Lean Accounting Implementation

Steps to simplify cost management and improve profitability by confronting shop floor reality – while still satisfying GAAP

A case study of one company that has taken the Lean Accounting plunge and learned to swim a new stroke

If you use a shop floor management system, you are familiar with the frustration of trying to use job tracking reports to improve the bottom line. These reports are retrospective in nature, meaning that they give a snapshot of costing data after the deeds are done, usually in less than user-friendly language. They imply that you can manage manufacturing processes by analyzing job cost accounting numbers and reviewing the results.

Management shows the numbers to supervisors hoping that insights gleaned from the reports will drive improvements in efficiency or productivity, but those improvements are often elusive. Trends seem inconsistent form one period to the next with no real improvement in profitability. Global competitive pressures keep a tight lid on the extent to which price increases can help, so managers find themselves asking "what can we do on the shop floor to protect and improve profitability?"

Well, the answer is simple and direct – ***Confront Reality***. By "Reality" we mean accepting the fact that ***managing by results does not work*** in a lean organization and never has. To effectively manage profitability in a lean company, you should reconsider this management practice now—before it is too late—and consider implementing lean accounting practices that reflect the working reality of your shop floor. For managers who have experienced the transformative power of lean improvements, it should come as no surprise that ***it takes lean thinking to profitably manage a lean enterprise***.

Leveraging the Lean Advantage

Why does managing by results not work in lean organizations? It's simple; most supervisors, let alone operators and other shop personnel don't understand what the numbers on tracking reports signify. To satisfy Generally Accepted Accounting Principles (GAAP), your company is likely using some sort of allocation processes or variances to make the numbers comprehensive. This is done to ensure that the cost data are representative of the complete or total cost of operations. But for shop personnel (let alone cost accounting professionals), the reports wind up distorting what has happened in the manufacturing process to the extent that it is not recognizable to them in a meaningful way. In short, it does not reflect the reality they observe and work in every day, making it virtually impossible for your shop people to react with corrective measures that will drive better results. OK, point made, you say, "but **what *can* I do**?"

What you can do is **introduce Lean Accounting Methodology** throughout your company. To understand what lean accounting can do for your business, let's first take a look at what accounting in general is all about.

Accounting is nothing more than tracking inflow to outflow as a measure of profitability, which is governed by GAAP. Essentially, GAAP-driven accounting methods provide the "10,000-foot view" of the financial operations of a company. As these methods proliferate across the company and throughout the manufacturing process with sophisticated allocation and job-costing practices, complexity increases and everyday decipherability usually decreases. Lean Accounting Methodology simplifies and streamlines the accounting process without upsetting GAAP by replacing distorting, confusing and time-wasting parts of the process with metrics and analysis that is grounded in the language of the lean manufacturing processes—the "value stream flow process"—that you and your people have already successfully implemented. Figure 1 below gives a visual representation of Lean Accounting Methodology

Figure 1: Lean Accounting Logic

The Simple Logic of Lean Accounting

As the implementation of lean processes expands throughout the organization, the principles of traditional accounting theory become ineffective as a management tool. This is because the traditional approach is retrospective in nature (management by results) and tries to "steer from the back end of the process." This is wholly contradictory to the prospective, forward-looking nature of lean methodology. In the lean organization, value stream processes require a new take on management cost accounting, driving a new concept of "**Management by Means**" or "**Management at the Point of Action**." In the transition to lean accounting practices, traditional accounting practices GO AWAY: they are removed from operations or value stream flows.

In traditional financial accounting, data about labor, equipment, material, etc. enters the operational value streams (Inflow) and finished products exit the other side of those streams. These two data points can be sent through the 10,000 foot view of the financial accounting system to generate income statements and otherwise satisfy GAAP requirements. BUT this financial information NEVER enters the operation/value streams. The question on every business executive's

or owner's mind is HOW do we measure what happens in value streams and operations?

The Logical Answer:

1. Admit that traditional cost accounting methods do not and can not accurately and appropriately measure operational activity in lean organizations based on the value stream concept.

