

# Opposing Teams?

## TOWARD A NEW MODEL OF ACCOUNTING IN THE ERA OF LEAN

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Imagine a day in the life of a factory manager. He/she hears the needs of sales management for repeatable and predictable product delivery with shorter lead times. He/she hears the demand of his own boss for efficient use of resources and lower costs through lean manufacturing methods. Finally, there is the financial department calling for absorption of the overhead and (in an apparent contradiction) lower inventories. At month end, financial reports appear with the familiar variance numbers: labor efficiency, overhead absorption and spending, material usage, and price.

Sadly, these competing claims and contrary measures are juggled daily by manufacturing executives at the plant

and senior levels. The plain fact is that accounting measurements, conceived at the turn of the nineteenth century, are no longer relevant at the turn of the twentieth century. The measurements of the standard cost era were established at a time when customers were docile about service, inventory was a virtue, and lean was a term applied to a not very desirable cut of meat.

Those who were expecting a reconciliation of traditional accounting measures should beware. This article exposes the inherent contradictions of traditional accounting and represents a call to replace counterproductive measures with simpler and more relevant ones. Recognizing that generally accepted accounting principles (GAAP) require that we value inventory using fully absorbed costs and that we use such concepts as LIFO and FIFO in financial statements, we don't have to use them in managing manufacturing operations. Let's look at the flaws of the current accounting approach and then explore new ways of measuring operations and profitability.

### **Standard and actual**

THE OLD ACCOUNTING calls for companies to consider how well operations is doing financially by calculating and reporting variances between standard costs and actual costs. To do this we

### **At-a-Glance**

- Current accounting measures were established in a very different time—namely, a time when customers weren't as demanding as today and inventory was seen as a good thing.
- For accounting to be effective in a lean operation, certain methodologies and concepts need to be re-examined.
- A new approach can be taken to accurately measure operations and profitability.

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report costs at two levels: the aggregate cost level and the unit cost level. In the aggregate, they are reported as total dollars—e.g., total labor, total depreciation, total utilities—and at the unit level they are reported as costs per unit. Here's how most of this dysfunctional system works or, more accurately, doesn't work to measure manufacturing in the era of lean.

**Manufacturing overhead and absorption.** Manufacturing overhead traditionally consists of what accountants call "period" costs. These are expenses associated with the passage of *time* compared to those associated with the *volume* of production or sales. Such expense items (or costs) as real estate taxes, plant management salaries, depreciation, and other so-called non-variable costs are classified as manufacturing overhead.

From an expense control perspective these types of costs can be compared against the budget established for them on a monthly basis to determine if spending is being held within planned limits. So far, so good—but the manufacturing accounting establishment of the 1899-1900 era decided that such period costs should be expressed on a production unit basis as if they were, in fact, variable. To accomplish unitization of these passage-of-time related manufacturing overhead costs, they were expressed as a percentage of a presumably variable cost—direct labor. Actually, the calculation is more complicated with allocations of common costs among various cost centers and, often, individual rates for different centers. But, no matter. After all the arithmetic was done, this aggregation of period costs was expressed as a unit cost based on the content of direct labor expended in the making of the product.

To further complicate things, the twin concepts of overhead absorption and variances from standard absorption were introduced. Simply stated, these work as follows. When production is less

than budget, the unit cost will increase, causing much consternation among cost-minded management. Conversely, with production higher than budget, unit cost declines, making management feel warm and happy. Ahh, but therein lies the rub: Spending on manufacturing hasn't changed; only the denomina-



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tor in the unit cost calculation has. The result of all this is an over- or under-absorbed overhead variance with "over" being preferred in financial circles.

By now it's becoming obvious how this works against lean manufacturing. Since manufacturing overhead costs are fixed by the period, more (not necessarily saleable) production is desirable, and this is totally at odds with the lean notion of producing in small lots to customer order or at least to a small stock buffer. When overhead isn't being absorbed, the financial department comes to plant management and orders them to get the costs down by producing more. Any plant manager with nerve endings to feel the lumps on her head caves in and, despite her lean programs, agrees to pile up more inventory.

Make no mistake—manufacturing absorption as a performance measure and lean manufacturing cannot coexist. One or the other must give way.

