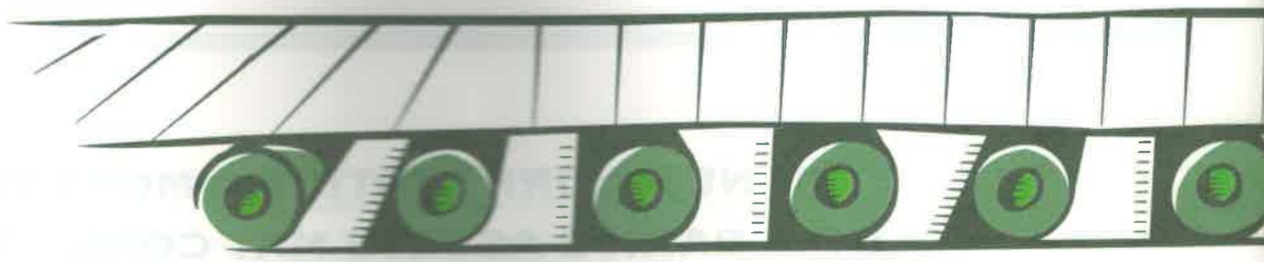

Confronting Cost Realities:

If Properly Managed, U.S. Manufacturing Can Be Competitive

BY RICHARD HERSHER

In this extensive look into U.S. manufacturing, Focus Management Group's Richard Hersher delves into the true costs — both standard and hidden — associated with offshore manufacturing. Through case studies and analysis, Hersher makes the case that the outcome of producing products domestically can be a profitable one.

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It is generally assumed that manufacturing in the United States cannot be competitive, when evaluating in terms of cost. However, if properly managed, my contention is manufacturing in the U.S. can in fact be cost competitive with any other country in the world. This nation's currently accepted accounting procedures result in many of the costs for importing products becoming charged to overhead accounts and not to the product. Therefore, key decisions on buying offshore products are made on incomplete information.

The reason cited most often for buying materials from overseas is cheaper labor. For most manufacturing companies, labor is 10% to 20% of the total cost. Despite cheap labor abroad, it may still be less expensive to purchase products made domestically, when all costs are considered. Many of these non-labor costs are often hidden thus do not become part of the product cost. If total costs were analyzed, the savings from purchasing offshore as opposed to domestically would be very marginal or nonexistent.

EXHIBIT 1: **Material Loss By Manufacturing Step Only**

Manufacturing Step #	Labor [hrs]	Material A [units]	Material B [units]	Loss [%]	Operation Totals		
					Labor	Material A	Material B
1	2.5	50		6.00%	2.65	53	
2	4		10	5.00%	4.20		10.5
TTL					**6.85**	**53**	**10.5**

EXHIBIT 2: **Material Loss With Cumulative Loss From Previous Steps**

Manufacturing Step #	Labor [hrs]	Material A [units]	Material B [units]	Loss [%]	Additional Losses		Operation Totals		
					Labor	Materials	Labor	Material A	Material B
1	2.5	50		6.00%			2.65	53	
2	4		10	5.00%	0.13	2.65	4.33	2.65	10.5
TTL							**6.98**	**55.65**	**10.5**

STANDARD COSTS

The critical information required in order to the make versus buy decision must be based on current manufacturing costs. Most companies use standard cost as the starting point. Therefore, it seems fitting to begin this article with a review of the process for developing standard product costs.

Standard Costing Basics

Most companies use standard costing to develop product cost. The labor hours generated from the standards and the forecasted sales volume are used to develop the department and GS&A overhead costs. The overhead costs are normally allocated to the products based on forecasted labor hours over the coming period. Under normal circumstances, the standards are reviewed and updated annually. Monthly variances are generated based on the actuals compared to the standards.

The base information used for the standard costs are developed by the operations personnel — possibly the industrial engineering department, or department supervisors along with purchasing or the engineering departments — to obtain the raw material component costs. Because so much of the planned profitability rests on the standard cost, it is critical that this number be as accurate as possible. Unfortunately, too often it is not accurate.

