Lean Practice: A Reader's Guide to The Gold Mine

By Freddy Ballé & Michael Ballé

What is the secret of companies that turn lean efforts into lean results?

Could it be that so many successful efforts are generally linked to the mysterious role of a lean "sensei?" Sensei is the Japanese word for teacher, with a Confucian connotation of master. In the field of manufacturing, many observers consider the role of the sensei mostly as someone who does spectacular shop floor actions to raise the awareness of managers in the shop floor, holds the roadmap to lean implementation, and supplies endless nuggets of lean insights, tips, recipes, and rules of thumb. Such actions often make the difference between a "kamikaze kaizen" and a lean success on the shop floor.

Unfortunately, few companies have access to a true sensei (in a master-disciple line going back to Taiichi Ohno himself), and not all companies who do have the privilege of working with a sensei know how to capitalize on their teachings. In fact, a true sensei does more than simply teach. He or she makes sure that lean implementers stay on the straight and narrow path of lean outcomes, and don't get bogged down in politics, activities, or even their own rationalizations about lean tools. The sensei does more than simply act as a repository of lean knowledge—he or she helps generate the continuing lean discussion that is at the heart of continuous improvement. Today the dearth of true sensei is an issue even for Toyota itself, just as much as any one else.

In many ways, The Gold Mine, a novel of lean turnaround is an attempt to put on paper the experience of working with a sensei. Indeed, this is why The Gold Mine was written as a novel: it highlights the nature of the interaction, beyond the cold dry facts of lean principles and tools. In particular, The Gold Mine explores lesser-known dimensions of lean such as:

Lean is a system. Lean is far more than a toolbox of techniques. It's system in which each tool is linked to all others according to fundamental lean principles. Certainly, one of the key roles of a sensei is to make sure practitioners don't get so enamored with their favorite tool that they forget to keep their bearings on both the purpose of the tools (improve customer satisfaction by reducing waste), and the links with all the other tools (how often do you hear of successful tool changeover reduction without reduction of batch size?).

Lean is a practice, not just a philosophy. Learning only occurs by doing, and lean happens at the kaizen focal point, when something in the system is changed to reduce waste. The senseis constantly reinforce this practical blend of: learn to see, take action, compare results, reflect, and take the next required steps. It is part of their job to be impatient with talk and concepts, with over-cautious plans, and to constantly remind practitioners of *genchi gembutsu*: go and see for yourself, and then, just do it. This aspect of the sensei's teaching is best conveyed by stories and vignettes in the lean tradition, which form the underlying basis for The Gold Mine. Every situation in the book is based on a sensei anecdote or story taken from the oral tradition of lean.

Lean is fundamentally about knowledge gained from rigorous problem-solving. Indeed, the sensei's role is to push the lean practitioner not to be satisfied with the first answer that comes to mind, but always to explore the question further, experiment, and ultimately learn, so as to continuously improve systems and operations.

The Gold Mine is meant to serve as a guide for lean practitioners who do not have access to a lean sensei. The authors hope that the book can be used by lean teams as a support for reflection on lean actions, or in lean terms, for *hansei*—which author Jeffrey Liker says "is not simply a philosophical belief system at Toyota, but a practical tool for improvement." This reader's guide is designed to aid you with the process of hansei—to reflect on the lessons of the Gold Mine, and to help you confront your own experiences with the stories told in the book, and to challenge your thinking and actions to continue to progress in lean understanding. The key here is to develop the critical insight to see a problem and then apply lean tools as a solution. As easy as this may sound, many people try to apply the tools without doing the upfront thinking first.

This reader's guide presents a short overview of each of the book's chapters, shares the challenge addressed in the chapter, and then asks a number of questions to encourage team discussions of lean actions and practices. We hope it will enable you to reflect on your own lean voyage, and move forward on your path to perfection.

