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"A Lean Accounting Curriculum"

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"A LEAN ACCOUNTING CURRICULUM"

by

Jake Lewis

**Thesis submitted in partial fulfillment
of the requirements for the degree**

of

**HONORS IN UNIVERSITY STUDIES
WITH DEPARTMENTAL HONORS**

in

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Statement of Purpose

This paper is written as a part of my honors thesis. My objective for my thesis was to develop a curriculum to be used in the classroom here at Utah State University, on the subject of lean accounting. This curriculum includes a set of lecture slides, selection of an assigned textbook, a case study assignment, and a DVD. Also compiled were several other optional materials that may be used as supplements to the aforementioned set of materials or as a means to briefly cover lean accounting in another course if so desired. This paper contains a brief summary of lean thinking and explains many fundamental principles of lean accounting. It also records the efforts of my thesis and describes the compiled materials.

The Customer

Customers, quality, and profit. Three very important words in the modern business world. Take care of the first two, and the third should quickly follow. Or should it? Most businesses today boast that they focus on the customer, that they are, in fact, "customer-driven." If this is true, however, why is the thought of contacting customer support one of the most abhorred concepts currently for individual consumers and business clients alike?

It is my theory that customer dissatisfaction occurs for at least one of two reasons: one, because the customer paid for more than he or she wanted; or two, the customer did not get the quality, performance, and availability that he or she expected. In either case, one finds a discrepancy between the customer's desired value of the product and the actual product value delivered. Both of these problems are solved when a business honestly asks the question, "What activities really add value to the customer?" To assist in answering this question, let me first outline the three types of business activities: (1) those activities which truly add value to the customer, (2) those activities which are waste, but which are currently necessary due to government regulations, technology, etc. (Type One *muda*), and (3) those activities which are unnecessary and only create waste (Type Two *muda*). *Muda* is a Japanese term meaning waste. (Womack 20).

A customer does not want to, nor should have to, pay for waste in products and services. A customer does not want to incur the holding costs while his/her desired product sits in a warehouse for 3 months. Nor does he or she want to pay for the extra labor required to rework a car that just came off the assembly line. Unfortunately, even a casual observer of the average firm will notice that *muda* is in fact, everywhere.

Introduction to Lean Thinking

Enter *lean thinking*. Lean is not just a business strategy or a cost-cutting scheme. Lean is a complete philosophy where all non-value added steps are removed, through appropriate leadership and management systems for all essential resources. In the ideal situation, an activity is not performed unless it adds real value to the customer. Lean thinking provides a way to first and foremost specify value. The remaining step are to then determine how to line up value-creating actions in the best possible sequence, to conduct these activities without interruption whenever a product or service is requested (a true pull system), and to do this more and more effectively. Jim Womack put it best when he said, "In short, lean thinking is *lean* because it provides a way to do more and more with less and less- less human effort, less equipment, less time, and less space—while coming closer and closer to providing customers with exactly what they want." (Womack 15).

Although the ideas of lean manufacturing have been around for more than 20 years, they are still fairly new to the U.S. Jerry Solomon, one of the leading experts on lean and lean accounting, estimates that only 80-90 U.S. companies have successfully completed implementation of lean manufacturing principles to date. (Solomon, "Successful Lean" 1). The number of companies that are in the process of adapting lean

manufacturing methods is easily twice as high. For companies that have completed the transition to lean *accounting* principles, the number is much lower, probably not more than 30 or so. This is caused by several factors. First, lean manufacturing has been around longer and is therefore more well-known. Most accountants today haven't even heard of the term *lean accounting* before. Besides the larger amount of literature available on the subject, lean manufacturing is also more easily understood than lean accounting, thus facilitating an in-house oversight of implementation; whereas consulting services are standard protocol for any company desiring to adapt a lean accounting model.

However, as is the case with lean manufacturing, there are hundreds of companies that have committed to conquer the accounting leg of the lean journey. At the First Annual Lean Accounting Summit in 2005, there were 267 representatives from 143 public and private business entities and educational institutions. At the Second Annual Summit in 2006, those numbers almost doubled, as the conference saw 470 participants from 227 various organizations. So although lean accounting is still in its infancy, its growth is sure to come as more and more businesses begin to apply lean manufacturing principles. With the continued help of professional organizations ranging from engineering to accounting, the creation of more discussion groups and forums every year, and the inclusion of its principles in the classroom, lean accounting will be able to continue to mature and expand until it becomes a part of every business's culture.

Fundamentals of Lean Accounting

Hopefully now that the reader has a basic understanding of the philosophy of lean, we may now move on to describe lean accounting. There are two basic, interdependent

sides to lean accounting: 1) Account for the implementations of lean manufacturing, and 2) Apply the principles of lean thinking to the accounting processes (Kennedy, "Lean Accounting" 4). One of the key principles of lean accounting is to use and report financial measures that can be understood by anyone. It hinges on the aspect of lean thinking that company data should be available to as many people as possible. In concept, this seems to be a widely accepted business principle, yet so many companies only report financial data to their management, usually taking a few hours each month to explain the metrics used. We will discuss it later in detail, but at a lean enterprise, shop floor employees have quick access to the data regarding their products and cost centers so that they may be allowed to offer suggestions for improvement and innovation in the processes, thus contributing to the overall efficiency of the company. An anonymous, SME (Society of Manufacturing Engineers) engineer well versed on the subject said lean accounting is a simple way to:

- Measure performance
- Reduce transactions
- Give a valid assessment of the financial impact of improvements
- Develop value stream costing to measure contribution margin
- And lean accounting naturally drives the business toward customer value

The Need for Lean

But why the need for a completely new method of accounting? We've been using the same standard costing systems for decades, and they seem to be doing just fine, right? Well, there lies the problem. The accounting methods we use today were developed in the early 1900s to support the mass production business model. Traditional reporting was

also geared towards presenting an accurate view of the company to outsiders, whereas the focus of lean is to help managers continuously improve their operations. Back in the early 1900s, a company's cost structure would typically consist of 60% direct labor, 30% materials, and 10% overhead. Overhead was such a small portion that it didn't really matter if it was allocated correctly or not. (Cunningham 87).

Today, most manufacturing processes include only a minimal amount of direct labor, between 5 and 15%, says David Arnsdorf, president of the Alaska Manufacturers' Association in Anchorage. (Kroll 5). As one can see, it doesn't make any sense anymore to apply overhead through direct labor. Another difference in lean accounting is that inventory really isn't an asset. Traditionally, inventory is used to manage uncertainty and to buffer against performance problems, which in the end avoids the real issue of reducing uncertainty and solving problems. In contrast, a true lean enterprise carries minimal inventory. It takes up floor space, requires handling costs, and ties up your cash flow. Honestly, would you rather have a wad of cash, or a large, dusty box?

Not only does inventory tie up cash, but the calculations used to arrive at inventory valuation are becoming less and less accurate. As Jim Womack, president of the Lean Enterprise Institute, points out, "Historically, there's been a bias to overvalue inventory, because you presume it all will sell at market price. However, products stocked in inventory often become obsolete before sold, forcing the company to sell them for less than market (and book) value. (Kroll 6).

If the reader is at all familiar with standard costing, he or she must infallibly let out a soft groan at the mention of the word "variances." It is definitely not one of the favorite topics even among accountants. Companies have entire databases committed to

tracking variances between the standard rates and the actual rates of production for such items as material costs, material usage, labor rates, production time, and so on. Many companies have just put the variances into their budgets. The author has worked with seasoned accountants that, before every month's overhead expense meeting, had to go back and review what the variances actually represented (only the more common variances of course, as there were many inexplicable numbers no one cared about).