Standard Cost Mis-Issues

In order for the standard cost to be correct, it must match the way products move through the plant. It is generally accepted that the standard cost programs of your Management Information System works correctly, but in truth most of these programs do not. The problem is the cumulative effect of the losses is lost as the product moves from one operation to the next. When a new raw material is used it will have a loss factor identified. This loss should be applied to both the labor and the material.

Now, in the next operation, there will normally be an additional loss. This loss may include the labor and raw materials, which come into the product at this operation, but it may or may not result in additional labor and/or material loss from the previous operations. This is the "cumulative loss" and is often not included in the standard cost programs. And there is another issue with the labor in this scenario. If the labor from operation one is lost in operation two, that means that the labor hours used for overhead calculations may also be understated.

Exhibits 1 and 2 are examples of two operations assemblies using raw materials. Exhibit 1 shows the labor and total material usage *without* cumulative loss, and Exhibit 2 shows the same example *with* cumulative loss. In Exhibit 2, the labor increased by 1.9% and the material loss on the raw material used in Operation 10 increased by 5.3%. This is a very simple example, and in reality most manufacturing activities will require more than two raw materials and more than two operations. But, the labor and material losses continue to increase as additional operations are added thus the amount of losses not included in the product cost will increase. If we add in inbound freight cost to the equation, then the numbers will grow even more.

Case Study 1 is an extreme example about a client we worked for many years ago, which made a number of decisions that resulted in significant capital expenditures to build a new product, which was not competitive in price. The project, which we initiated and managed, resulted in reducing the standard cost by over 50% and used the excess capital equipment to reduce the standard cost of many of their other products.

HIDDEN COSTS

Again, let's define hidden costs as those costs, which are incurred for a specific product, but then get buried in overhead or GS&A accounts and therefore do not become part of the product standard cost.

Inbound Freight

It is commonly accepted that freight costs overseas are greater than freight domestically. During most manufacturing operations, there is an operational loss — some percentage of product coming in does not go out to the next operation. The loss percentage is a factor used in the costing activity. This results in additional raw material being ordered to cover the loss. But if the freight cost is buried in an overhead account, the additional money that is paid to ship the extra product in is not added to product costing. Therefore, standard product cost is understated.

Import Fees

There are fees for brokers — importing agents — and often duty or tariffs must be paid. These fees can be significant, yet do not normally get charged to product cost. Depending on the product, some duty fees can be extremely high, and these fees can change based on the whim of our government.

Letters of Credit

When an item is purchased, a letter of credit must be opened through the bank, and a corresponding fee is attached. The bank often ties up the money the day the letter of credit is opened. If the product has to be manufactured, the product may not be delivered for three to four months.

Overseas Staffing

Many companies hire local people in the offshore countries to oversee the manufacturing activities there, but do not factor this into product cost.

Increased Inventories

Often product must be ordered in container load quantities, resulting in increased inventory, and therefore, increased inventory carrying cost. Increased inventories can also lead to increases in obsolete and/or slow moving inventory, an additional cost. The increased inventories might also require renting additional storage facilities, increasing overhead labor costs and internal transportation costs. This issue can be further complicated if multiple items are purchased overseas from the same vendor that will only ship in full containers. In this case, the purchasing staff has to make

CASE STUDY 1: COMPETITIVE PRICING

Many years ago, on one of my first client jobs as a consultant, I was working with a division of a major NYSE-listed company that manufactured industrial valves. The company had recently released a line of butterfly valves, which ranged in size from 4" to 36" in diameter. The company had purchased several new machining centers solely for this product line and had built additions onto its building to house the associated equipment. The company was located in a suburb of Chicago, the casting manufactured was in California.

The high volume orders were for 4", 6" and 8" valves, but sales quickly discovered that these valves were not priced competitively. In a meeting with the VP of Manufacturing, he mentioned the discovery. My suggestion to start a value analysis program was well received, and work to that end began immediately.

The company worked on a standard cost system, but had not, for an unknown reason, developed the costs for these valves prior to production. A word of advice, I do not recommend commencing the manufacturing of a new product until a preliminary standard cost has been determined. Back to the issue at hand, a cost had not been determined and thus needed to be. Within this, incoming freight cost had not been determined. As is normally the case, it got buried in an overhead account and became part of manufacturing overhead.