CHAPTER ONE: PROFIT IS KING, BUT CASH RULES

In the first chapter, Phil Jenkinson, a young entrepreneur with a struggling business in a serious cash crisis meets his sensei, Bob Woods. Bob is a retired automotive executive who has led many successfully automotive supplier turnarounds, yet has turned his back on industry to return to his first love of boats and sailing, spending much of his time working on his ketch at the Yacht Club. Bob Woods is brought back into the lean turnaround game by his son, Mike, who wants nothing to do with industry, but is Phil's best friend, and is convinced that his father's know-how and experience can help Phil save his company. Like many senseis, Bob rejects the notion that he should get involved. Eventually, however, he listens to Phil explain his problems, which have mostly to do with insufficient productivity and high inventory despite growing sales, all of which are now conspiring to create a cash crisis that is pushing the company to the brink of bankruptcy. Phil laments that it is close to defaulting on its payments to suppliers, and can't pay back the high interest the banks are charging for the debts Phil and his partner guaranteed when they bought the ailing company.

The underlying challenge in this chapter is to understand the true nature of the crisis. In this case, it's neither a problem of sluggish sales, nor Phil's diagnosis of low profitability (although there is some of that). The primary culprit is poor cash flow due to low inventory turns and high cost of goods sold. The company has extremely poor output. If it could simply sell more products (and they do have a backlog of orders) without increasing overhead or labor cost, it could postpone the immediate risk of collapse and begin to turn around its prospects.

KEY QUESTIONS TO DISCUSS

Before moving into the details of lean, it is important to have an overall grasp of the business challenge you're facing. Most companies avoid competition by seeking one of two strategies. They compete through product differentiation, enabling them to charge a premium for high functionality products; or they offer cost leadership, which wins though low prices yet minimal product functionality. Increasingly, companies are finding that lean competitors are bringing the fight to both areas: forcing them to compete on cost and quality with companies who are able to offer a similar level of product functionality. Lean leaders must respond by learning to increase customer satisfaction while driving down labor and capital costs, and increasing cash through inventory reduction.

So ask yourself, as a fundamental beginning point for your lean voyage: What is your fundamental business challenge?

You may consider it poor sales due to lack of product attractiveness. It could be disappointing sales caused by high prices. Your high production costs may be causing low profitability. The complexity of the products may be driving up production costs. Excessive inventory might be creating a cash crisis. Likewise, low capital utilization coupled with over-investment in capital equipment that isn't doing its work might be driving up your debt.

The important takeaway here is to gain a shared understanding about the key business challenge facing your company, or business unit. And so, as a group, try to formulate your fundamental business challenge in a statement of a couple of sentences. Work hard on uncovering the underlying problems; those that are in fact generating what appear to be immediate crises. Work on this until each member of team sees the problem in the same light.

CHAPTER TWO: GOLD IN THE FLOW

Phil and Mike drag a reluctant Bob to the factory, where he shows them how to quickly evaluate the efficiency of a factory by observing ongoing operations. Phil pleads with Bob to help him turn the place around, but Bob, more interested in enjoying his free time, refuses. In the end, however, Mike convinces his father to help out—on the condition that Bob won't have to deal with any politics or resistance. If people don't do as he says, Bob warns that he will simply walk. Phil eagerly accepts, and they return to the plant, where they are joined by Amy Cruz, the firm's HR manager. Bob teaches them to see the gold in the flow—the potential value lying dormant in the plant. By carefully tracking the flow of materials and work involved in making different products, they identify the various wastes in the process and how this affects the performance of the plant. They then focus on a specific area and look at the key metrics of quality, productivity and inventory on that part of the process, and discuss the kind of targets for improvement on this line.

The challenge here is to visualize the entire flow of materials and information through the factory, and to realize that every product that gets held up because of waste reduces the contribution of all the fixed costs of the plant to profitability. Similarly, the company is penalized by every product not shipped to the customer, which counts as inventory that is being financed by the company (parts cost, labor content, holding and handling costs).

KEY QUESTIONS TO DISCUSS

At this early stage, Bob is basically trying to open Phil's eyes, to see his shop floor as a flow of value that is broken by many obstacles that waste productivity and erode cash flow. Seeing the shop floor in this manner is a key lean skill. Without it, you are prone to implement lean tools as isolated improvements instead of parts of an integrated system. In practice, of course, learning to see is challenging in one's own plant, where old habits, politics, and other human considerations often blind us to the real work.