Once again, lean has a solution to all that *muda*. Instead of using rates and variances that are nearly impossible for most non-financial people to understand, lean promotes a system where everybody can comprehend the financial metrics, which leads to *transparency* throughout the organization. This leads to employees who are more responsible and more empowered to contribute to greater company efficiency. It takes much less effort to simplify the financial reports than to attempt to train the other 90% of the workforce in accounting. Using lean principles, accountants will spend less time explaining what the numbers mean, and more time assisting in resolving issues and finding improvements.

Because standard accounting systems do not reflect the impacts of lean improvements, it is critical that lean accounting is implemented right from the first step of a company's lean journey. This is especially important because in addition to not accurately reflecting good lean improvements, standard cost measures will actually show negative impacts due to lean changes because of the variances and such so often used in standard manufacturing accounting. (Maskell, "What's It All About?" 35).

Brian Maskell stated that nearly all companies implementing lean accounting have been turning down highly profitable work, out-sourcing products or components

that should be made in house, or manufacturing overseas products that could be competitively manufactured here at home because of the inaccurate metrics used in their accounting. (Maskell, "What's It All About?" 35).

Let it be clear that lean accounting has nothing personal against standard cost accounting; as there are several other business items that push against lean, such as MRP systems, HR systems, union agreements, etc. In order to reap the full benefits, lean must become a part of *every* department, transaction, product, and employee.

Value Stream Mapping and Costing

So how exactly does lean accounting work? Well for starters, costs are not categorized by department, but rather by value stream. Brian Maskell, in a presentation at the 2006 Lean Accounting Summit, defined a value stream as, "All the processes required to create value for the customer; organized as a team accountable for increasing value and profitability through continuous improvement."

A value stream should be organized for a family of products which have a similar production flow. A value stream should include all of the costs a company incurs as it takes a product (family) from design and the supplier all the way to the customer. Costs associated with customer support, purchasing materials, and collecting sales payments should be included if possible. The value stream team should be a reasonable size--Maskell suggests a team of 25-150 people. More importantly however, the team should include all the people and processes that support that particular production process. The value stream should also be extended as much as possible up and down the stream to the customer and the suppliers. (Maskell, "Value Stream Costing" 12).

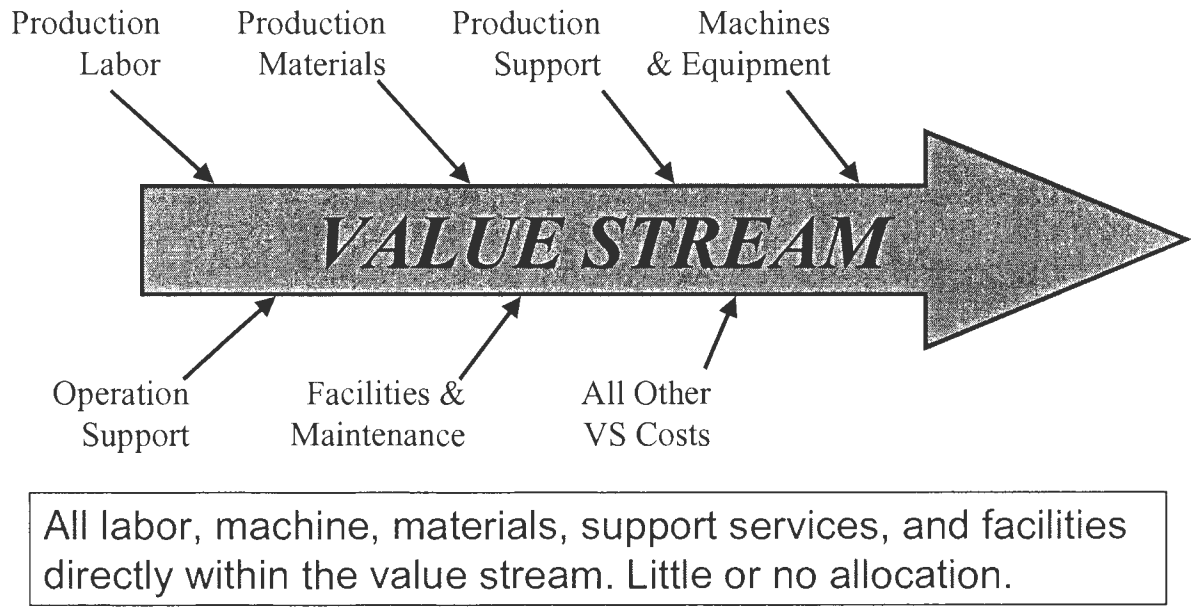

Figure 1. Costs Included in Value Stream costing

If one finds the task of defining a value stream too difficult to grasp, Maskell simply suggests to "staple yourself to a customer order." A value stream should only be defined for product lines with significant business. A typical business might have 3 major value streams, with a fourth value stream containing the remaining portions of the business.

Ideally, each employee and machine should be assigned to a single value stream. Any costs that are unassignable, such as corporate overhead, should be included below the line, where a company will report a corporate hurdle rate, or a minimum return-on-sale percentage that the value stream is required to meet. There is no point in trying to allocate costs to the value stream, as the team members have no control over them. You must not hold an employee responsible for something that he or she cannot influence. However, Bruce Baggaley, of BMA, Inc., does suggest using one allocation of the facilities costs to the value stream, as an incentive for the team to minimize the space

used. This allocation should include rent, utilities, and building maintenance, and be applied by cost per square foot. (Baggaley, "Costing" 25).

The value stream costs for a company we will refer to as "Electronic Components Inc." is shown in Table 1. Electronic Components is a manufacturer of controllers used in automated manufacturing machinery. Note that employee costs, such as purchasing, customer service, accounting, and IT are all included in the value stream's costs in addition to the direct labor and material costs.

	Material Cost	Outside Cost	Employee Cost	Machine Cost	Other Cost	TOTAL COST
Customer Service	-	-	12,109	-	-	12,109
Configuration	-	-	-	-	-	-
Purchasing	-	-	16,145	-	-	16,145
Loop 1 SMT	358,512	-	17,080	16,956	20,000	412,548
Loop 2: Hand Load/ Wave /Post	25,608	-	23,485	2,016	-	51,109
Loop 3: Test & Rework	-	-	17,080	3,528	-	20,608
Assemble & Burn-In	128,040	-	10,675	-	-	138,715
Shipping	-	-	2,669	-	-	2,669
Quality Assurance	-	-	8,073	-	-	8,073
Mfg. Engineering	-	-	8,073	-	-	8,073
Maintenance	-	-	8,073	-	-	8,073
Accounting	-	-	8,073	-	-	8,073
Human Resources	-	-	-	-	-	-
Information Systems	-	-	4,036	-	-	4,036
Design Engineering	-	7,760	4,036	-	-	11,796
Test Engineering	-	-	-	-	-	-
	$ 512,160	$ 7,760	$ 139,606	$ 22,500	$ 20,000	$ 702,026

Table 1: Value Stream Costs for the Component Products Value Stream--Electronics Components, Inc.

