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)

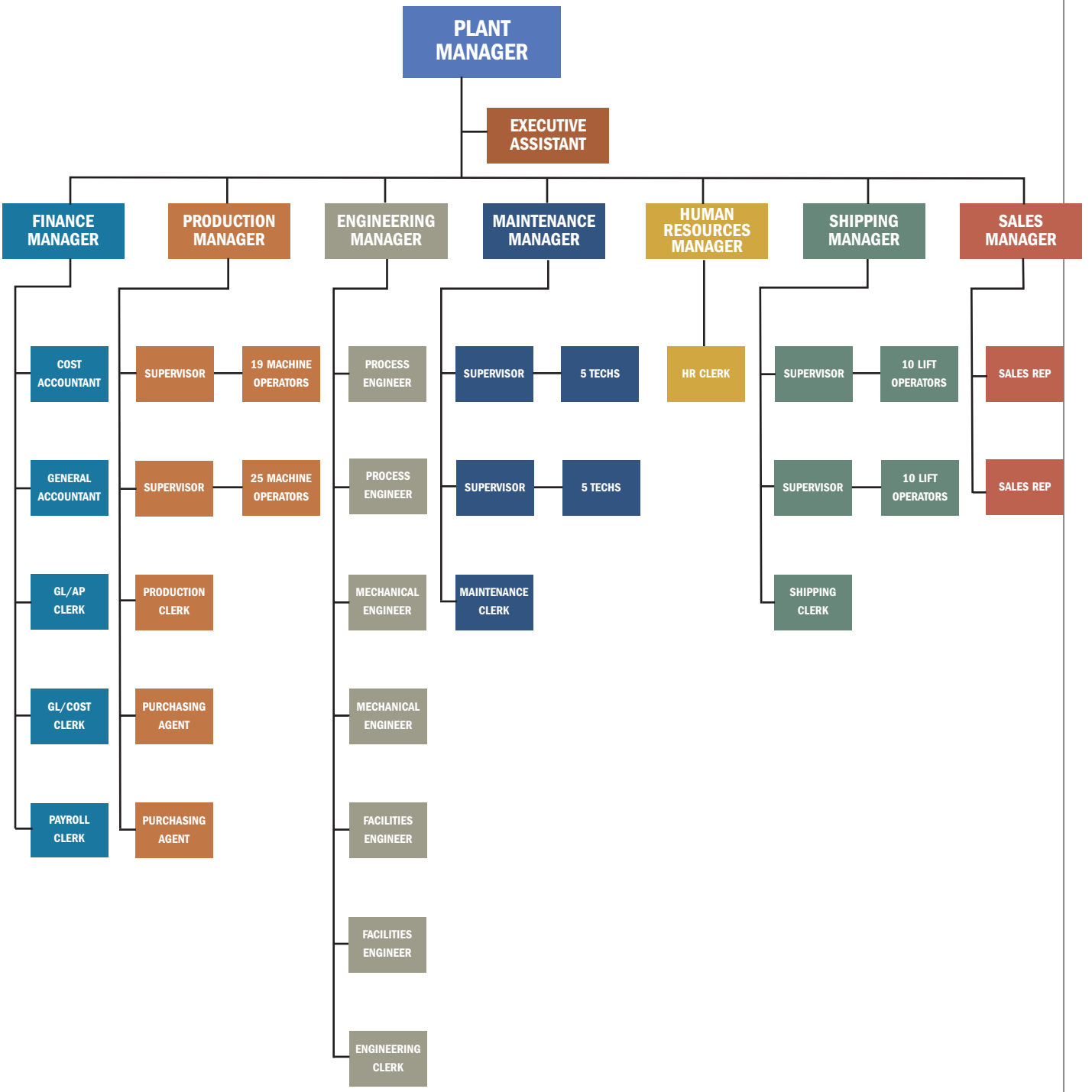


FIGURE 2: LEBANON GASKET COMPANY (TOPEKA PLANT) LEAN ORGANIZATION CHART (total head count = 109 employees)