To train your eyes to see the flow of material and information instead of discrete production processes, you and your team will need to draw a value-stream map of a product family, if you haven't already done so. Bob, whose eyes are trained to see flow, didn't introduce mapping to Phil and his team until later in the transformation process, after the plant's serious quality and machine stability problems had been addressed, as we learn in Chapter Three. The mapping exercise also will show you how to begin the transformation process step-by-step.

The LEA web site (www.leanuk.org) has resources for value-stream mapping, including the story "Creating a Future State" and the workbook *Learning to See*

"Value-stream mapping is a pencil and paper tool that helps you to see and understand the flow of material and information as a product makes its way through the value stream. What we mean by value-stream mapping is simple: Follow a product's production path from customer to supplier, and carefully draw a visual representation of every process in the material and information flow. Then ask a set of key questions and draw a "future-state" map of how the value should flow.

"Doing this over and over is the simplest way—and the best way we know—to teach yourself and your colleagues how to see value and, especially the sources of waste. Practice drawing value-stream maps and you will learn to see your shop floor in a way that supports lean manufacturing. Just remember that the point of getting lean is not "mapping," which is just a technique. What's important is implementing a value-adding flow. To create this flow you need a "vision" of the flow. Mapping helps you see and focus on flow with a vision of an ideal, or at least improved, state."

Mike Rother and John Shook, *Learning to See: Value-Stream Mapping to Create Value and Eliminate Muda*.

CHAPTER THREE: TAKT TIME

In order to ascertain a realistic target for headcount reduction on the mechanism line, Bob asks Phil to time the operators as they work. Yet the mere mention of stopwatches triggers angry resistance from Dave Koslowsky, the factory's production manager, which leads to Bob walking out, as promised. Amy charms Bob into accepting a compromise, in which he continues to talk to Phil and herself, on his turf, at the yacht club, and to give them homework from there. Bob then explains how building to customer demand, according to takt time, is the key to understanding the productivity problem. He teaches them how to ascertain the target number of operators that should be on the line. He also explains that the first step to lean improvement is basic process stability, and in the case of an assembly line, stopping defects in the process. He suggests a "red bin" system to isolate non-conformity at every workstation. He adds to this by discussing the impact of variation in the customer cycle on productivity, and advises them to start reducing the variation in the operators' cycle before tackling more detailed inefficiency.

The theme of this chapter is to understand the impact of one type of variation (quality) on process performance. There are two core points. The first is understanding takt time, which should be the North Star to regulate production processes, and is often misunderstood during lean implementations. The second is to calculate a target number of operators for the line at a given takt time; and to have a plan to kaizen the line to get there, by first taking away the different causes of variation in the operators cycle before worrying about more detailed approaches such as value-added work versus non-value added work. Keep in mind that to the operator, work is work, whether value added or not. Variation, however, caused either by man, machine, material, or method is a major problem regarding performance and must be dealt with.

KEY QUESTIONS TO DISCUSS

As a starting point try the following exercise for discovering waste:

1. Brainstorm with your team on criteria for visual excellence: how can we tell, just by seeing and without asking any questions, how well the plant is operating?
2. Compare your criteria with the following short list:
    a. Customer service
    b. Safety
    c. Quality
    d. Inventory
    e. Labor productivity
    f. Equipment utilization
    g. Flexibility
    h. Involvement
    i. Space utilization
    j. Supplier performance.

   Add your own criteria to this list
3. Rank every area of your factory according to the following point system:
    a. 4 points for World Class
    b. 3 points for not quite World Class, but no major issues
    c. 2 points for okay, but one major issue
    d. 1 point for more than one major issue
    e. 0 for nothing done

   Total up the points by area and by person, and discuss differences.

This first exercise is basically an eye-opener. After completing it, you can continue by picking a product and following it through the plant, noting places of parts stock in the process until they reach the shipment bays (you can also count the distance in steps a product runs through the factory).

Finally, as a more detailed eye-opener, you can stand at a workstation and watch ten operator cycles for all seven wastes:

1. overproduction of parts beyond customer demand
2. waiting of the operator
3. transport of parts or components
4. unnecessary processing
5. inventory of parts at the workstation
6. motion of the operator
7. non-conformities and rework

Having completed these exercises, you can then agree with your team on a likely area to start the kaizen work. One key area to start: What is the takt time of the line or cell your team is focusing on? (This can be the same product family identified in the mapping exercise) Over how many weeks have you averaged the customer demand to calculate the takt time? How many shifts are you taking into account? What are the main sources of process instability on this cell or line?