Costs for the value stream are typically aggregated for a weekly period. Labor costs are the sum of the wages and direct benefits paid to the value stream team members. Under the stipulation that inventory is low and under control, material costs are simply the cost of the items purchased for that value stream. This technique also assumes that materials are consumed in the same period as purchased. An average product cost may be calculated by simply dividing the costs for the period by the number of products

produced. This calculation is more accurate proportionally to the similarity of the products produced in the value stream. (Baggaley, "Costing" 26).

The advantages of a value stream approach allow a business to formally define which activities really add or create value to the customer. This also aids in identifying areas of waste as well as obstacles to a true pull or one-piece flow system. As waste and other issues are more readily apparent, a business may begin process improvement, creating growth and profit. Specifically, it eliminates the need for hundreds of cost centers, which contribute to thousands of *muda* transactions of purchasing, overhead allocation, and other expenses every month.

Lean Financial Reporting

As previously discussed, a large part of lean accounting is getting useful, easy to understand numbers to those who can use them- whether they're on the shop floor or in a corner office. We already know the variances in the traditional-style income statement don't do anyone any good. Orrie Fiume emphatically states, "The average recipient of a standard-cost based profit and loss statement does not understand the document in his hands. It communicates nothing. Worse still, for those few who do understand it, these statements fail to give meaningful information about what is really happening in the operation." (Cunningham).

A "plain English," or lean, income statement segregates expenses into readily identifiable pools of labor, materials, assignable overhead such as facilities and support labor, and any others. Any changes in inventory as well as corporate overhead allocations appear below the line. A company will usually establish a minimal hurdle

rate equal to the incremental cost of capital, which a value stream or division must meet in order to remain profitable.

Traditional Income Statement

	Period 1		Period 2	
REVENUE				
OEM	$998,977		$1,039,440	
Systems	$1,002,466		$1,009,246	
	$2,001,443		$2,048,686	
Cost of Goods Sold	$1,621,169	81%	$1,687,800	82%
GROSS PROFIT	$380,274	19%	$360,886	18%
ADJUSTMENTS				
Purchase Price Variance	($60,466)		($59,467)	
Materials Usage Variance	$94,533		$96,733	
Labor Variance	($19,718)		($93,895)	
Overhead Absorption Variance	$38,341		$182,577	
SG&A	$129,689	6%	$135,215	7%
NET PROFIT	$197,695	10%	$99,723	5%

"Plain English" Income Statement

	Period 1		Period 2	
REVENUE				
OEM	$998,977		$1,039,440	
Systems	$1,002,466		$1,009,246	
	$2,001,443		$2,048,686	
Materials	$829,936	41%	$849,526	41%
Direct Labor	$305,767	15%	$312,984	15%
Support Labor	$340,245	17%	$342,421	17%
Machines	$113,862	6%	$116,550	6%
Outside process	$60,043	3%	$53,731	3%
Facilities	$40,250	2%	$41,200	2%
Other Costs	$12,009	0.6%	$9,664	0.5%
TOTAL COST	$1,702,112		$1,726,076	
GROSS PROFIT	$299,331	15%	$322,610	16%
Inventory Adjustment	($41,593)		($161,426)	
Corporate Allocations	$60,043		$61,461	
NET PROFIT	$197,695	10%	$99,723	5%

My Own Lean Journey

I think it is worth mentioning how I was introduced to lean thinking. I think it started my junior year of college when I had a business operations course, and learned about the importance of product flow and constraints, citing "The Toyota Way" nearly every week. The previous summer I had worked at a local warehouse, which, I am sad to say, gave me an excellent example of what not do, and opportunities to imagine how things could be improved. My next summer I took the accounting cost management course, where we read *The Goal, Code Blue*, and *Who's Counting?*. *The Goal* introduces the theory of constraints, but its focus on creating value and cash profits supports lean thinking. *Who's Counting?* is a wonderful novel that introduces the concepts of lean accounting very gently. As the months went by, articles on lean accounting from "Strategic Finance" caught my eye and continued to wet my appetite of this cutting-edge philosophy.

This all provided me with a wonderful perspective of how inefficient the average business is, and what amazing results may be achieved by just challenging traditions and thinking outside the box. I realized that although only a handful of firms had implemented lean accounting as part of their lean journey, this was the direction of the future of business and accounting, and it would be to my advantage to learn as much about it as I could.

Thus the decision to do my honors thesis on lean accounting was made. Since then, I have read several books, countless articles, and even had the privilege to attend the 2nd annual Lean Accounting Summit in Florida earlier this year, with the assistance of the Shingo Prize organization and ASUSU (Utah State's student government). I don't know

if many at USU realize the wonderful advantage and immense opportunities made available to students and professors alike by having the Shingo Prize here on campus. Lean principles can be applied wherever you go.

Putting aside the obvious need for education on lean manufacturing, the Accounting Department here at USU must find the time to teach its students lean accounting. The opportunities and resources are here, we only need to take advantage of them. Rosemary Fullerton for example, who has attended the Lean Accounting Summit both years, has continued in her emphasis of manufacturing accounting while on sabbatical this year as she has worked with Jerry Solomon, author of *Who's Counting?* and one of the leading experts on lean accounting. Irvin Nelson also attended the Lean Accounting Summit in Florida this year. Professor Nelson's interest in including lean accounting in his course became the driving motivation for my thesis.

Developing Course Materials

Originally, my goal was to develop a small set of materials that Professor Nelson would use in teaching lean accounting to the undergraduate cost accounting course he teaches each semester. However, as he found out that he would be teaching a new course for the MAcc students in 2007, he thought they would be a much better audience for my work.

Therefore, my goal for my thesis project was to select required reading materials, a set of lecture slides for the professor, a case study assignment for the students, and any other additional materials that would aid in the students' understanding of lean accounting practices.

So after much deliberation between various choices of books and/or supplemental articles, it was decided that Professor Nelson's graduate students would be required to purchase the text Practical Lean Accounting by Brian Maskell (approximately $50.00), providing a very solid basis to the concepts of lean accounting that would be scheduled for a significant portion of the course. Two other great books that we considered, Real Numbers by Jean Cunningham and Orest Fiume, and Lean Thinking by Jim Womack and Daniel Jones already are used in other graduate courses.

Maskell's Practical Lean Accounting is quite comprehensive in its coverage of lean accounting, and is filled with charts, models, and other visuals to facilitate the reader's understanding of the subject as much as possible. Maskell also has a fictitious electronics company that is followed throughout the book in examples of value streams, costing methods, box scores, etc., complete with commentary and additional explanations. The book also includes a CD which contains various charts intended for the student to complete from the fictitious electronics company to further assist in the learning process.

Furthermore, I have spent a significant amount of time collaborating with Dr. Frances Kennedy from Clemson University, who has been kind enough to share a set of slides she uses in teaching lean accounting at Clemson. The slides give an overview of lean accounting, discuss cells and appropriate metrics, value streams and value stream costing, and finishes with lean accounting financial reports and how to assess the benefits of implementing lean accounting. I am especially impressed with the detail and simplicity that is used in regards to the subjects of cells, value streams, and value stream

costing in Dr. Kennedy's slides, as these generally seem to be the more difficult parts of lean accounting to grasp.

I also compiled a case study that should be an excellent tool for the graduate students to show what they have learned of lean accounting. The scenario was actually written by Peter C. Brewer from Miami University in Ohio and Dr. Kennedy. It was published in *Strategic Finance* in the Sept. 2005 issue, as the IMA 2006 Student Case Competition. In all honesty, it was the only case I could find on the subject (not that it isn't a great case study), and I concluded it was much better than anything I myself could produce.

