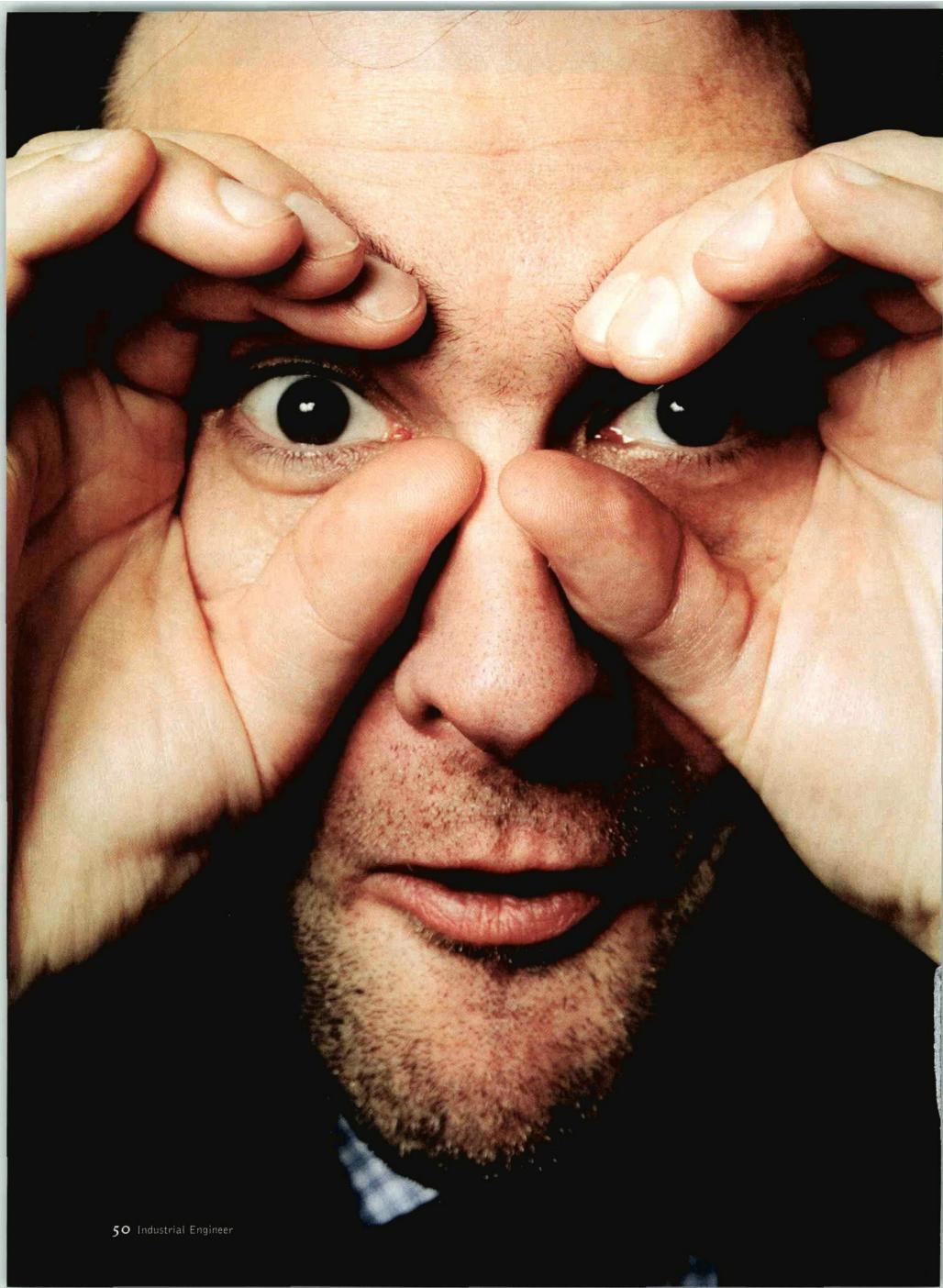


# **Confessions of a lean lunatic**

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# Confessions of a lean lunatic

BY GREG LANE

*How one entrepreneur used Toyota methods to transform his company*

**WITH NORTH AMERICA AND EUROPE** losing a large share of traditional high-volume manufacturing to offshore competition and low-cost country sourcing, the West is left with predominately short lead-time products, engineered products or other high-variation/low-volume items. This begs the question as to whether lean methods and a bit of common sense can increase profitability when businesses produce or sell a high variation of products at lower volumes.