These exercises will help you delve into issues such as:

- unreliable equipment which has never been fixed by maintenance or engineering
- non-conforming components which have to be reworked before they can be used
- unstable production processes which produce defectives
- material handling glitches which cause waiting, additional storage and transport

These issues can usually be fixed quickly by creating a "kaizen board" at each cell, and asking supervisors to follow the guideline of "answer within the shift, action within the week."

Why is producing to takt time in a continuous flow so important? Lean authors Mike Rother and Rick Harris explain:

"Lean manufacturing strives to achieve continuous flow in even greater measure, because it is the most efficient way of turning materials into products:

- minimum resources are used. The amount of people (direct and indirect), machines, materials, buildings, handling equipment, etc., required to make a product is kept to a minimum. This means higher productivity and lower costs.
- Shortened lead times, which permits quicker response to the customer and a shorter 'money conversion cycle' (time between paying for raw material and getting paid for the products made out of those raw materials.)
- Problems such as defects can quickly become apparent instead of remaining hidden. Problems can be identified quickly and corrected before proceeding. It is easier to identify root causes of abnormalities when they are detected as they occur.
- Encourages communication between operations, which become linked in "customer-supplier" relationships.

"Any item produced before it is actually needed by the next processing step creates waste, such as extra handling, counting, storage and so on. When you see batching of even one extra piece, you should realize that you have used an operator's time to process and handle an item that was not needed. You could have used that person's time and skills to process something that was needed!"

Mike Rother and Rick Harris, *Creating Continuous Flow: An Action Guide for Managers, Engineers, and Production Associates*.

CHAPTER FOUR: STANDARDIZE WORK

Phil, Amy and Mike meet up with Bob, who is busy clearing out the hold of his yacht to prepare for a new coat of paint. This leads to a discussion about standardized work, which is defined as always doing the same operations in the same order, and employing the 5S exercise. Phil and Amy are surprised to hear Bob's unusual take on 5S as the starting point of standardization and people involvement.

There's a key takeaway in this chapter: after takt time, standardized work is the second foundation of lean practice, one that is all too often obscured by the glamor of flow, kanban, and other exotic terms. Repeating the same operations in the same order absolutely needs to be understood by all in order to secure the lean gains beyond the initial kaizen workshops. Mastering 5S on the shop floor is a fundamental starting point of a process, which eventually leads to autonomous teams. It is not a mere "clean your room" tool, but rather, the core starting point to involve operators and generate suggestions. As such, 5S should never be underestimated.

KEY QUESTIONS

How many 5S attempts have your team members lived through? Which ones stuck in the long run, and which ones collapsed? Discuss why.

In the previous 5S programs did you ever go all the way to S4 (maintain) and S5 (discipline), or did it mainly focus on the first 3S?

Try a five S exercise with the S4 objectives of creating a checklist of specific areas to clean at the end of the shift. A good way of visualizing this check list is to take photos of each area after a 5S workshop, and see how well the equipment and materials have been maintained, serviced, and cleaned.

Experiment with your team at always working in the same order in non-production tasks, such as preparing a presentation or organizing travel. Compare the order that different team members use for everyday actions.

Discuss the impact of non-standardization on your every day factory and/or office environment and find the most glaring cases of waste. Remember that standardized work is dynamic because the standard is always being improved; it's creative, and not just following routine.

As Toyota expert Yasuhiro Monden points out:

"The ultimate purpose of the Toyota production system is to reduce costs relating to production. To do so, Toyota tries to eliminate production inefficiencies such as unnecessary inventories and costs.

"*Standardized operations* are aimed at using a minimum number of workers for production. The first goal of standard operations is to achieve high productivity through strenuous work. Strenuous work at Toyota, however, does not mean forcing the workers to work very hard; instead, it means working efficiently without any wasteful motions. A standardized order of the various operations to be performed by each worked, called the *standard operations routine*, is important to facilitating this first goal."