Additionally, I recommend the use of a DVD produced by the Society of Manufacturing Engineers (SME) for the teaching of lean accounting in the classroom. It is entitled, "Manufacturing Insights: Lean Accounting," and covers a great overview of lean accounting methods led by visuals and explanations by two of the subject's experts, Brian Maskell and Orest Fiume. It is only 33 minutes in length, and would therefore be a wonderful aid in teaching basic lean accounting principles to any business class.

Aside from these basic materials I have just described, I have also compiled several other sets of slides on lean accounting basics and value stream costing, as well as numerous articles that could be used to supplement the Practical Lean Accounting text, or introduce lean accounting concepts in any other class if so desired.

While I myself have only just begun the lean journey, it has already proven to be one of excitement, adventure, and even far off places. It truly has made me exercise the muscles in my brain – sometimes to the point of frustration and exhaustion – for which growth I am quite grateful. It has been wonderful to delve into the world of lean thinking

and its counterpart of lean accounting. This thesis opportunity has already benefited me greatly, and I know that as I grow older and begin to make my mark in the world, the practices of lean and lean accounting will forever follow in my wake.

*I would sincerely like to thank the USU Honors Program for all they have done for me while here at USU. I would recommend the program to every student who is genuinely interested in learning. I would also like to express my gratitude for my thesis advisor Dr. Randy Cook, as well as Dr. Irvin Nelson, Dr. Rosemary Fullerton, Dr. Frances Kennedy, Ross Robson of the Shingo Prize, and the ASUSU student association. Each of them has played an essential role in this project. Thank you.

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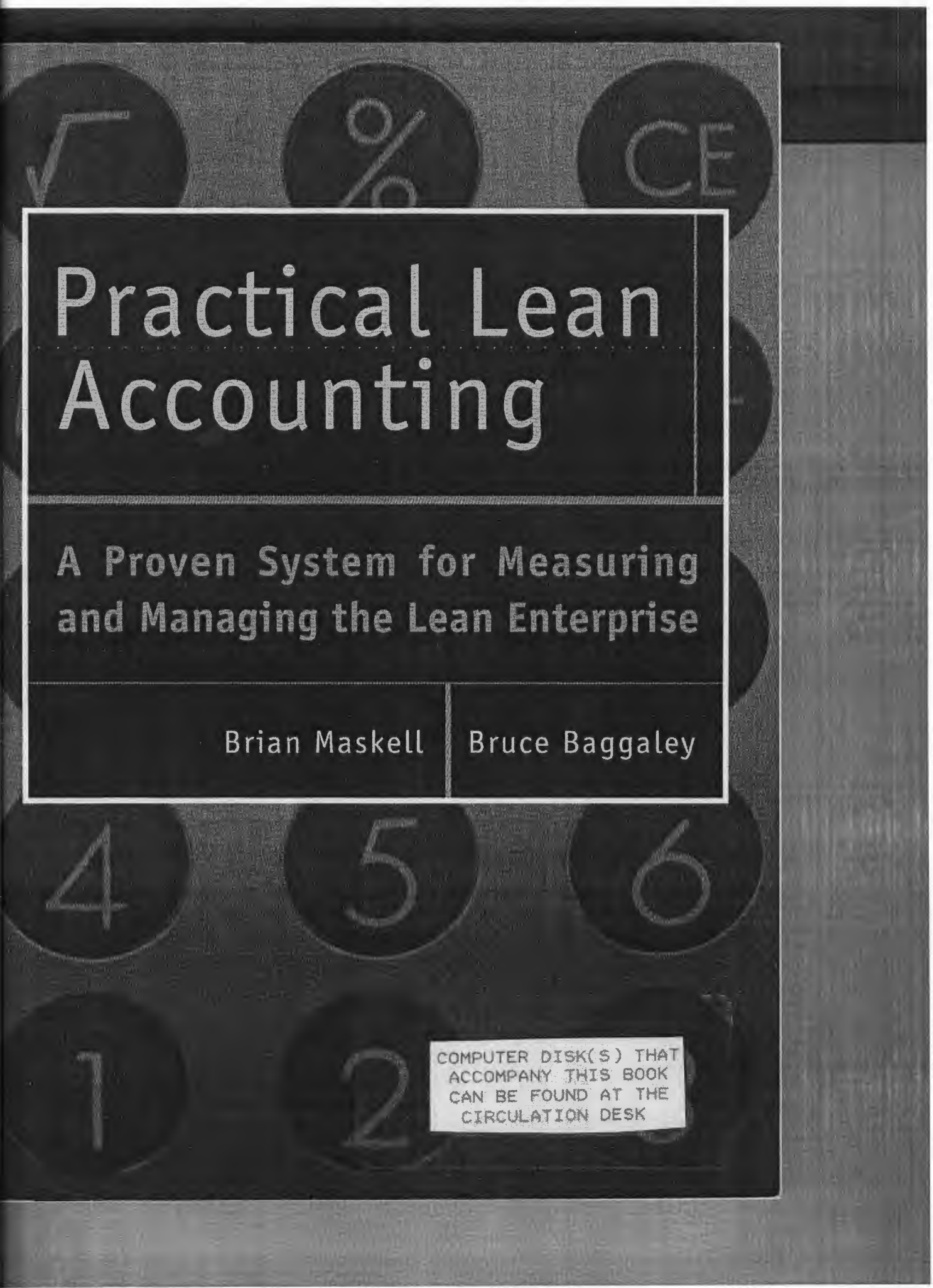

