.78	\$97.10	\$86.96
Planned gross margin %	35%	35%	35%
Last Month			
Actual selling price	\$57.78	\$81.26	\$97.07
Actual gross margin	35%	22%	42%

EXHIBIT 2
Monthly Production and Cost Summary

Product Lines	Valves	Pumps	Flow Controllers
Monthly production	7,500 units (1 run)	12,500 units (5 runs)	4,000 units (10 runs)
Monthly shipments	7,500 units (1 shipment)	12,500 units (7 shipments)	4,000 units (22 shipments)

Monthly Total

Material and Labor Costs

	<u>4 components</u>	<u>5 components</u>	<u>10 components</u>	
Material	2 @ \$2 = \$4 2 @ 6 = 12	3 @ \$2 = \$6 2 @ 7 = 14	4 @ \$1 = \$4 5 @ 2 = 10 1 @ 8 = 8	
Total	\$16	\$20	\$22	\$458,000
Labor (\$16 per hour including employee benefits)				
Set-up Labor	8 hours per production run	8 hours per production run	12 hours per production run	168 hours
Run Labor	.25 hours per unit	.50 hours per unit	.40 hours per unit	9,725 hours
Machine Hours	.50 hours per unit	.50 hours per unit	.20 hours per unit	10,800 hours

Manufacturing Overhead

Receiving	\$ 20,000
Materials handling	200,000
Engineering	100,000
Packing and shipping	60,000
Maintenance	30,000
Machine depreciation (10 year life)	270,000
Total	\$680,000

EXHIBIT 3
Monthly Overhead Activity Analysis

	Valves	Pumps	Flow Controllers
Receiving:			
Receive each component once per run	4 transactions (3%)	25 transactions (19%)	100 transactions (78%)
Materials Handling:			
Handle each component once per receipt (60% of cost)	4 transactions (3%)	25 transactions (19%)	100 transactions (78%)
Handle each component once per production run (40% of cost)	4 transactions (3%)	25 transactions (19%)	100 transactions (78%)
Packing and Shipping:			
One packing order per shipment	1 transaction (4%)	7 transactions (23%)	22 transactions (73%)
Engineering:			
Estimated engineering workload percentage (subjective)	20%	30%	50%
Maintenance and Depreciation:			
Machine hours basis	3,750 hours (35%)	6,250 hours (58%)	800 hours (7%)