Yasuhiro Monden, *Toyota Production System: An Integrated Approach to Just-in-Time.*

CHAPTER FIVE: IT'S ALL ABOUT PEOPLE

In this chapter, Phil and Amy find themselves both exhilarated and disturbed by what they've learned running workshops. They've discovered that, first, quick results are in fact easy to obtain by working with the operators. Second, they've found out that the operators have been complaining about causes of variation in their work for years—yet because management never paid attention, they have lowered their expectations of them. Phil and Amy want to build on the gains obtained from the workshops in day-to-day operations. Bob's third key concept of sustaining lean, after takt time and standardized work, is kaizen. To introduce it, Bob invites Phil, Amy and Mike to join him at the Yacht Club for the preparation of the first spring regatta. He shows them how the best skipper operates and details the key roles of supervisors and team leaders in sustaining lean. And he reveals the heart of the system: "it's all about people."

This chapter shows how the greatest challenges in lean truly involve people. Shifting supervisors from their traditional role of looking for missing parts and ad hoc rescheduling of people and production, to a mentoring job of developing work standards and training operators to work at the standard, is a fundamental lean leap. Indeed, one of the critical issues all lean companies face, Toyota included, is a constant dearth of good supervisors. Bob also defines the team leader role, which is an operator, not part of the hierarchy, for every team of five to seven operators, who makes sure hourly production targets are achieved by solving all the little mishaps which can happen in day-to-day operations and create variations in the work cycle. Overall, Bob's insight in lean management is that you have to "produce people before producing parts."

KEY QUESTIONS FOR DISCUSSION

One of the secrets of sustaining lean improvement is investing in enough shop-floor management and technicians to resolve problems as they appear, rather than simply listing them as priorities set by management in their offices. This investment in shop-floor leadership pays for itself in spectacular productivity gains. In the discussions with your team, ask the following key questions:

How much support do our front-line people really get?

When a machine is stopped, or a defect appears, or a problem arises with a customer being served, do we see shop-floor management and/or technicians come running?

Are operators ever left to fend for themselves with technical problems?

Are supervisors focused on solving operators' problems rather than ordering them about?

Is our shop-floor management focused on training operators to work at standards?

An interesting shop floor exercise for your supervisors is to ask them daily: "What have you done to help operators reach their targets today?"

Supervisors spend much of their day firefighting. The real question is: have these problems occurred before? Firefighting goes with the job to a certain extent, but the key is to solve problems at a fundamental level so that they don't recur.

"The practice of genchi genbutsu is easy to adopt as a corporate policy and new hires can be sent out to the shop floor to 'go and see' and then report back on what they see. But at Toyota, this is not simply a lesson for the neophyte to learn. The executive or manager must go, see, and really understand the actual situation at the working level. Managers are not just managing technology or tasks; they are promoting the culture. The absolute core of the Toyota philosophy is that the culture must support the people doing the work. Management must demonstrate a commitment to quality every day, but ultimately quality comes from the workers."

Jeffrey K. Liker, *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*.

CHAPTER SIX: LEVEL TO PULL

Now that Mike, Phil, and Amy have enjoyed significant results on the mechanisms sub-assembly lines in terms of increasing daily production with the same resources, and consistently hitting the new production targets, Bob drags them to the local supermarket to see how pull works on an entire flow. The first important pull concept is the "shop stock," or supermarket. Work-in-process, or WIP, should be held at the cell as output from the process as opposed to being held as material and components waiting to be transformed, since lean processes always stress flow over holding storing excess material. This leads Amy to draw a parallel from her experience working in a fast food restaurant, most of which have a shop stock behind the counter. This inventory contains several rows of standard burgers for the "runners," models most people are likely to purchase because they are basic standards. When one of these burgers is sold at the counter, the salesperson tells the production staff to make another—in other words, the counter pulls stock replenishment in the burgers' shop stock. The advantage of this system is that customers ordering standards can be served in a few seconds by helping them from the stock; and that if several customers want the same type of burger at the same time, they are all held in the buffer. Also, the rotation prevents burgers from going stale. At low traffic periods, the shop stock is often kept empty.