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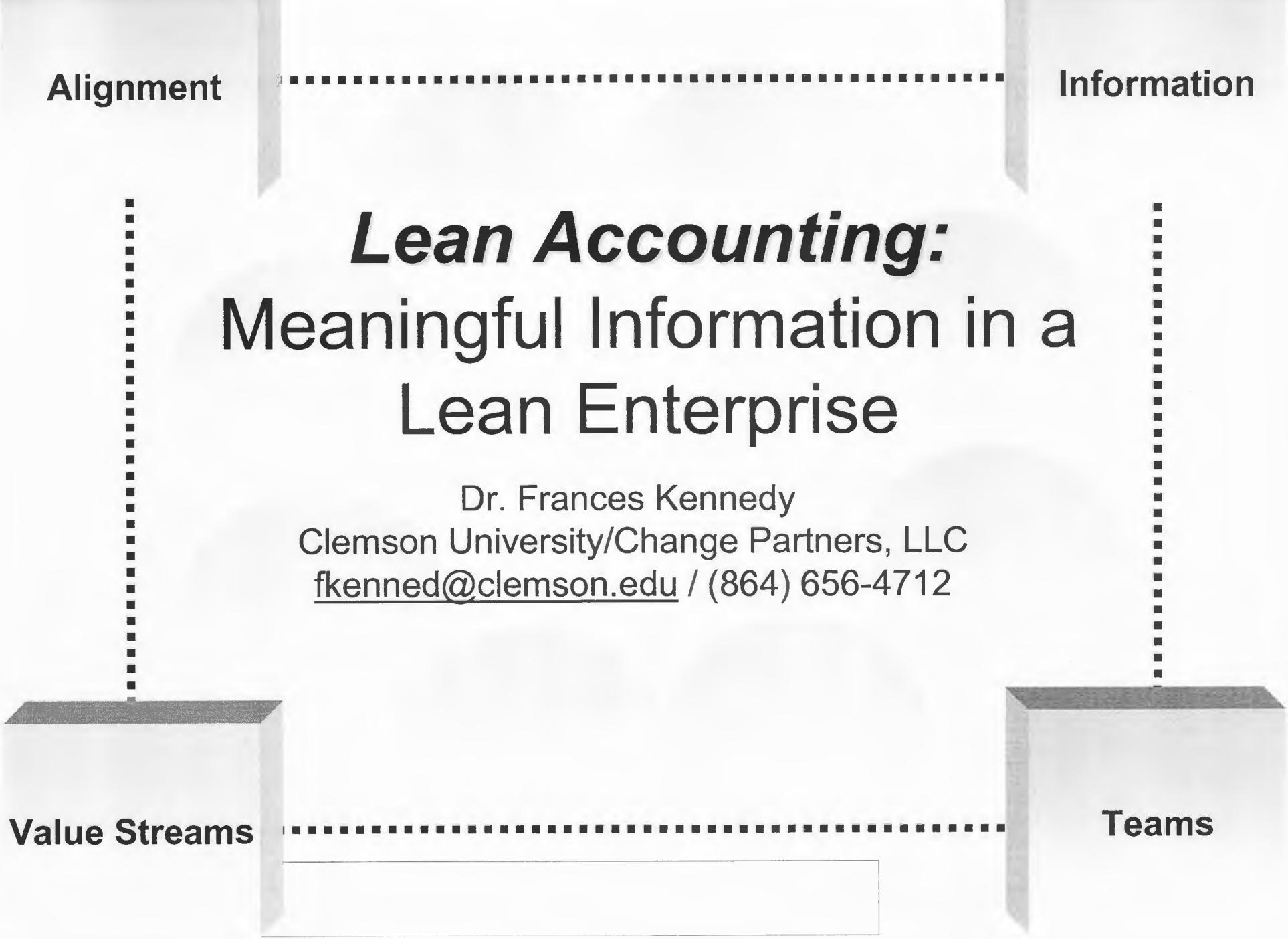
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The Student Case Competition is sponsored annually by IMA to promote sound financial/accounting analysis and presentation skills.

CREATING A LEAN ENTERPRISE

The Case of the Lebanon Gasket Company

By Peter C. Brewer, CPA, and Frances A. Kennedy, CPA

The Lebanon Gasket Company (LGC) hired Tom Walsh as the plant manager of its Topeka, Kans., facility in January 2004. LGC was impressed by Walsh's 20 years of experience as a manufacturing engineer, including four years of employment as a manager in Toyota's Georgetown, Ky., facility. Walsh's charge at Topeka was to turn around a plant that had been suffering from declining profits and margins, excessive waste and inventory levels, unsatisfactory on-time customer delivery performance, and shrinking market share. His game plan for overcoming these problems was to focus on one core strategy—operational excellence. He intended to abandon the mass production mind-set that had guided the Topeka plant since its inception in 1979 in favor of the lean thinking approach that he had seen work effectively at Toyota.

After 18 months on the job, Walsh and his co-workers had accomplished many goals related to the plant's lean transition. Two value streams and four manufacturing cells were up and running. The lean training program was proceeding on schedule. The production, engineering, and maintenance employees had started to buy-in to lean thinking. Customer order-to-delivery cycle time had drastically improved, which, in turn, was growing sales. Nonetheless, the financial results were disappointing. The absorption income statements shown in Table 1 indicated that the plant's return on sales had continued to decline from the 11.5% that was reported for the fourth quarter of 2004. To make matters worse, organizational infighting was at an all-time high—the Finance Department was blaming the Production Department for the plant's declining performance and vice versa.

As Walsh stared at his plant's 2005 quarterly income statements and reflected on his stressful refereeing duties between Finance and Production, he wondered aloud: "Where do I go from here?" Perhaps it was time to have a conversation with his finance manager to explore the role accounting should play in a lean enterprise.

TABLE 1: LGC ABSORPTION INCOME STATEMENTS

(For the quarters ended March 31 and June 30, 2005)

	Quarter ended 3/31/2005	Quarter ended 6/30/2005
Sales	$4,022,755	$4,182,214
Cost of Goods Sold	2,909,477	3,049,357
Gross Profit @ standard	1,113,278	1,132,857
Adjustments:		
Direct Material Variance	24,485	28,065
Direct Labor Variance	31,380	37,562
Overhead Variance	64,527	88,880
Scrap	34,392	26,782
Total Variances	154,784	181,289
Gross Operating Margin	958,494	951,568
Operating Expenses		
Selling Expenses	96,006	97,670
Shipping*	429,797	432,047
Total Operating Expenses	525,803	529,717
Net Operating Income	$432,691	$421,851
Return on Sales	10.8%	10.1%

* Shipping expenses include salaries, occupancy cost, and supplies.

THE PLANT AND ITS PRODUCTS

Topeka's head count has held steady in recent years at about 109 employees (see Figure 1 for an organization chart as of January 2004). The plant relies on two main manufacturing processes—injection molding and extrusion molding—to produce a variety of rubber sealing systems for automotive, healthcare, plumbing, and telecommunications applications. Three main product families—OS1, TX4, and KC13—are produced in the injection molding process. More than 100 product models are produced across these three-product families. Two main product families—LX22 and KB8—are produced in the extrusion molding process. More than 75 product models are produced across these two-product families.

In the injection molding process, small resin pellets are fed into a machine where they travel down a large screw that carries them to the molding cavity. As they move down the screw, the pellets are melted to form a liquid compound that is injected into a mold. While in the mold, the liquid is cooled using a combination of water and air. The mold eventually opens and the completed part drops onto a conveyor belt where it continues to cool until it reaches a machine operator. The injection molding machines are expensive pieces of equipment that constrain the pace of production within this process.

In the extrusion molding process, small pellets are heated and transformed into a liquid compound. Instead of shooting a predetermined amount of compound into a mold to form a completed part, however, the liquid compound flows in a continuous stream through a shaping mold. The resulting tubular product is then heat treated and either cut to a specific length or spliced into hollow circular seals to meet the customer's requirements. The heat treating activity constrains the level of output from this process.

THE LEAN ORGANIZATION

Figure 2 shows a Topeka plant organization chart as of June 2005. A total of 109 employees are shown in this chart, which corresponds to the total number of employees shown in Figure 1.[1] The fact that these two numbers correspond isn't an accident because Walsh had made a conscious effort to retain all employees when transitioning to lean production based on the belief that layoffs

FIGURE 1: LEBANON GASKET COMPANY (TOPEKA PLANT) ORGANIZATIONAL CHART PRIOR TO LEAN REORGANIZATION (total head count = 109 employees)