To prove this, but mostly to profit in the process, I purchased a small but already profitable manufacturing business I knew nothing about. By following simple, lean methods, the company doubled sales while increasing the profit margin. More interesting was that this company essentially was a job-shop, traditionally not a lean haven.

My lean journey started like many others, in the higher-volume, lower-variation automotive industry. I received a limited and specialized year's worth of training based in Japan by Toyota, then returned to train others within the company's U.S. plants. After Toyota, I remained in the automotive industry. The working parameters did not change until I decided to scratch the entrepreneurial itch and was exposed to companies "unlucky" enough to work with lower volumes and a much higher variation in part numbers.

The machining company I bought provides parts to original equipment

manufacturers (OEMs) in the semiconductor equipment industry. It was a dynamic and cyclical industry led by technological developments. It was a small but often first-tier supplier to the equipment OEMs. The company had been operating for 18 years and had a respectable profit margin. I had to learn the business and then try to increase its profitability.

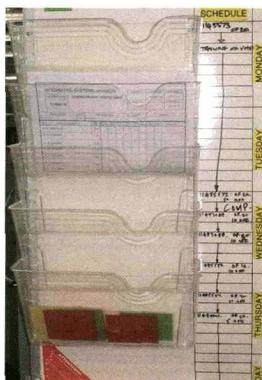
To accomplish both the learning and improving, I used a lesser-known Toyota method called OSKKK, which stands for observe deeply, standardize, kaizen of flow and process, kaizen of equipment and kaizen of layout. The first steps appear as common sense, which they are, but managers often jump to

solutions after short observation periods. The kaizen (meaning continuous improvement) steps are in the order of effectiveness and sorted from least to most costly to implement. This is reversed from the human desire to work with the more tangible and exciting layout issues first, then to address equipment and finally to tackle process and flow issues, which normally are dominated by human roadblocks that intrude on process or flow improvement.

As you will see, it's a mistake to think that lean principles cannot be adapted easily and profitably to a job shop. The word "principles" works better than lean "tools" because many tools presented do not apply directly to these environments, but the underlying principle can be adapted profitably.

## Take time to learn

I had a positive experience from Toyota's policy that new employees typically start with a hands-on learning period, usually regardless of level. So I followed OSKKK methodology, spending my first months after purchasing the company working my way up from a machine operator to managing the business. I had contracted the former manager to stay on and manage during this period. Hard as it was not to jump in at the top and start changing things, I knew the value in first "observing deeply" and humbly learning, even though I am not a patient person. This helped prioritize changes.



Simple tools used appropriately, like this sample day-by-hour board, can improve productivity by 15 percent. This board is a pilot version placed on a bottleneck machine.

# confessions of a lean lunatic

It also earned the respect and buy-in of the employees, as I clearly could sell the reasons for modifications and communicate their necessity. This experience reinforced for me that company standards and documentation basically were nonexistent; "tribal knowledge" ruled the roost.

I ended up learning by day and documenting by night, so at least I had some standards on which to base improvements. This also reinforced the point that when no documentation exists, there is no easier time to begin than during someone's training period.

This learning had an additional benefit; it kicked off the creation of real "respect" for me from my new team. Probably the most significant reason improvements are not maintained is we do not really respect the people we work with. Most pay it lip service and periodically remember to sell their commitment when addressing their team but then return to their autocratic management style drummed into the American business mind: "I am smarter and a better decision maker. That's why I'm the manager." Respect really means wanting to see everyone in the organization excel, take on more responsibility and ultimately see their lives improve.

## Business case should determine what tasks to target

Although opportunities to improve abounded (shop and office), I needed the patience to link and prioritize improvements to the overall business strategy, along with true indicators (metrics) instead of starting numerous disjointed projects. Over time, many hastily started projects would frustrate my few resources and leave me with lots of incomplete or unsustainable ideas and projects.

After two months of patiently learning the business, I was ready to put forward a rough strategy and start making changes.