This highlights one of the key aspects of pull: stock replenishment. Now what happens if a customer orders a special, non-onions and extra-pickles burger? The counter staff instructs the kitchen staff to make this burger to order. Since there is little changeover time in making burgers (this is "fast food" after all), the kitchen staff simply cooks the burgers in the same order as the orders arrive, and either replenishes the shop stock, or creates special burgers to order. The upshot of the system Amy described is that if you, as a customer, order a standard, you are served in a few seconds from the shop stock, and if you ask for a special, you will get the burger in the time it takes for the next available cook to finish his latest burger and make yours. The system is lean because it pulls on a controlled stock and delivers just-in-time to customers, while the staff resources in the kitchen vary according to the demand at various hours of the day.

In industry, flow can be complicated by the fact that changeovers are hardly ever instantaneous, so batching might be a necessary evil. And so Bob explains how to use takt time to build a leveled production program, which pulls continuously on the production cell as with the burger stand. Later, at a dinner party with a lean academic specialist, he details to Phil the link between pull, leveling and tool changeover.

The key challenge in this chapter is getting a feel for pull as opposed to push production. Also, it is important to realize that for a just-in-time system to deliver lean results in terms of labor cost and capital utilization, the pull signal must be "leveled" as much as can be, both in mix and volume. This is a critical lean insight to gain, because without it your team will never be able to reap the cash, labor and capital benefits from just-in-time techniques such as kanban.

KEY QUESTIONS

To have this discussion, we suggest that you take your team for a fast food burger and observe how the supplying system actually works. Then try to reproduce Steve McAllister's "square, circles and triangles" demonstration until the team understands the dual implications of reducing batch size and increasing internal delivery in order to reduce WIP.

Finally, you can experiment with calculating product takt times and creating a level schedule. Discuss with your team how you can establish "fake trucks" to simulate customers' demand from logistics, and maintain a constant pull on your operations.

As LEA author and faculty member Art Smalley points out:

"Continuous flow of materials and products in any production is a wonderful thing, and lean thinkers strive to create this condition wherever possible. The reality of manufacturing today

and for many years to come, however, is that disconnected processes upstream will feed activities downstream. Additionally, many internal processes are currently batch-oriented and function as shared resources. The major challenge in this situation is for downstream processes to obtain precisely what they need when they need it, while making upstream activities as efficient as possible. This is where leveled demand and pull production are critical"

Art Smalley, *Creating Level Pull: A Lean Production System Improvement Guide for Production Control, Operations, and Engineering Professionals*.

CHAPTER SEVEN: KANBAN RULES

Phil and Amy badger Bob into returning to the factory, where he compliments them briefly about their progress before pointing out all they've done wrong. This starts a new round of discussion about how to establish a kanban, as well as a discussion of basic kanban rules, and more importantly, an inquiry into a kanban's true purpose. Bob tries to clarify by asking them to visualize the entire flow in the plant, from the truck preparation area in dispatch, to the shop stock at the conveyor and at the mechanism lines. He also introduces the "heijunka" board, which tells the material handler how to do the picking from the conveyor's shop stock into the truck preparation area. Amy and Phil complain about the difficulties they are experiencing with Kevin Lorenz, the plant's logistics manager.

A couple of weeks later, Bob accepts an invitation to return to the factory once more when Phil and Amy hit a wall. This visit leads to a loud argument with logistics manager Kevin Lorenz, who ends up being publicly humiliated by Bob's friend Harry, who suggests to Phil that he should fire Lorenz right then and there. After everyone calms down, Bob admits that the plant is not progressing as fast as it should, particularly on the inventory front, and takes the blame for not being more involved. He has tried to advise at arms length, which can't work with lean transformation. In the end, Bob will have to return more often to the shop floor to help Phil and Amy with their lean implementation.

The key challenge in this chapter is to see lean flow as a logistics issue as well as a production one. Production needs to be stabilized, which will only happen if logistics maintains a steady pull on the production cells and regularly supplies the cells with the needed components and materials. On the shop floor, leveled pull is realized by the "heijunka board," or "leveling board," which simulates the customer's use of the product in its own production line. Bob teaches them that kanban is a kaizen tool, not the other way round—that kanban was not invented to relieve production from worrying about logistics. On the contrary, kanban's purpose is to fail every time the flow gets out of standard conditions. Because no one wants the kanban to fail (which can stop the entire plant), shop-floor management must constantly make sure that production and logistics glitches are solved in real-time. Kanban is in fact a tool to schedule production in a way that problems will appear visually immediately, at the point of the problem—so that they can be resolved right away.