**Direct labor and labor efficiency.** One of the great myths of modern manufacturing is the strange idea that labor varies in *direct proportion* to production

volume. Labor may have been variable with output at the turn of the previous century but it hasn't been in a long, long time. Direct labor typically increments or decrements in plateaus or steps. For example, as production rises perhaps 20 or 30 percent, no crewing changes will be needed. But when the increase passes, say, 35 percent, a new labor plateau has been reached and fifteen more direct employees are needed.

Nonetheless, we measure labor management by the accounting convention of the labor "efficiency variance." Operating on the assumption that labor hours vary *directly* with output, we calculate this variance as the difference between earned hours—i.e., engineered hours per unit of production multiplied by the actual units produced—and actual clock hours. To make matters worse, we often bring the calculation down to the level of cost center or shop order.

The plant manager or foreman confronted with the monthly (and often weekly) labor efficiency variance knows that labor hours change in steps and that if the variance is favorable, he has not yet reached the next crewing step along the rising production curve. If it is unfavorable, he knows that he is locked to the current labor force plateau and production has not risen to a level at which labor is "efficiently" used. In the former case, he breathes a sigh of relief and in the latter, he prepares for a scolding. The plant manager, conscious of the potential for an unfavorable labor efficiency variance, will be on the lookout for ways to be producing more products (for inventory), whether they're needed or not.

Labor efficiency variance as a metric contradicts lean manufacturing. At the plateaus, it resembles overhead absorption—denominator becomes the focus. In lean, we encourage discontinuance of production (the denominator) when orders decline and we use direct employees on such indirect activities as total productive maintenance. In fact, the distinction between direct and indirect activities has no meaning in lean manufacturing.

**Purchase price variance (PPV).**

Purchase price variance is one of the favorites of the non-lean standard cost era. It too takes the focus away from lean ideas. The basic measurement is the actual price per unit of material less the standard cost per unit (usually set in the Fall of the previous year for companies on a financial calendar year) multiplied by the quantity of units received. The entire focus of PPV is on price, while the lean criteria—on time delivery, correct quantity, and material quality—are not measured. The pressure is therefore on the procurement department to get the lowest price and make the variance positive or, at least neutral, regardless of the lean issues.

Certainly, low purchase prices for materials are desirable. But if we are doing lean purchasing and setting long-term contracts in place with major suppliers, then the standard price and the actual price should not differ and the

variance would be nil. Where long-term contracts specify price escalation, we should change the standard price in the system at the time of the scheduled escalation to reflect the reality of the negotiated contract.

Finally, for those materials for which a long-term contract has not or cannot be negotiated, the notion that a purchasing agent can predict the price of such items during the Fall planning cycle and have a real chance of being correct far into the new year is a fantasy. If a purchasing agent could predict with accuracy that far into the future, he or she could have a lucrative career as a patron of the casinos. In these cases, standard costs in the system should be changed quarterly to reflect the current price reality combined with the purchasing agent's knowledge of what the next three months might bring.

Take the self assessment test in Figure

1 to see if your organization is in need of new metrics to encourage lean behavior.

### Toward a new model

IN ORDER TO dispense with the old measures we need a new accounting framework within which to cast lean manufacturing concepts. Much of lean manufacturing has roots in Eli Goldratt's book, *The Goal*, and its subsequent elaborations, *Theory of Constraints* and *Throughput Accounting*. These fundamental ideas direct us toward setup reduction, small lot sizes, and cycle time compression that minimize finished goods inventories. Further, they direct us toward the notion that throughput unfettered by a constraint is to be pursued in order to optimize the profitability of the manufacturing enterprise. Let's examine how we can bring these ideas together to create a managerial accounting framework that supports lean manufacturing.

**Cost thinking.** The old accounting model has some peculiar notions. Chief among these is the idea of costing, in which a noun is used as a verb. Through the odd arithmetic of overhead allocation, generic natural expenses are costed to a product. We are then led to believe that (activity-based costing notwithstanding) we can actually identify a causal relationship between, say, the materials management department or the accounting department or any of their natural expense classifications and a particular stockkeeping unit (SKU).