2. The underlying principles that guide lean implementation and the creation of value streams are **flow**, **self-improvement** and **problem resolution**. These principles must also be the foundation for ***properly designed, well executed and continually improving lean accounting systems***.

3. Focus on what is happening from moment to moment inside value stream operations using ***metrics that reflect lean practices and values*** in plain language and understandable analytics.

Value Stream Costing simplifies the accounting process to give everyone real information in a basic, understandable format. By isolating all fixed costs, value stream costing identifies the resources (direct labor, materials, supplies, etc.) consumed in the value stream. Costs represented in this way are easily applied to a given Value Stream through metrics that are accessible and understandable to the shop personnel who work every day in the cells or stations that make up the value streams.

Beyond the representation of direct manufacturing costs, any operating cost that can be effectively apportioned to a value stream, such as rent, utilities, or machinery expense, can be easily applied to value streams as a commonly understood value. People intuitively understand the nature of these costs from everyday life and can easily associate them with the space used in manufacturing processes that make up a value stream. For example, a metric representing these costs on a basis of the square footage utilized by a particular workstation is easy to grasp.

Such a factoring methodology—when broadly applied—can provide a truer picture of workstation cost consumption relative to value-added throughput for each value stream company-wide. As an example, if a workstation is found to include unused floor space that might be released for use in another value stream process, reducing the shop space utilized by the stream would correspondingly reduce the associated square-foot apportioned operating costs, while making way for better, more profitable use of the space in another value stream.

This approach to value stream costing is really a transition process that is completely dependent on a focused corporate vision; moving from Management by Results to Management by Means or at the Point-of-Action. The goal is a simplification of management accounting practices that focuses on what is actually happening at any given moment in the operations within value streams in a lean company. This means designing metrics that reflect and measure manufacturing activity according to the lean values at the foundation of the company.

In today's lean world, one company stands out—Toyota. At Toyota, the guiding management vision is expressed through their "True North" metrics, which include **growing the skills of the workforce**, **enhancing the quality of products**, **reducing the cycle time of production**, and **building profitability through productivity and cost management**. These four key areas of Toyota's True North metrics drive comprehensive, company-wide lean improvement efforts while still hitting all of the crucial figures on corporate financials. It is an example to be emulated and followed.

Sunset Manufacturing – A case study in lean accounting implementation

Sunset Manufacturing Company, Inc. is a state-of-the-art precision machining job shop serving the High Tech, Automotive, medical and aerospace markets. Over a number of years, Sunset's president, Jim Warren, developed a custom computerized shop floor data collection system to track and gather data from their traditional job costing and work flow processes.

Constantly seeking improvements in manufacturing methodology, Mr. Warren and the Sunset management team began implementing Lean Manufacturing practices in 2002. An intense kaizen event was staged for the purpose of value stream mapping the in-house work order data collection process. Representatives from business partner companies, outside consultants as well as Sunset management and shop floor personnel participated in the rigorous review.

The outcome was a much clearer understanding of the value stream flows within the company and the decision to unplug the custom shop floor data collection system. Analysis clearly showed that it was too costly, time consuming and inaccurate a tool to support critical management business decision-making. Warren's experience at the helm of Sunset had taught him that misleading data can result in disastrous management decision making. Reflecting on the insights revealed by several kaizen events, the Sunset team decided to develop, test and implement a "Kanban" work order card system that has proven to be a dramatic success and Sunset was well on its way to becoming a fully Lean company.

In 2004, Mr. Warren and Sunset participated in the startup of the Lean Accounting SIG (special interest group) in conjunction with the local lean consortium, Northwest High Performance Enterprise Consortium (NWHPEC). The purpose of the Lean Accounting SIG was to facilitate learning about lean accounting principles, methodologies and implementation strategies among business associates advocating lean manufacturing principles.

Through NWHPEC, Warren was contacted by Jim Huntzinger who was interested in what topics the group was working on. Learning of the group's interest in studying lean accounting issues, Huntzinger generously offered to loan his thesis "A Lean Accounting System For Manufacturing Companies" to the group for continuing study.