KEY QUESTIONS

Is your team familiar with all the basics rules of kanban?

- The following process comes to withdraw from the previous process
- the following process only produces what has been withdrawn
- production or withdrawal only happens with corresponding kanban cards
- no parts are allowed on the shop floor without a kanban attached to them
- zero defects in the parts delivered by the upstream process
- reduce the number of kanban over time

Discuss each kanban rule with your team, and clarify its purpose.

If you have a kanban system already in place, what happens when there are no parts in the shop stock when the material handler comes with a card to pull? Does the material handler simply take container from another buffer, or does this trigger questions to the team leader and supervisor about what happened on the cell to make it late?

Are all members of your team clear on the difference between a production instruction kanban, and a withdrawal kanban?

Can you draw out on paper a complete kanban loop with:

- heijunka board
- kanban posts

- kanban waiting file

Has your team thought about organizing the material handlers according to set circuits (as postmen, rather than couriers), to standardize the flow of material throughout the plant?

As lean authors Rick Harris, Chris Harris and Earl Wilson remark:

“Many facilities that are lean in terms of operating their individual processes are still mass producers in supplying these processes. They lack a Plan for Every Part (PFEP). (Indeed, some facilities seem to lack a plan for any part!). They lack a properly located and managed purchased-parts market. They lack a rigorous material delivery route using standard work. And they lack pull signals to tightly link their areas of continuous flow to the supply of materials. The consequence is starvation of processes, loss of flow, and a major waste of effort and money in keeping too much inventory and spending too much time hunting for missing items.”

Rick Harris, Chris Harris and Earl Wilson, *Making Materials Flow: A Lean Production Guide for Operations, Production-Control, and Engineering Professionals*.

CHAPTER EIGHT: GEMBA ATTITUDE

In this chapter, Bob shifts Phil and Amy's focus from the mechanics of flow and kanban back to the core of lean, which is attitude. He takes them back to the shop floor, pushing them to learn to see by looking intently at the equipment, and of course, at the operating conditions, which people create. Bob points out that beyond the usual tools, such as SMED and TPM, the heart of lean is rigorous problem-solving. Indeed, to obtain results after the initial quick wins from these tools, one must follow the five why's exercise rigorously so as to always resolve the fundamental cause of any problem. Secondly, Bob demonstrates the "just-do-it" element of the lean attitude in organizing an impromptu build of the cabinet assembly cell, working with the operators and shop-floor technicians. These shop-floor actions lead to another run-in with the plant's management structure and force Phil and Matt, his partner, to finally make a stand for or against total lean implementation.

The key point of this chapter is that while many try to lean their operations, few succeed. The authors believe that although people get mesmerized by the technicalities of lean tools such as kanban and leveling, they often completely miss several core principles of lean: never by-pass a problem and work with the operators to continuously improve operations. In that respect, this is probably the most important chapter of the book, and raises a fundamental issue for you to ponder: are you really walking the walk, or are you just talking the talk!

KEY QUESTIONS

This chapter addresses the practical details of your lean implementation effort, and should prod you to examine the reality of your initiative. Remember, the "just-do-it" nature of lean means you should be doing lean rather than simply discussing it. With your team, ask yourselves:

How much time do we really spend simply looking at operations, to distinguish anomalies from standards?

Do we walk the shop floor (or service office) at the very least once a day to look at production boards and check the response time from technicians to operator problems? (Answer in the shift, action in the week.)

Do we spend more time challenging people on the shop floor or having meetings in an office? (The best lean managers spend several hours every day watching how their plant works and challenging supervisors and functional services.)

Are we ready to hold all meetings at the gemba, with the real people in front of the real parts?

As we do kaizen activities, do we systematically plan to:

1. reproduce the same result in another area
2. "re-kaizen" the area we've just improved immediately.

Are we training shop-floor supervisors to lean tools at least one hour every week?