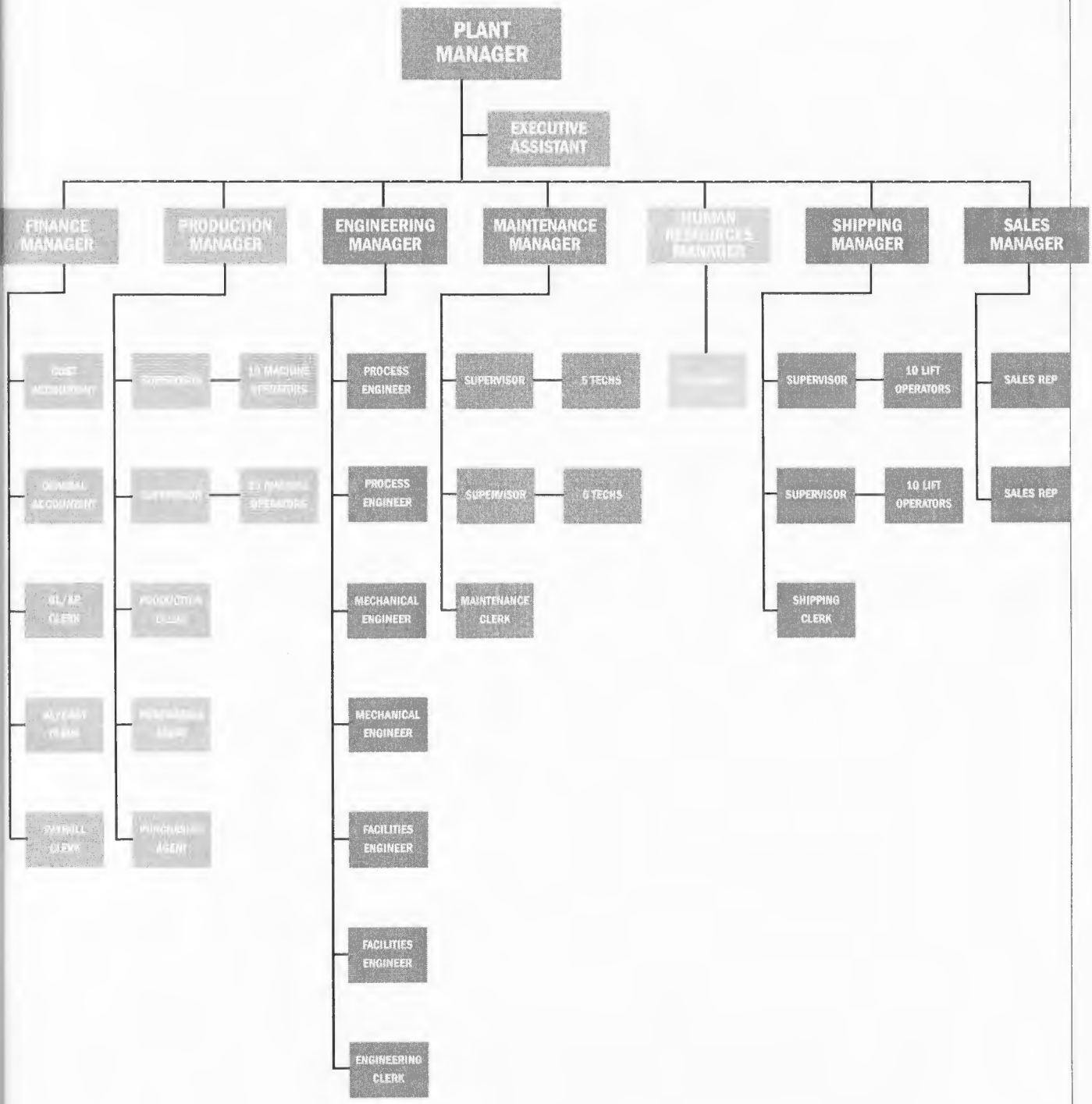


FIGURE 2: LEBANON GASKET COMPANY (TOPEKA PLANT) LEAN ORGANIZATION CHART (total head count = 109 employees)

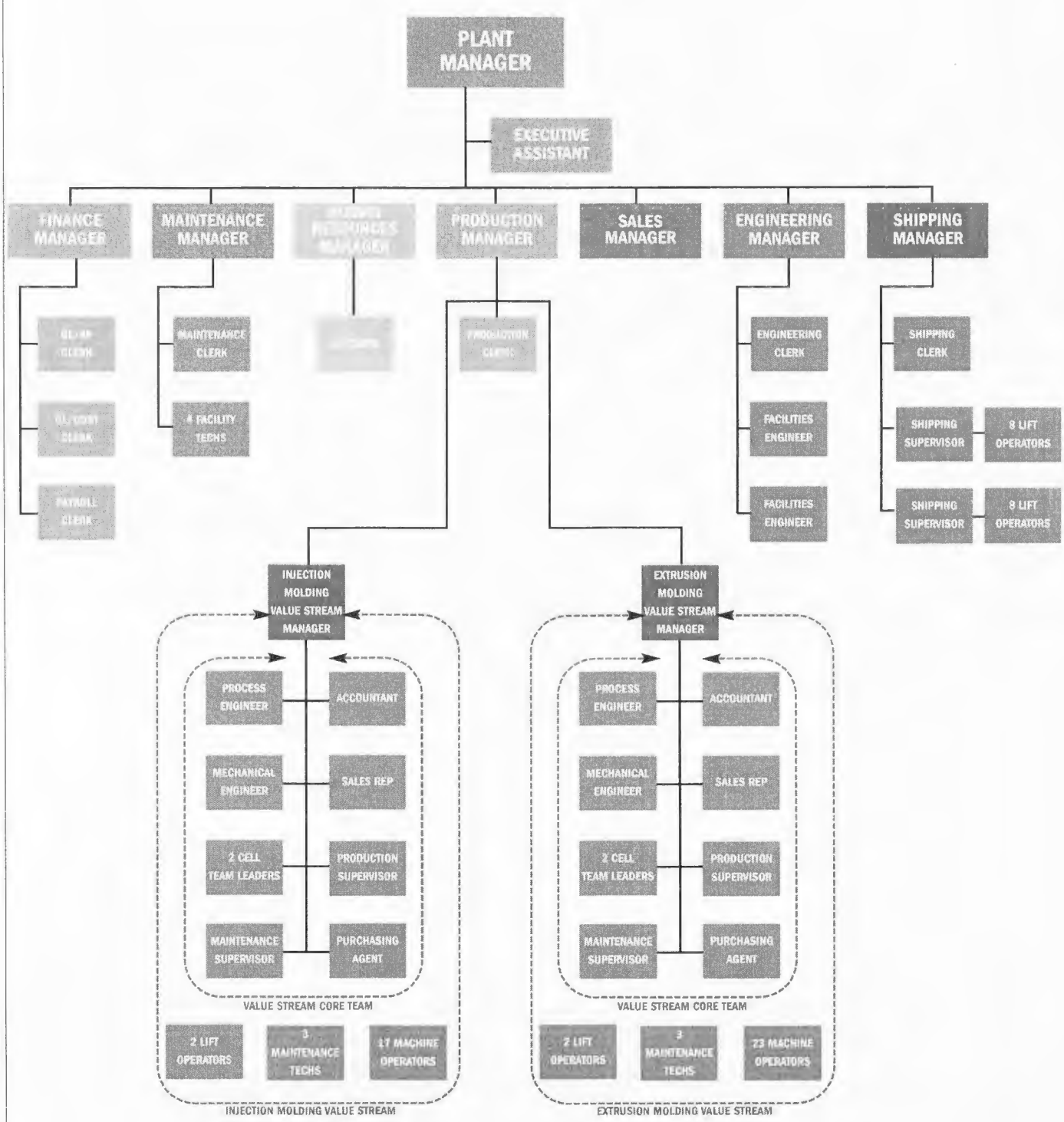
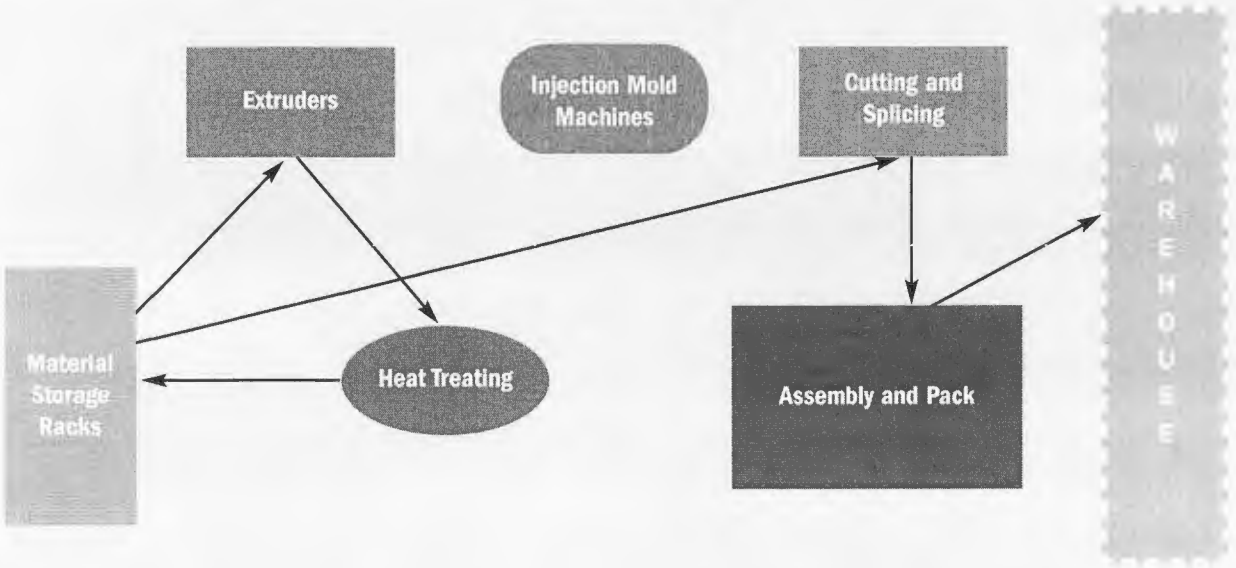