While familiarizing himself with Huntzinger's ideas and doing background research into related issues, Warren became familiar with the work of Alexander Church and his theory of reducing overhead expenses to direct costs or "production factors" as they relate to, or are consumed in, the manufacturing process. Church's theory describes a single piece flow where each machine in a manufacturing process continually produces a single component of the product and the output of all the machines in the larger product flow are coordinated to ensure the most rapid assembly of the finished product possible. The implication for manufacturing was a flexible approach to managing labor, raw materials and production machinery that would allow for their most efficient use in manufacturing any given product. Church believed that manufacturers should maintain an inventory of raw material that was just sufficient to support the flow of production, and he advocated a cycle of customer orders and production where product was sold and delivered as fast as it was manufactured.

Jim Warren recognized something very familiar in Church's views. The parallels with the value stream concept that Sunset was implementing were very strong, but it was obvious to Warren that Sunset confronted two limiting factors: First, as a custom "job shop", the composition of production flows—the value streams—would change based on the unique type of product that customers actually ordered, and Second, it was not feasible for Sunset to constantly reposition the large and heavy machinery in the shop to accommodate optimized flow. Warren knew that to implement a truly lean methodology, Sunset would have to take a hard look at work practices, categorizing all effort by processes and developing families of parts with similar flow characteristics. This approach would allow Sunset to organize or group machines for processing the particular family of parts in a hybrid flow process, eliminating wasted movements and lag time waiting for availability of the next process.

After intensive analysis, review and internal process modeling, the Sunset team developed six distinct value streams at the core of manufacturing operations:

Value Stream Description	Color Code
Toyoda 550 CNC Horizontal 3 machine Cell System	Red
Hitachi 500 CNC Horizontal 3 machine Cell System	Purple
CNC Horizontal and Vertical Milling Machines	Blue
CNC Turning Centers with live tooling and Robo Drills	Yellow
Auto Band Saw, CNC Turning laths and Horizontal Mill	Orange
Fixturing, Tooling, Maintenance & Shipping / Receiving	Green

The colors associated with the individual value streams are for the purpose of quick visual identification of activities, resources, metrics and performance measures unique to particular value streams. Color-coding also enable quick, intuitive and easy matching of other lean processes to a particular value stream. For example, color-coding Kanban cards to particular value streams facilitates easy match-up of costs to the area of consumption, and color-coded work-orders clearly identify the value streams they belong to. Sunset is also extending the color-coding schema to work-force assignments, purchasing and inventory, as well as customer sales, service and shipping. The simple visual aid of color is helping the Sunset team to fully integrate value stream costing practices throughout the enterprise

In a perfect “lean world” of manufacturing, employees would consistently be on target for takt-time and daily process improvements—right. But in the imperfect world where today’s lean manufacturing actually takes place, management needs a means of reliably gauging the shop floor reality in support of tactical as well as strategic business decision making. Reflecting on this problem—how to glean valid production data for decisive management action—Warren came full circle to the problem he encountered in the old custom shop management software application he had originally created for Sunset: How could he see what’s really happening within the value stream processes if the information he was receiving about the bottom line was in disarray? It became apparent to him that accounting in a Lean manufacturing environment was going to require the creation of appropriately lean financial reporting and management tools.

The Sunset team set to the task of developing value stream costing practices. They identified the resources that were consumed in each value stream and devised factors to represent them that were easily understood by supervisors and operators on the shop floor. To present data gathered from resource factoring in the value stream, Sunset devised a “plain English” profit and loss statement.