As if it wasn't strange enough that we try to bring expenses from their highest level of aggregation (the general ledger account) down to their lowest level (that of the individual SKU), we engage in a form of analysis and measurement that holds people responsible for such unit costs and we make market decisions based on them. This is "cost thinking" that puts the focus on allocation of expenses instead of controlling the dollars actually spent for them. The first step to a lean accounting model is to abandon cost thinking.

**Throughput: the real accounting measure.** Moving away from cost think-

### Figure 1: Lean Accounting Self Assessment Checklist

Take this self assessment to determine if you need to re-engineer your measurement of manufacturing to encourage lean operations.

	Yes	No
1. We have a month-end "hockey stick" of production to reach overhead absorption and sales goals.	<input type="checkbox"/>	<input type="checkbox"/>
2. We have long runs of production (in large lot sizes) to amortize set-up costs.	<input type="checkbox"/>	<input type="checkbox"/>
3. Purchase price variance is our primary measure of procurement effectiveness.	<input type="checkbox"/>	<input type="checkbox"/>
4. Capitalization of variances into inventory is a quarterly or annual exercise.	<input type="checkbox"/>	<input type="checkbox"/>
5. We don't have inventory turnover goals.	<input type="checkbox"/>	<input type="checkbox"/>
6. Writeoffs of obsolete or aged-out inventory is a quarterly or annual exercise.	<input type="checkbox"/>	<input type="checkbox"/>
7. Plant managers are held accountable for "unit" costs of labor and manufacturing overhead.	<input type="checkbox"/>	<input type="checkbox"/>
8. We hold foremen responsible for cost center labor and overhead variances.	<input type="checkbox"/>	<input type="checkbox"/>
9. Fill rate is not the responsibility of manufacturing.	<input type="checkbox"/>	<input type="checkbox"/>
10. We make marketing decisions based on fully "costed" product data.	<input type="checkbox"/>	<input type="checkbox"/>

If you answer yes to two or more of these self assessment questions, your lean program managers are getting contradictory messages from your accounting measures.

ing and into a lean accounting model requires that we recognize that the lean enterprise is optimized when throughput is maximized. In lean terms and in the terms of throughput accounting, throughput is revenue less material costs. Note that it is not production, which can be manufactured to inventory; it is the value of production (net of materials) *that is sold*. If this sounds like direct costing to readers who are accountants, it is.

When throughput is the measure, then the focus of the enterprise changes; we look for anything that constrains it. Looking for constraints and then dissolving them is the essence of the theory of constraints. When we let throughput be the accounting measure and become acclimated to it, we are now engaged in what could be called throughput thinking. Plant managers are now incentivized to a) dissolve constraints within the plant when sales is putting pressure on the resource or, b) produce only the amount demanded when the market is the constraint.

**What to do with expenses.** Having assigned material costs to the generation of throughput, all the rest of the costs represent the cost of being in business. They are simply those expenses that are related to the passage of time and can be managed with traditional spending control techniques. In fact, these expenses may be managed using activity analysis as is done in activity-based costing as long as it doesn't result in allocation to products. However expenses are managed, it must be remembered that the objective is to see them as a *planned and controlled constant* in the generation of maximum throughput.

**Is this really like direct costing?** Yes and no. To the extent that we are recognizing only materials as variable costs, throughput is, in direct costing parlance, variable gross margin. Similarly, expenses are being treated as related to the passage of time or as period fixed costs in direct costing terminology.

Without further examination, these elements of throughput accounting constitute direct costing.

But there is more to it. Product mix optimization decisions, instead of merely being a choice of the product with the higher variable gross margin, are now



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seen through the prism of the constraint resource in the plant. The decision as to the amounts of competing product to be made and eventually sold is dependent upon their respective dollar values of throughput per unit of time through the constrained resource. The product with the greater dollar value of throughput per unit of time through the constrained resource is inherently the more profitable.