A team of representatives from all departments was set up, and at our first meeting, I asked the marketing representative if he could purchase one or two of the competitor valves for comparison. After a side-by-side comparison at our second meeting, the reason our valve was not priced competitive was immediately apparent.

To illustrate, let me explain the mechanics of the valve. The body of a 4" valve was a steel casting about 8" in diameter, and about 3" thick with a 4" diameter hole in the middle for the butterfly to be installed. We machined extensively a virtually solid steel block to meets our needs. The competitors used a casting, which looked more like a bicycle wheel with an inner and outer rim connected by spokes. So, to review, we were shipping a casting twice as heavy from California to Chicago. And then, the casting needed to be machined extensively.

Let's take the process one step further. The three projected high volume valves were 4", 6" and 8" diameter. Each valve was designed by a different engineer, thus the certain aspects were unique to each valve, and some of these aspects required machining. This means it increased the cost of the raw materials, thanks to setup and tear down of different machinery and lower volumes of each piece. During the value analysis meetings, we suggested using the handle parts for the 6" diameter valve for all three valves.

The matching handles for each of the different valves were painted a bright blue at a contract painting facility about 20 miles away, despite having an infrequently used in-house painting room. When asked why the parts were sent outside to be painted, the answer was color. To resolve the issue, a paint manufacturer nearby agreed to match the color, and the painting was brought inside.

By the time this value analysis team completed its job, we had removed more than 50% of the cost, which now made it cost competitive. We could not reduce the size of the building, since it was completed, which would have saved even more. And, too much equipment was purchased, but was still used to the companies advantage for other parts.

decisions on how much of the various products to order. If the wrong decisions are made, there is an increased cost for running smaller orders.

Quality Issues

Many manufacturing companies in the U.S. are seeing return customers that, after going overseas for cheaper purchasing cost, return due to poor product quality. The process of ordering a product in response to demand, having it delivered, then ultimately rejecting the shipment due to poor quality is a frustrating one. The cost of solving this problem can be excessive, and can potentially lead to loss of customers. One of the key issues in importing product is the loss of control. If the manufacturing is under local control, response to customer demand can be much faster.

REDUCING MANUFACTURING COSTS

Dr. William Deming developed the modern quality assurance concepts yet could not get anyone to implement them in the U.S. In Japan, his concepts were adopted with great success. Toyota's innovation of many of the current manufacturing techniques was a direct response to the success of U.S. automotive companies and the need to do things differently. Toyota understood that they could not compete with the U.S. automotive companies without a major change in their manufacturing process. Manufacturing companies in the U.S. have been very slow to implement the newer technologies. This fact might be due in part to the many small manufacturing companies that operate in the United States. Often entrepreneurial in nature, acceptance of newer manufacturing concepts is difficult in these environments, as management is often afraid to take risks on new ideas. Today, these concepts are generally considered "lean manufacturing."

Cellular Manufacturing

Under the old manufacturing concepts, a plant is arranged by product type. In a machine shop, the machining equipment is in one department. The lathes are in another department and the drill presses, reamers and tappers may be in another department. In this type of production, parts are brought to a machine in containers. Product is taken out of the container, put on the machine, work performed, product put back into another container, container moved to the next operation, delay involved of course before the product is worked on again. And so on until the product is finished. The result is a good deal of wasted time while the product sits in containers between operations, with a lot of extra material handling required.

In cellular manufacturing, all the equipment necessary to make a part is moved near each other so as much work as possible can be done without putting the product into a container. The product should not hit the ground until it is finished. Sometimes, it is impossible to get to the ultimate process, but by working on improving the process, normally you can get very close to the ultimate solution. In this case, a cell might have five or more different machines in it and require one or more operators. The object is to minimize the material handling and minimize the clock time required to complete the part. By reducing the amount of time the item spends in the plant, inventories are reduced and floor space, which was used to store materials, can be converted to manufacturing areas.

Case Study 2 is an example of a cellular operation. While the process is different, the overall concept is the same — minimize handling and not allow the product to "rest" until it is complete.