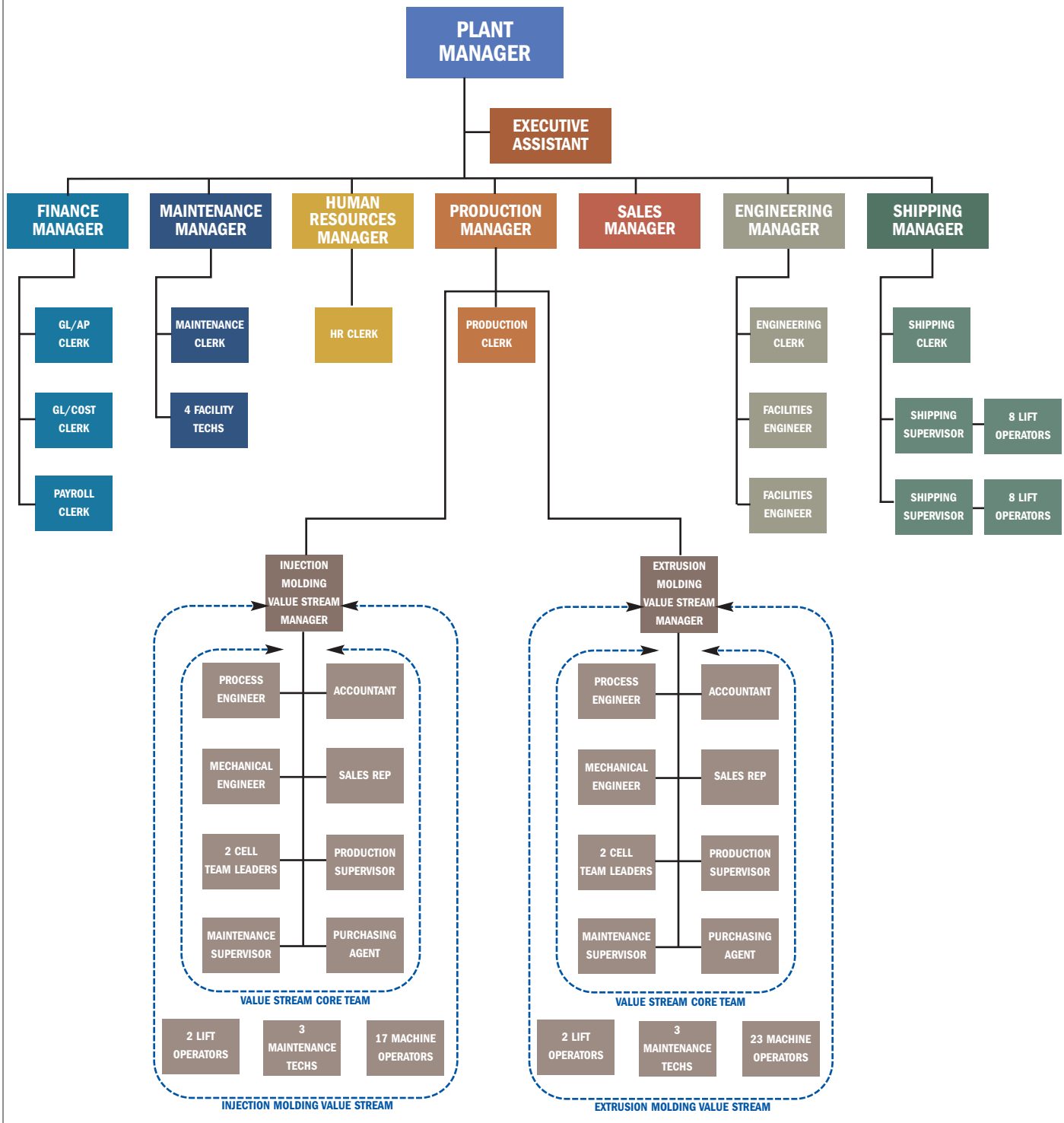
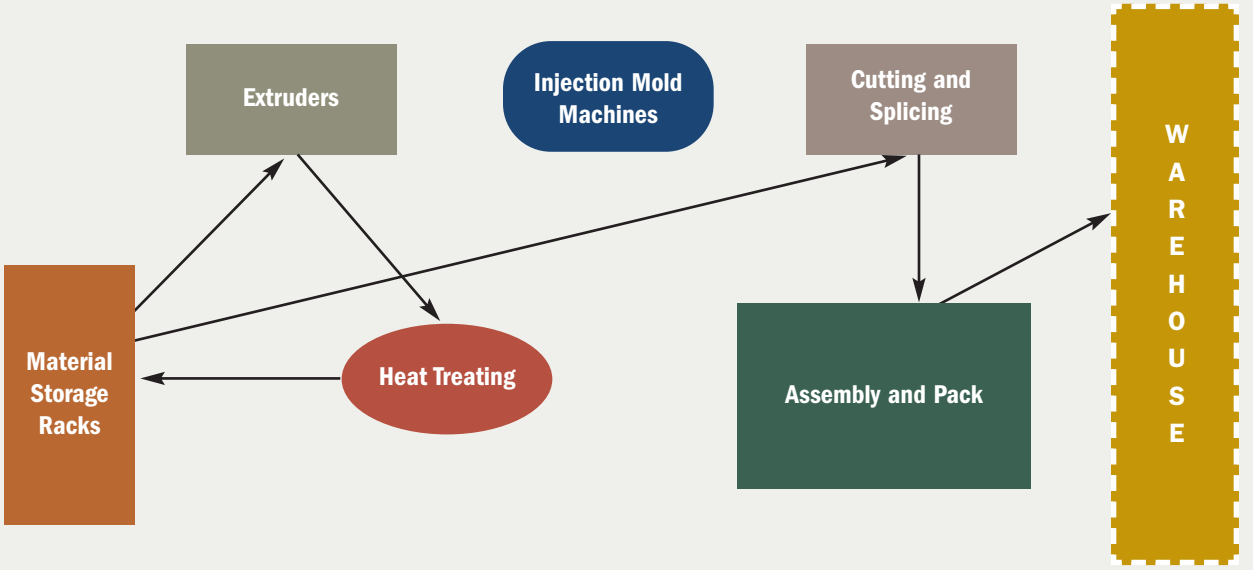