Since my quality tracked well and was praised by customers (although naturally this begs continuous improvement), maintaining and increasing sales would play the strongest role in improving profitability and margins. So I locked in on the estimating process as being the critical starting point or bottleneck.

The estimating process became a focal point for a few key reasons: The former owner had been performing this task, and there were few outsiders with experience. It was complicated and completely lacked standardization, and it could make or break the business because it was absolutely critical to the overall profit margin. Although during the first two months of my training I spent considerable time trying to learn and document this process, certain areas proved fairly elusive. This was complicated further during my search to hire an estimator/programmer prior to the former manager's departure. I found many candidates with programming experience but few who had significant and complete estimating knowledge. And the few candidates with estimating experience demonstrated a variety of disjointed processes when asked to estimate a part during the interviews.

The new estimator/programmer we hired had demonstrated the most logical process, but to standardize and improve this process took years of mapping, learning and a feedback system. Probably the most important and critical improvement introduced immediately was a measurement system with a weekly review leading to improvements. We continuously targeted and measured two key performance indicators (KPIs): the "hit rate" on quotations, which also entailed investigating "why" we lost the important ones, and second, but likely most important, measuring actual labor and materials against each quotation's estimate of labor and mate-

rials. This worked because we could see an improvement in our indicators (profit margin/order and overall sales); therefore it was always a priority to improve the processes.

What is important to the boss remains important to the team. In all cases, I tried to coach and facilitate the improvement of the "process," instead of the traditional business school ideology of measuring results of various processes and pushing for improvement through KPIs. It's continuously amazing that so few companies focus on improving their estimating processes. Most lack basic metrics and a feedback loop, and many miss the strong connection between continuous improvement of this process and their profitability.

## Simple tools require management involvement, not lip service

Scheduling in a job shop can be difficult on a good day. Ideally, the work should be balanced around takt time (time available/customer demand), though it is nearly impossible to apply this concept strictly by its definition. In a job shop, machines are shared resources, therefore the "time available" really is dictated by the "time necessary" to complete the job, and "customer demand" usually is unknown other than the quantity on the current order. Forecasting is usually poor or nonexistent. So when you have little to no forecasting and share machines among the demand of various sales orders, it is best to substitute takt time with a day-by-hour board(s).

Day-by-hour boards should visualize the planned schedule of a machine or process versus actual attainment. This is a detailed breakdown of planned start and stop times for a work order. It usually looks no more than 24 hours ahead because problems will arise that require revising the plan. This does not

eliminate the need for capacity planning (a look ahead from one to four weeks) but works in conjunction as a shop floor management tool. The time (hours and minutes) should be taken from either the original estimate or the work order, which might contain a revised time from the last production run. This links it to part of the feedback system previously described as necessary to improve the accuracy of the estimating process.

Many will chuckle at this simple and archaic board. Some will see it as a control mechanism, and in most cases it will fail unless the following issues are addressed. Management must believe in it and understand its strong correlation to planning, estimating and ultimately profitability. Managers must review it daily, trying to resolve one or two of the most chronic problems. The operator must have a place to note problems. And it only should be used on the bottleneck (capacity constraining) processes.

When this is supported properly, productivity improvements upward of 15 percent have been substantiated. But this requires commitment and effort to remove a few of the larger issues. Electronic methods and software can accomplish this, but since many behavioral and subliminal issues are linked to this, start out simple.

## Team leader

With this company I could prove the financial viability of a team leader and put to shame all those who think in terms of "direct" employees being the productive moneymakers and "indirect" employees being a drain on profitability. I changed an employee who spent more than 50 percent of his time as a machine operator (direct employee) into a team leader (indirect employee). Some simple before-and-after overall equipment effectiveness comparisons proved this a profitable move.

My part-time supervisor turned

full-time team leader was charged with keeping machines running. This involved everything from minimizing setup times, eliminating material shortages, root cause problem solving and a host of other duties that turned him into one of the hardest working and most productive in the shop. Manager after manager unknowingly would accept 70 percent to 80 percent effectiveness of the entire work force as they randomly struggled to resolve problems. Instead, providing a team leader could increase the entire team's effectiveness to more than 90 percent. This move had an extremely high return on investment.