Just-in-Time Inventory

One of the lean manufacturing techniques most utilized is just-in-time inventory. The objective is to bring in materials as close to the time they are required in the manufacturing process as possible, which results in less inventory on hand and also means that the invoice is often due to be paid after the product is already made, and ideally, shipped. When fully implemented, just-in-time inventory concepts result in significantly reduced raw material warehouse space.

EXHIBIT 3: Additional Overhead Contribution Examples

	Overhead Contribution $ at Multiples of Fully Burdened Labor Rates					
	Per Month*			Per Year*		
Addt'l Labor Hrs/Mo	**1.5**	**2.0**	**2.5**	**1.5**	**2.0**	**2.5**
300	$11,250	$15,000	$18,750	$135,000	$180,000	$225,000
600	$22,500	$30,000	$37,500	$270,000	$360,000	$450,000
1,000	$37,500	$50,000	$62,500	$450,000	$600,000	$750,000

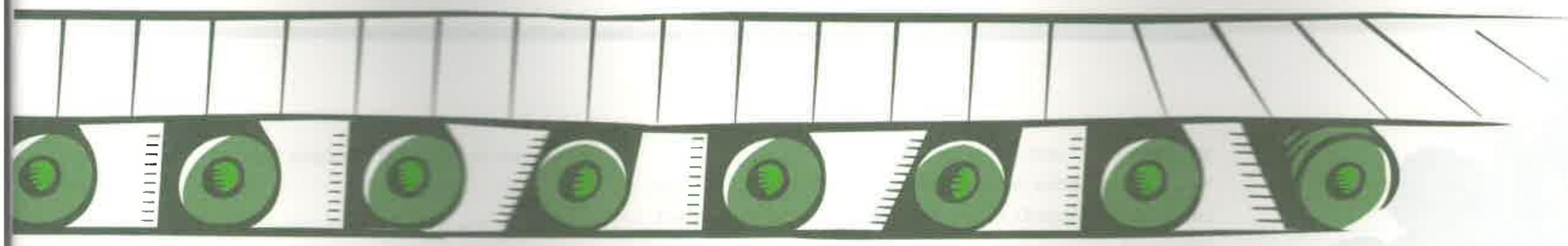
Assumptions: 1) Labor rate = $15/Hr, 2) Fully burdened labor rate = $25/Hr

CASE STUDY 2: CELLULAR OPERATION

Some years ago, my consulting group worked for a paper converter that made writing pads, spiral wired books, etc. To make the writing pads, the process went as follows. First, the paper was ruled. Next, it was cut into strips four pads wide. After this, by stacking the strips on a truck and using a roller to apply glue to the edges, the ends were glued. Finally, the strips were stacked to be cut into individual pads and ultimately packaged. For each work order, it took three to four weeks. Each step in the process was completed separately. The ruling machine stacked the paper onto a skid after ruling. Then, the skid was moved to the shear, paper taken off the pallet, run through the shear, etc.

The company had recently purchased a machine to glue each strip of four pads quickly in a machine, one strip at a time. Upon review of machine brochures and the other equipment, a decision was made to put all the machines together. We engineered a table to be built to move the sheared strips to become the in feed for the gluer. Next, a conveyor belt, which ran very slowly, was installed to accept the output of the gluer and feed the strip cutter. The operator of the cutter was told to stack 12 strips. There was a conveyor out feed from the cutter, which fed the shrink wrapper. All machines had to be run simultaneously. After the ruler paper started being processed at the shear, it did not hit the ground until it was in a carton, on a skid ready for the warehouse. It took hours to complete a work order rather than weeks.

Later, when doing a walk through of the plant, an employee pointed out some ruling issues. Taking advantage of the new system, we were able to trace it back to a specific point in the process. Under the old process, this issue might not have been caught until after the entire production order had been completed. The improvements to the manufacturing flow allowed for quick review and a significant decrease in the amount of rejected material generated.



Implementing this process takes a lot of time and effort. It requires a coordinated effort between the manufacturer, their suppliers and often, as in the example discussed below, the customer. In this case, the supplier had to stock more material for the manufacturer, and the manufacturer paid an increased price for the raw material.