Current Value Stream Production

Blue Value Stream

Actual Cell Production	Blue Cell		
Revenue-Sales	$ 49,475.00		
Materials	$ 2,721.13	5.5%	
Subcontract	$ -	0.0%	
COG Override %	$ -	0.0%	
Value-Added Sales (VAS)	$ 46,753.88	100%	
Cell Daily Capacity Hours	48		
Cell Capacity Hours	1032	100%	
Production Hours	719	69.7%	

Produced Revenue	Monthly		Annually
Revenue	$ 49,475.00	15.2%	$ 593,700.00
Value-Added (VAS)	$ 46,753.88	18.5%	$ 561,046.50
ROA	$ 17,520.57	2.8%	$ 210,246.80
Profitability	$ 17,520.57	37.5%	$ 210,246.80

Actual Consumption	Monthly		Annually
Labor Factor	$ 15,321.76	18.2%	$ 183,861.12
MRF	$ 5,352.39	9.9%	$ 64,228.73
O&A	$ 6,761.43	9.9%	$ 81,137.21
Equip Factor	$ 1,000.00	1.3%	$ 12,000.00
PP Tax	$ 797.72	1.0%	$ 9,572.64
Total	$ 29,233.31	62.5%	$ 350,799.70

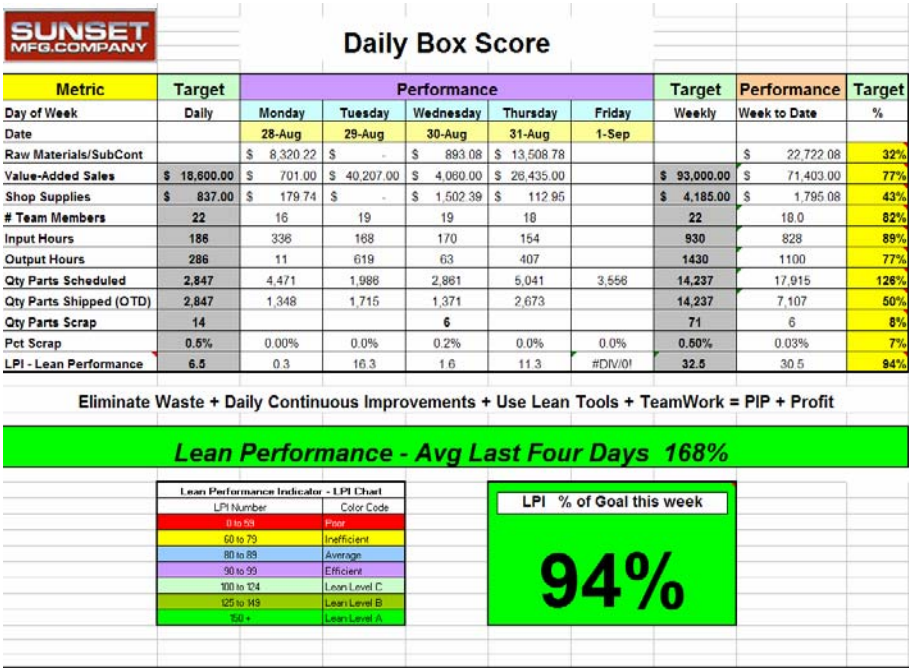
P&L		
VS Value-Added Sales	$ 46,753.88	100.0%
VS Conversion Cost	$ 22,471.87	48.1%
VS Gross Margin	$ 24,282.00	51.9%
VS O&A Cost	$ 6,761.43	14.5%
VS Profit	$ 17,520.57	37.5%

Figure 2: Sunset Manufacturing's "plain English" Value Stream Production summary

Brainstorming over how resource factoring might be broadened to include some of the fixed costs traditionally represented in company overhead, Warren hit upon the idea of using the square footage of production space in the shop dedicated to a value stream as a basis for applying resource factoring. Any cost that could be effectively and accurately apportioned over the entire shop space (utilities, rent, facilities and equipment maintenance, etc.) could be allocated through resource factoring in the same common sense, plain English way as materials, effort and equipment utilization.

Wanting a straightforward way of presenting lean accounting metrics to shop personnel that did not require the ability to wade through complex financial statements, Sunset went on to develop a "Box Score Card" that quickly and easily portrayed cost and performance metrics for daily, weekly, monthly,

quarterly and yearly reporting periods. The box score card provides direct visual feedback utilizing color coding for easy recognition of daily, weekly or monthly metrics, performance and target values as a reference for further improvement.