For example, if a constrained resource is measured in minutes and product A has a \$15 per minute value of throughput through the constrained resource and product B has only a \$10 per minute value, product A will most

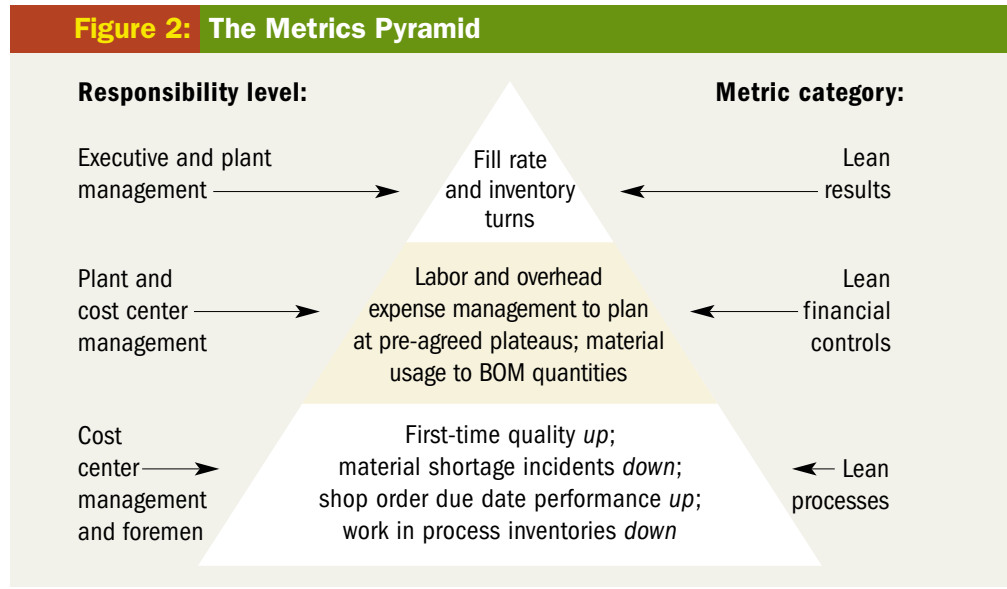
profitably exploit the constraint even if it's absolute throughput value (or variable gross margin) is smaller.

**What to do with the old accounting measures.** Amendments to GAAP with regard to overhead and labor absorption are not on the horizon (amendments to the U. S. Constitution probably take less time) and PPV is embedded in the typical MRP/ERP system. In the case of the former, minimization of finished goods inventory through lean manufacturing will ameliorate the absorption seesaw.

If we want to have a net income number on the company's profit & loss statement without the confusion of absorption, the accounting department can isolate the absorption dollar amount and show it as a separate line item after pre-absorption net income. In the case of PPV, two options are available: either ignore it altogether, or summarize it by commodity code and present it quarterly to show how we are doing compared to the very recent past.

**The new metrics**

Readers who have read lean manufacturing articles in recent issues of this magazine probably have a vague notion of what needs to be measured to encourage lean behavior. Setting effective metrics lies in connecting manufacturing measures with those



financial or market measures that senior management believes important to optimization of the enterprise. Figure 2 presents a pyramid of potential lean metrics.

**High level results and micro performance.** Recognizing that micro measures imposed from the top can be counterproductive to lean operations, the degree of aggregation of data will be the key to successful measurement. It therefore behooves senior management to set high level results metrics and then let the factory managers develop their own micro performance measures to hit them.

For example, two results metrics that will encourage lean behavior when taken together are inventory turns and fill rate. If a manufacturing manager is asked to have high inventory turnover, he or she will have to implement lean to achieve high turns or will have to sacrifice fill rate. This is an example of bal-

anced scorekeeping that leaves no room for plant managers to optimize one measure at the expense of another and forces them to implement lean and to set their own measures to achieve it. It makes no sense to hold a plant manager responsible for throughput. Fill rate will do nicely, for if the plant has a constraint that inhibits filling orders, the manager will be incentivized to dissolve it.

**The expense side.** Since we have abandoned absorption and unitizing of period costs, we can tie *controllable* spending to *plateaus* of throughput so that the controllable expense levels can be allowed to step up or down when sustained volume changes occur. For measurement of expense spending, a plant manager could be asked to submit budgets for three levels of throughput and then be expected to conform to the one that most closely approximates the current level of throughput. This approach is not flexible budgeting

redux; it is a variation on zero-based budgeting.

When the New York Police Department (NYPD) senior management began a program of measuring crime statistics by precinct (known in the NYPD as “COMSTAT”) and held the commanders responsible for the unfavorable trends, crime declined in the city. The NYPD management metrics program was focused on the results desired and they got what they measured: effective policing and less crime. It’s the same in manufacturing. You get what you measure. ♦

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