Several years ago, I visited a company that produced to order. This company was a division of a NYSE-listed company and all the accounting functions were done at the corporate office. Lead time was seven days and it had no raw material in stock, as raw material weren't ordered until the company had an order to ship the product.

The customers were also utilizing the just-in-time concept and Kanban (*see Case Study 3*). The truck driver would bring in the Kanban cards each week indicating what was required, the material was ordered and delivered to the plant in two days, product was manufactured and completed when the truck driver came the next week. The customer agreement required they pay seven days after shipment. The payment for the finished product was received before the invoice for the raw material showed up.

Production Scheduling

The most commonly recognized name in lean manufacturing is Kanban, a part of the Toyota production system. This is a very simple, easy to implement and extremely effective production scheduling process. Since it was developed by Toyota, most people assume it works only for continuous production manufacturing and does not work for make-to-order production. This scheduling process can effectively be used for all types of manufacturing.

Kanban uses cards to "pull" inventory through the manufacturing process instead of "pushing" product through the process, which the normal MRP type systems do. The result is reduced WIP inventory a reduction in the amount of floor space required for the manufacturing process. This allows space to relay out the facility to further improve efficiencies. Case Study 3 is an example of how Kanban was implemented in one of the assignments we had some years ago.

AN ATTEMPT TO FIX THE ISSUES

A brief note regarding Activity Based Costing (ABC), which appeared a few years ago. ABC was an attempt to allocate all of the indirect and overhead costs to the individual products. However, this process was extremely cumbersome to implement, and once implemented, if anything changed in the company operation, the information was no longer.

SUMMARY

In making a decision to buy a product instead of manufacturing it in-house, one needs to have all the information. The standard cost needs to be accurate and all the costs need to be developed and correctly accounted for. Remember that increasing labor hours while keeping overhead fixed will lead to additional dollars to cover the overhead. That makes all other products more profitable. Everything starts with the standard labor hours calculated in the beginning. Exhibit 3 shows a simple example of how much additional overhead can be absorbed. In this case, adding 50 man hours per day — just over four people — shows an additional $750,000 in overhead absorption.

Importing product requires long lead times and large inventories in order to maintain product flow. Rapid changes in demand causes havoc since either there is too much product or not enough product. Where importing product requires warehouse space, often more than normal due to the long lead times and often minimum shipment quantities, manufacturing domestically using lean manufacturing techniques results in lower inventories and faster, more nimble manufacturing resulting in improved customer service.

Lean manufacturing concepts work on the concept of speed, by "pulling" materials through the plant, (i.e. calling for product or subassemblies only as they are needed.) The increased volume, which results from bringing product back to domestic manufacturing, will over absorb the overhead costs making all other products more profitable. abfj

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CASE STUDY 3: KANBAN IMPLEMENTATION

A few years ago, my consulting group was asked to assist a division with installation of a Management Information System (MIS). The division operated in a job shop environment, had sales of just under $30 million and approximately 13,000 raw materials, but lacked part numberings and a production scheduling process.

Obviously the first issue had to be to develop a part numbering system. The division president was hesitant as he believed that his staff wouldn't think if the system was in place. It took me several weeks to convince him that implementing part numbering was necessary. Now faced with developing a part numbering concept that will allow the company to continue to grow, but still be able to find all the current parts when needed. The part numbering system consisted of groups of numbers and letters, which allowed parts to be classified, the classification becoming more defined as the number moved from left to right. This concept worked well and the part numbering system was easily adopted.

The second issue at hand was production scheduling. Despite three-year sales growth of $29 million to $85 million, just one person handled scheduling for the division. At the start of the project, essentially no production scheduling was in place. We decided against use of the scheduling package in the MIS system as it required too much manpower to implement and instead implemented Kanban-type scheduling. For this type, we created cards for each job, hung boards at the beginning work stations, and placed the cards on the boards in the priority we desired. To change the schedule, we rearranged the cards. The scheduling manager told me he had never seen as effective a scheduling process.

The division general manager wanted to know where every job was any time. We installed radio frequency barcode scanners and had barcodes on the Kanban cards. As the product moved from department to department, the cards were scanned indicating that specific activities had been completed. Real-time information allowed us to monitor the production at any time in any of the four manufacturing facilities.