SUNSET MFG.COMPANY

Daily Box Score

Metric	Target	Performance					Target	Performance	Target
Day of Week	Daily	Monday	Tuesday	Wednesday	Thursday	Friday	Weekly	Week to Date	%
Date		28-Aug	29-Aug	30-Aug	31-Aug	1-Sep			
Raw Materials/SubCont		$ 8,320.22	$ -	$ 893.08	$ 13,508.78			$ 22,722.08	32%
Value-Added Sales	$ 18,600.00	$ 701.00	$ 40,207.00	$ 4,060.00	$ 26,435.00		$ 93,000.00	$ 71,403.00	77%
Shop Supplies	$ 837.00	$ 179.74	$ -	$ 1,502.39	$ 112.95		$ 4,185.00	$ 1,795.08	43%
# Team Members	22	16	19	19	18		22	18.0	82%
Input Hours	186	336	168	170	154		930	828	89%
Output Hours	286	11	619	63	407		1430	1100	77%
Qty Parts Scheduled	2,847	4,471	1,988	2,861	5,041	3,556	14,237	17,915	126%
Qty Parts Shipped (OTD)	2,847	1,348	1,715	1,371	2,673		14,237	7,107	50%
Qty Parts Scrap	14			6			71	6	8%
Pct Scrap	0.5%	0.00%	0.0%	0.2%	0.0%	0.0%	0.50%	0.03%	7%
LPI - Lean Performance	6.5	0.3	16.3	1.6	11.3	#DIV/0!	32.5	30.5	94%

Eliminate Waste + Daily Continuous Improvements + Use Lean Tools + TeamWork = PIP + Profit

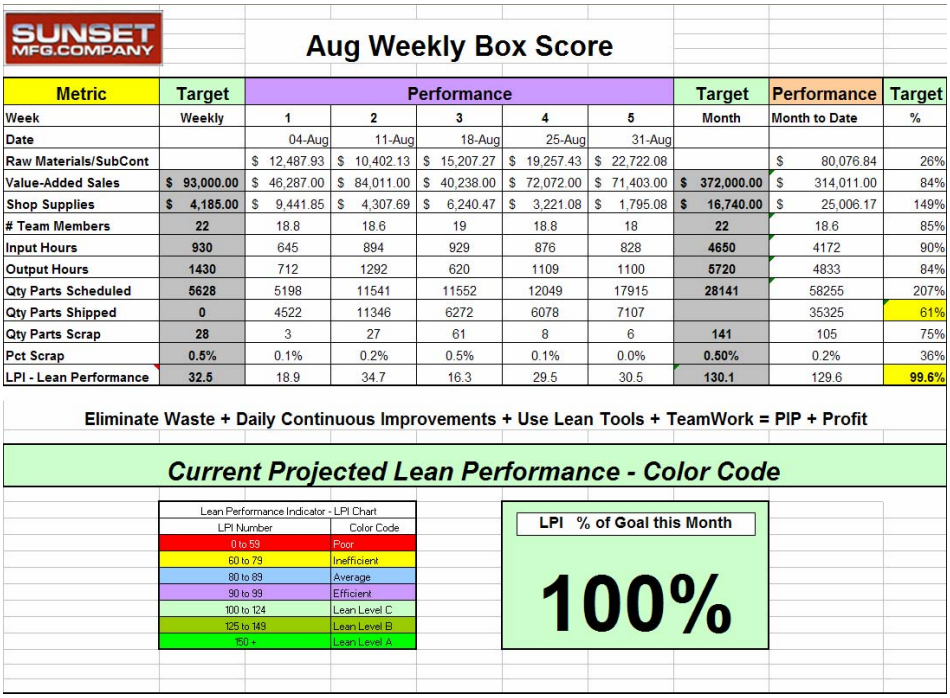
Lean Performance - Avg Last Four Days 168%