FIGURE 3: TOPEKA PLANT: FUNCTIONAL PLANT LAYOUT

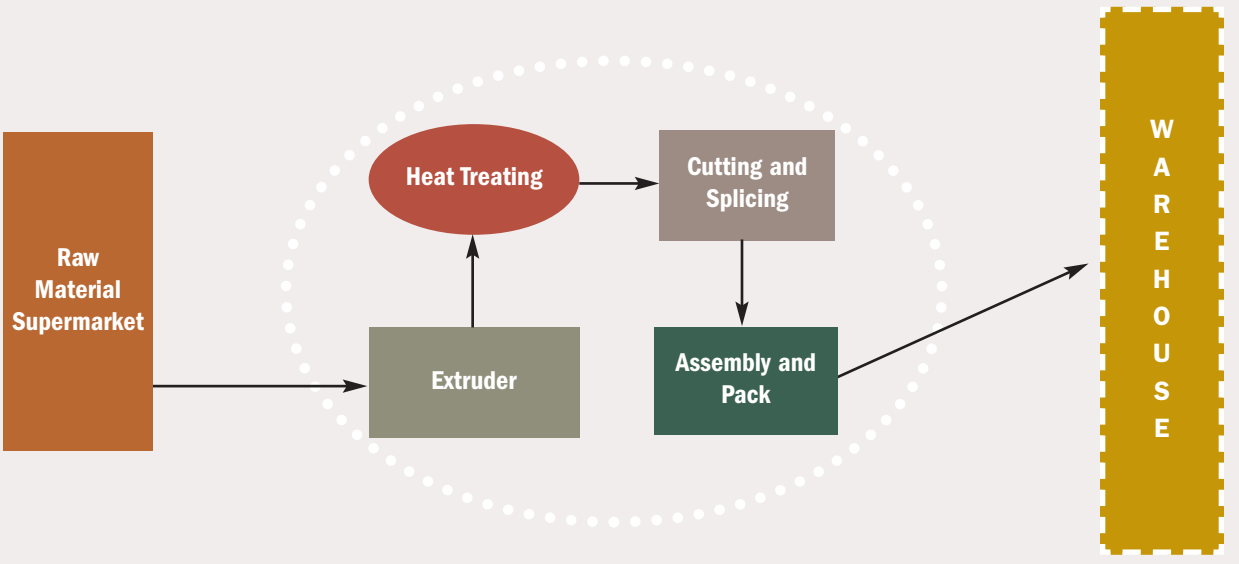
(arrows depict extrusion molding product routing)



* 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.

Peter C. Brewer, CPA, is associate professor, Department of Accountancy, Miami University, Oxford, Ohio. You can reach him at brewerpc@muohio.edu.

Frances A. Kennedy, CPA, is assistant professor, Department of Accounting and Legal Studies, Clemson University, Clemson, S.C. You can reach her at fkenned@clemson.edu.

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.