FIGURE 3: TOPEKA PLANT: FUNCTIONAL PLANT LAYOUT

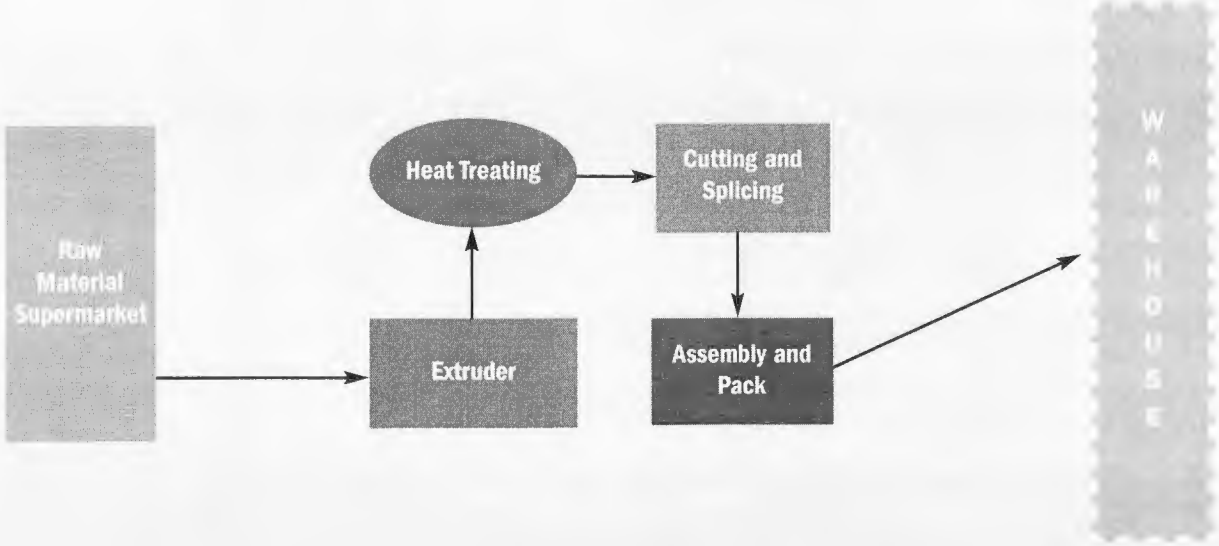
(arrows depict extrusion molding product routing)



* The product routing depicted above covers approximately 300 yards.

FIGURE 4: TOPEKA PLANT: EXTRUSION MOLDING MANUFACTURING CELL

(arrows depict extrusion molding product routing)



* The product routing depicted above covers approximately 140 yards.

would lower employee morale and decrease the likelihood of a successful lean implementation.

As Figure 2 indicates, Topeka's lean plant layout contains two value streams—one for the injection molding process and one for the extrusion molding process. Each value stream team is represented by one value stream manager. Although the value stream manager can be chosen from any of the functions represented on the value stream core team, the individual selected should have substantial manufacturing process knowledge and strong leadership skills. Both value stream teams report directly to the Production Manager and have cross-functional representation from every department within the plant except the Human Resources Department.[2] Each value stream contains two manufacturing cells as indicated by the fact that there are two cell team leaders on each value stream team.[3]

MASS VERSUS LEAN PRODUCTION

Implementing the lean approach dramatically changed the goal of the Topeka plant's manufacturing processes and the routings for all of its products. Previously, the goal of the plant's mass production process was to achieve the lowest possible cost per unit by maximizing employee and equipment productivity. Figure 3 shows the plant layout that was used to achieve this goal (the arrows in the exhibit depict the routing for products made in the extrusion molding process). Notice that all of the plant's resources were organized functionally. In other words, its heat treating, assembly and pack, cutting and splicing, injection molding, and extrusion molding resources were maintained in physically separated and autonomously managed departments. Units of production were scheduled based on a forecast of expected customer demand and then processed in large batches to minimize changeover costs. Work-in-process inventory was stored as needed in between work stations. Supervisors administered strong oversight to ensure that front-line workers met productivity standards. The purchasing agent frequently pitted numerous suppliers against one another in a bidding war to drive down raw material costs.

As a point of contrast, Figure 4 shows one of the two manufacturing cells within the Topeka plant's extrusion molding value stream. The goal of the plant's cellular-oriented lean approach is to deliver customer-driven value. Resources are organized in a manner that mirrors the linked set of activities that deliver products to customers. Units of production are pulled through manufacturing cells in a one-piece flow in response to actual customer orders. Cross-trained cell workers are empowered to collaborate with one another to continuously improve performance within the cell. Raw materials are frequently replenished by a limited number of long-term suppliers through the use of visual cues called kanban cards.

THE FINANCE FUNCTION

Tom Walsh was an engineer, not an accountant. He always believed that if he properly managed the manufacturing floor, the financial results would take care of themselves. Yet after his first 18 months at the Topeka plant his rule of thumb had not held true. In an effort to understand the plant's unsettling financial performance, Walsh decided it was time to truly acquaint himself with the role of the finance function within his plant. He set up a meeting with his finance manager, Mike Dwyer, and asked him to provide an explanation for the plant's shrinking return on sales.