Toyota knows this is a great investment, and probably has one of the highest team-leader-to-team-member ratios (about 1-to-5 when I worked there). Although the struggle resides in the selection process, the job description, developing management support and mentoring, the starting point for you is to get the terminology "direct and indirect" out of your vocabulary and focus on the value someone adds to the bottom line.

## Modified/simplified activity-based costing

One of the most interesting parts of my journey was pulling the business out of a sales slump caused by one of the worst industrywide downturns in decades. We used an extremely simplified form of activity-based costing to change the pricing structure. This increased revenues and margins. Activity-based costing more accurately allocates indirect, overhead and fixed costs to the type or family of part that proportionately consumes the various level of activity or cost. The downturn exasperated problems because all our customers had time to shop around for the best pricing on the limited orders they were placing. This reduced our hit rate to less than 50 percent (from a range of 65 percent to 68 percent) on the few quota-

tions we received. I figured our overhead was equal to or lower than our competitors and our continuous feedback system ensured our labor and materials estimates were accurate. So other than quoting errors from competitors, I thought the only other way they could underbid us was that my overhead cost allocations did not reflect reality. Thus, my price did not reflect the true costs associated with that specific part. Remember, in low-volume/high-variation businesses, usually half or more of your personnel are indirect. Their costs likely are allocated only based on direct labor hours, instead of linking those costs to the products that consume their related activities.

Traditionally, the company calculated prices by multiplying estimated direct labor hours by one standard rate (various rates were introduced later) that covered all variable and fixed costs. Then, we added material costs and made a marketing adjustment based on the customer and market conditions. I figured we lost these orders because the simplified standard rate(s) arbitrarily spread our significant fixed and overhead costs.

I started developing one matrix for the shop. I developed another for the office. The matrices used an arbitrary system to apply points proportionally based on factors that affected the activity levels within the office or the workshop. Basically, the more activity consumed, the more points assigned. These points then were associated with a dollar value that reflected the costs consumed by the activity level. After following each request for quotation, the direct labor hours were estimated for each part. Then the particular part type and customer were evaluated according to each matrix to arrive at a price much more reflective of the activity it consumed from the shop and office personnel. Figure 1 shows the first iteration of the office matrix.

This simple and basic solution likely

## GETTING THE BUSINESS

Administrative (office) Influences		(+1) Easy Customer (on time pay, good terms, etc.)		(+2) Difficult Customer (not on time pay, poor terms, etc.)	
		(+1) Easy ship & Pack requirements	(+2) Difficult ship & Pack requirements	(+1) Easy ship & Pack requirements	(+2) Difficult ship & Pack requirements
(+1) Minimal or Standard Customer Support Requirements (few changes, easy sales support, add. specifications, qty, etc.)	(+1) Short Bill of Material (1-5 items) & no outsourcing	1+1+1+= 4	1+1+1+= 5	1+1+2+= 5	1+1+2+= 6
	(+2) Medium Bill of Material (6-15 items) & outsourcing 1-2 services	5	6	6	7
	(+3) Long Bill of Material (16+ items) & outsourcing 3 or more services	6	7	7	8
(+2) Increased Customer Support Requirements (freq. changes, extra sales support, add. specifications, qty, etc.)	(+1) Short Bill of Material (1-5 items) & no outsourcing	5	6	6	7
	(+2) Medium Bill of Material (6-15 items) & outsourcing 1-2 services	6	7	7	8
	(+3) Long Bill of Material (16+ items) & outsourcing 3 or more services	7	8	8	9

Figure 1. Activity-based costing helped deliver better prices to customers, leading to a better hit rate among quotations received.

## THE PAPER TRAIL

Shop	Tasks	Observe (Documentation)	Standardization	Kaizen of flow and process	Kaizen of equipment	Kaizen of layout
CNC machine operation	1	6	42.84	66.85		78.86
CNC machine setup	3	7	45, 55, 61	66, 86		
CNC programming	7	10	11, 83, 84			
Workplace organization (5S)	4	5	44		78	
Interviewing	8	9				
Machine TPM		59			60	
Identify shortage of skills	14	15				
Actual vs. estimated times	19	20	21			
Problem solving development		49	50, 57	64, 67		
Overtime management		53	54			
Bonus system – Suggestion system		56	64			
Machine productivity improvements					63	78
External quality accreditation		77				
Stocking of tooling and consumables		82				
Shearing and bending of sheet metal	87	88	90	92		
Welding						

Figure 2. A sample of the documented OSKKK method used in the shop.

was an insult to true activity-based costing. But it derived nine distinct labor rates for the shop and six for the office. All were factored into each quote from then on.