Lean Performance Indicator - LPI Chart	
LPI Number	Color Code
0 to 59	Poor
60 to 79	Inefficient
80 to 89	Average
90 to 99	Efficient
100 to 124	Lean Level C
125 to 149	Lean Level B
150 +	Lean Level A

LPI % of Goal this week

94%

Figure 3: Week-end recap Box Score Card



SUNSET MFG.COMPANY

Aug Weekly Box Score

Metric	Target	Performance					Target	Performance	Target
Week	Weekly	1	2	3	4	5	Month	Month to Date	%
Date		04-Aug	11-Aug	18-Aug	25-Aug	31-Aug			
Raw Materials/SubCont		$ 12,487.93	$ 10,402.13	$ 15,207.27	$ 19,257.43	$ 22,722.08		$ 80,076.84	26%
Value-Added Sales	$ 93,000.00	$ 46,287.00	$ 84,011.00	$ 40,238.00	$ 72,072.00	$ 71,403.00	$ 372,000.00	$ 314,011.00	84%
Shop Supplies	$ 4,185.00	$ 9,441.85	$ 4,307.69	$ 6,240.47	$ 3,221.08	$ 1,795.08	$ 16,740.00	$ 25,006.17	149%
# Team Members	22	18.8	18.6	19	18.8	18	22	18.6	85%
Input Hours	930	645	894	929	876	828	4650	4172	90%
Output Hours	1430	712	1292	620	1109	1100	5720	4833	84%
Qty Parts Scheduled	5628	5198	11541	11552	12049	17915	28141	58255	207%
Qty Parts Shipped	0	4522	11346	6272	6078	7107		35325	61%
Qty Parts Scrap	28	3	27	61	8	6	141	105	75%
Pct Scrap	0.5%	0.1%	0.2%	0.5%	0.1%	0.0%	0.50%	0.2%	36%
LPI - Lean Performance	32.5	18.9	34.7	16.3	29.5	30.5	130.1	129.6	99.6%

Eliminate Waste + Daily Continuous Improvements + Use Lean Tools + TeamWork = PIP + Profit

Current Projected Lean Performance - Color Code

Lean Performance Indicator - LPI Chart	
LPI Number	Color Code
0 to 59	Poor
60 to 79	Inefficient
80 to 89	Average
90 to 99	Efficient
100 to 124	Lean Level C
125 to 149	Lean Level B
150 +	Lean Level A

LPI % of Goal this Month

100%

Figure 4: Month-end recap Box Score Card

To formalize the lean accounting methodology they were creating at Sunset, Jim Warren decided to take another stab at developing software to support efficient and effective cost management in lean organizations. With the help of Ken Starnes Associates (.NET programming) and ShopWerks Software, Warren is automating many of these ideas and processes and incorporating them in a new generation of lean software tools that help lean organizations systematically identify and remove waste and production inefficiencies. Ultimately Warren's goal is to share these innovations through distribution of a suite of software tools that will make the lean accounting transition easier for others than it has been for Sunset.

Since the development of software tools for lean accounting cost management is still in its infancy, measurement of its effectiveness over the long range will require continued development, testing and real-world application. But the interim results of the overall effort to effect a lean transition at Sunset Manufacturing are impressive and promising. As a part of their value stream costing methodology, Sunset created a Lean Productivity Index (LPI) metric that measures value-added sales throughput in hours monthly per employee. Over the past five years of progressive lean implementations in Sunset's operations, that metric has seen an improvement from 96.32 hours per employee in 2001 to 188.78 hours per employee in 2006.

Jim Warren feels that the truth is in the improving performance and productivity numbers. Says Warren, "Sunset today is decidedly a constantly improving *lean machine*."

"The hard facts of a changing manufacturing reality mean introducing lean accounting methodology throughout the organization. Continuing traditional accounting practices risks derailing the lean organization you have labored to create. In today's highly-competitive global marketplace the consequences can mean downsizing due to loss of profitability—or even to the point of bankruptcy. The choice is yours to make".

Jim Warren