Although Dwyer started by describing the plant's department expense reports that compare actual costs to budgeted costs for each functional department, he quickly began to focus his comments on defining the attributes of the plant's standard costing system. He explained that the standard costing system provides the foundation for the plant's: (1) cost-plus pricing system that is used by the sales staff to bid on new business opportunities, (2) monthly variances analysis reports that are used to facilitate operational control on the manufacturing floor, and (3) incentive system that is used to evaluate and reward the performance of employees within each department. Dwyer argued that the plant's poor performance was due to three operational inefficiencies. First, the purchasing agents were paying too much money for raw material inputs as indicated by the unfavorable direct materials variance on the income statements shown in Table 1. Second, direct labor efficiency was at an all-time low as indicated by the unfavorable direct labor variance on the income statements. Dwyer suggested that the low labor efficiency highlighted a cost-cutting opportunity that could be realized by laying off a few laborers. Finally, the plant's equipment utilization and overhead cost recovery were nose-diving as highlighted by the unfavorable overhead variance on the income statements.

THE NEXT STEP

After Walsh's meeting with Dwyer, four things became very clear. First, Walsh was confused by the language of accounting. Terms such as variances and overhead absorption were difficult for him to understand to say the

TABLE 2: LEBANON GASKET COMPANY (TOPEKA PLANT)— PRODUCT FAMILY INFORMATION

(unit cost information is averaged across all product models)

		Injection Molding			Extrusion Molding	
		OS1	TX4	KC13	LX22	KB8
Unit Cost						
Material		$0.093	$0.148	$0.129	$0.587	$1.101
Labor		$0.046	$0.069	$0.050	$0.261	$0.289
OH		$0.086	$0.148	$0.148	$1.650	$1.400
Total Unit Cost		$0.225	$0.365	$0.327	$2.498	$2.790
Sales Dollars	March	$195,118	$399,642	$432,003	$1,227,003	$1,768,988
	June	$187,599	$375,366	$414,282	$1,323,012	$1,881,954
Units Sold	March	542,960	684,319	825,694	350,853	452,890
	June	556,900	685,600	844,612	365,261	465,247
Units Produced	March	534,290	662,498	808,723	354,972	442,099
	June	550,900	650,430	885,900	360,890	450,890
Units Processed per Hour:						
Extrusion		n/a	n/a	n/a	1,080	1,110
Injection		2,040	1,650	2,050	n/a	n/a
Heat Treating		n/a	n/a	n/a	970	920
Cutting and Splicing		n/a	n/a	n/a	1,250	1,280
Assembly and Pack		2,760	2,600	2,400	1,100	1,150

FACILITY INFORMATION

	March 2005	June 2005
Occupancy Costs		
Utilities, Insurance, Property Taxes, etc.	$ 372,000	$ 396,000
Janitorial, Security, and Grounds Maintenance*	$ 62,000	$ 54,000
Building Depreciation and Repairs	$ 87,835	$ 95,835
Corporate Allocation	$ 84,874	$ 97,670

*These services are performed by outside contractors.

TABLE 3: TOPEKA PLANT— VALUE STREAM INFORMATION

		Injection Value Stream	Extrusion Value Stream
Raw Material Inventory			
Beginning Inventory	March	$ 156,920	$ 372,690
	June	$ 142,450	$ 368,759
Ending Inventory	June	$ 112,461	$ 333,048
Material Purchases	March	$ 237,594	$ 691,189
	June	$ 231,789	$ 672,426
In-Process Inventory			
Beginning Inventory	March	$ 79,850	$ 156,980
	June	$ 56,750	$ 102,578
Ending Inventory	June	$ 32,698	$ 34,890
Finished Goods			
Beginning Inventory	March	$ 120,568	$ 230,890
	June	$ 78,493	$ 187,432
Ending Inventory	June	$ 60,361	$ 58,126
Equipment Related Costs	March	$ 139,098	$ 357,682
(repairs, depreciation, parts, etc.)	June	$ 149,378	$ 384,116
Other Costs	March	$ 8,407	$ 14,799
(selling supplies, travel, etc.)	June	$ 9,840	$ 15,030
Square Footage**	March	57,500 s.f.	112,500 s.f.
	June	47,500 s.f.	105,000 s.f.

** There are 250,000 square feet in the facility, 62,500 feet of which are in the warehouse. The remainder is shared office space and unused production space.

AVERAGE ANNUAL SALARIES*

Position	Salary Amount
Plant Manager	$ 125,000
Executive Assistant	$ 33,000
Sales Representative	$ 72,000
Clerks	$ 27,500
Accountant	$ 52,000
Engineer	$ 65,000
All Managers	$ 80,000
All Supervisors (including purchasing agent)	$ 45,000
Technicians	$ 36,000
Forklift Operators	$ 32,000
Machine Operator	$ 26,000

* Salary amounts do not include 30% fringe (e.g., insurance, payroll taxes).

least. Second, Walsh wasn't comfortable with the thought of laying off employees. He felt that his employees were intellectual assets that should be optimized to grow sales, not an expense that should be minimized whenever possible. Third, Walsh had a "gut feel" that something wasn't quite right with the standard costing approach. The accounting conventions that Dwyer described had been in place since 1979 when he was hired as the plant's finance manager. It seemed to Walsh that if the production process had been changed dramatically, the finance function ought to adapt accordingly. Fourth, it was obvious that Dwyer was disinterested in the whole lean concept. He had more than 30 years of experience with standard costing, and it defined his view of how to run a manufacturing facility. Furthermore, Dwyer was planning to retire in the near future and didn't have an interest in critically reviewing his department's procedures and reporting practices.

Walsh decided he needed a fresh perspective on the role accounting should play within his plant. Although he tended to have an adverse reaction to the word "consultant," he realized that consulting advice was exactly what he needed. After reviewing proposals from three consulting firms, Walsh hired Lean Enterprise Development from Chicago, Ill. He asked the consulting firm to help him answer three questions:

1. Do the traditional accounting practices that the Topeka plant adopted in 1979 to support its mass production process have value in a lean environment? Explain the specific reasons that support your answer.
2. How can the accounting function better serve our senior management team's strategic planning, control, and decision-making efforts within its current lean environment? Specifically, address issues related to capacity planning, aligning employee incentives with lean goals, and product mix decision making.
3. How can the accounting function better serve the needs of our value stream teams and manufacturing cells in their efforts to optimize performance? Specifically address issues related to value stream profitability analysis, linking strategic goals to operational performance measures, and eliminating non-value-added transactions and activities.

In an effort to answer these questions, the consulting firm reviewed the Topeka plant's operations and accounting practices for two weeks and gathered the data shown in Tables 2 and 3. Walsh anxiously awaited the answers to his questions as well as the firm's overall recommendations.

THE ASSIGNMENT

Assume that you are employed by Lean Enterprise Development. The principal in charge of this engagement has asked you to create a draft of the presentation that answers Walsh's questions.

SUPPLEMENTAL RESOURCES

B. Maskell and B. Baggaley, *Practical Lean Accounting*, Productivity Press, New York, 2004.

K.M. Kroll, "The Lowdown on Lean Accounting: A New Way of Looking at the Numbers," *Journal of Accountancy*, July 2004, pp. 69-76.

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Watch for the authors' future article in Strategic Finance: *"Lean Accounting: What's It all About?"*

ENDNOTES

1 The value stream managers depicted in the dotted-line boxes shown in Figure 2 are chosen from the members of the value stream core team. Therefore, it would be redundant to count the value stream manager boxes when tabulating the head count of 109 employees.

2 Each employee on the value stream teams maintains dotted-line accountability (which is secondary in importance to their primary accountability to the production manager) to their respective functional manager.

3 The cell team leaders are shown as machine operators in Figure 1.