Measuring various factors before and after linked this change to an improvement in the hit rate on quotes from less than 50 percent to a percentage in the mid-60s. The average earnings-before-interest-and-tax percentage increased from the low 40s to just more than 47 percent. This concept could be taken further, but this simplified system took little time and effort to implement and proved quite successful.

### Strategic inventory

Another perspective worth mentioning in the quest to reduce the cost of capital continuously through inventory improvements (a major driver in any lean transformation) is that periodic inventory increases can improve profitability (along with increased customer satisfaction). The term "strategic" inventory encompasses any stock that you have that has been improved and is under review for further reductions. This is drastically different from inventory held because you lack robust business practices and have no history of continuous improvement.

An example of adding strategic inventory that can improve profits was the discovery of an opportunity to specialize in extremely short lead-times for machined parts and assemblies. This meant moving from order to delivery in less than 24 hours. Accomplishing this meant stocking a range of raw materials and dedicating machine capacity to meet the 24-hour or less turnaround time. You can imagine that this segment had a nice margin.

When you don't know what the customer might ask for, it is hard to guess what material to stock. But time and a

self-adjusting system can help you learn and perfect your types and level of inventory. Plus, in the machining business you always can cut down larger material. The point is that only by deciding to have the necessary inventory, whatever that may entail, can you compete in this profitable segment. But the gains well offset the extra carrying costs. Ask yourself how much of your inventory is strategic and receives continuous improvement, and how much of it results from current processes and a belief the inventory is needed to maintain or improve customer satisfaction.

### Using changes in the business situation to implement change

Most people know that successfully implementing change correlates strongly to human acceptance, with a small part of that success directly tied to technology or the idea itself. Therefore, changing a process for the sake of change or to increase profitability is often a hard sell, and buy-in is slow or nonexistent. On the other hand, prioritizing and relating changes to a change in the business environment or an outside factor usually is easier to sell, justify the timing and make a priority.

My priorities often were affected by external factors, though I tried to use each market or customer demand as an opportunity to implement further improvements. For example, an increase in demand helped us focus on tools like setup improvements or workplace organization as necessities for productivity increases. A customer who implemented an online order system created an opportunity to streamline the incoming order process. A customer's new quality standard often would allow us to review and streamline our quality control procedures. Once, a drastic rent increase coupled with a slow sales period justified us moving

locations. That opened the door to major layout improvements. Many other ideas can be introduced on the day that employees drive to a new location to work because a new job or site makes people more open-minded for change.

These customer-driven or external demands periodically offered opportunities to implement improvements, but they also required me to be flexible with OSKKK. For example, the final "K" is kaizen of layout. But the business relocation happened before I reached this point in the OSKKK methodology. In the end, I documented my improvement strategy in relation to OSKKK. Figure 2 shows a sample of the actual order used in the shop. Although I periodically deviated from the priority established in OSKKK and often returned to improve the same process further, I was able to justify and sustain buy-in, which overcame the biggest hurdle most of us try to leap over when pushing continuous improvement.

OSKKK is an excellent guideline, but never miss an opportunity to change and improve a process. This is true even when the market or customer creates an urgency that initially appears to be a burden or a cost. ~

*Greg Lane is the principal consultant for Low Volume Lean, which has provided support to manufacturing and service companies for 20 years. He is the author of Made to Order Lean and Mr. Lean Buys & Transforms a Manufacturing Company. Lane was trained by Toyota in Japan as a TPS key person and worked for Toyota training others. He has owned, operated and transformed his own company in addition to supporting others in 31 countries. As well as holding a B.S. in mechanical engineering and an M.B.A., he is a faculty member of the Lean Enterprise Institute and teaches graduate level lean courses.*