As lean authors Mike Rother and Rick Harris advise:

"A good way to keep improvement going, and to prevent backsliding, is to establish a routine of daily, weekly, and monthly audits conducted by overlapping levels of management. In this overlapping system, team leaders audit the work of operators, supervisors audit team leaders, area managers audit supervisors, and the plant manager audits the plant.

"This may sound like a lot of auditing, but it usually takes less time than you might think. Team leaders and supervisors may spend about 10-30 minutes a day auditing. Area managers may spend 20 minutes to an hour. And the plant manager many spend only one day a month on a formal plant audit in a mature lean operation.

“These audits should be part of management’s standardized work. Every one from operator to plant manager has a responsibility to sustain continuous flow. And each member of the management team is expected to serve as a coach, teaching the audit process to the people at the next level.”

Mike Rother and Rick Harris, *Creating Continuous Flow*.

CHAPTER NINE: THE HEIJUNKA WAY

Phil faces a new unexpected problem as Bob informs him that his work is done. Now Phil must step up and manage the transformation. It's Phil's plant, and he should lead, or let it go. Phil agrees reluctantly, yet persuades Bob to continue to advise him by stating his vision of lean principles. Bob then explains the use of value stream mapping, or MIFA (Material and Information Flow Analysis.) Phil and Bob also discuss the tricky issues of leveling in volume as well as in mix, and understanding the relationship between JIT shop floor techniques and the MRP. They explore how to protect the production process from volume variations in customers' orders, and how to avoid passing on these variations to their suppliers, which would increase the likelihood of missing parts, and hence return variation in the production process.

The focus on this chapter is on management, and the need to maintain both a big picture outlook and a detailed vision of the plant at the same time. Bob helps Phil to visualize the plant's processes as a continuous flow, and enlarges the vision to include customer and supplier effects on the total supply chain.

KEY QUESTIONS

In recent years, much has been made of value stream mapping as a first step to lean transformation. Oddly enough, this is a well-known Toyota tool which the senseis often introduce late in their supplier plants they help, fearing the tool could become a distraction from genchi gembutsu: go and see. So be sure that your maps are serving the right purpose of focusing your attention on the work itself.

If you use Value Stream Mapping, are your maps detailed enough, particularly on the information front? A good test of the map's requisite level of detail is if it tells you how a material handler knows when to pick up parts and where to move them.

Discuss each one of Bob's lean principles with your team:

- customer satisfaction with lean manufacturing
- flexibility in mix and volume
- have a gemba attitude
- produce people before you produce parts
- never bypass a problem and kaizen

Have you checked the impact of your procurement signal on your suppliers?

Could you be creating supplier problems by an unpredictable procurement signal, either forcing them to hold stock (which they'll make you pay for in their price anyhow), or by triggering missing parts, forcing you to hold inventory?

Have you discussed with your team the articulation between the MRP (for purchasing and production planning) as opposed to kanban tools (for production scheduling)?

As Lean Thinking authors James Womack and Daniel Jones remind us:

"Looking at the whole has always seemed natural to us and doing so will always suggest ways to slash costs while dramatically improving responsiveness and quality. Yet most managers we have encountered on our value stream walks want to stand in one place and look only at one point—their machine, their department, their plant, their firm. Often, the machine, the department, the plant, and the firm are performing well on traditional measures – high labor and machine utilization, low defects, on-time shipments – and the managers are pleased with their achievements.

"However, when we get managers to change their focal plane from their assets and their organization to look at the product itself and what is actually happening on its long journey, they immediately realize that the performance of the entire value stream is abysmally sub

optimal. Indeed, most wonder how they have worked for years in traditionally compartmentalized operations and somehow failed to notice the waste everywhere."

Dan Jones and Jim Womack, *Seeing the Whole: Mapping the Extended Value Stream*.

CHAPTER TEN: KAIZEN FOREVER

Working life being what it is, Phil encounters a new round of challenges. Although he has had spectacular results in the lean turnaround of his plant, his managerial problems are mounting. Moving from lean production to creating a truly lean enterprise that can sustain shop-floor successes is no small task. Bob organizes a plant tour by his own sensei, visiting from Japan. The sensei seems to scarcely notice Phil's achievements, choosing instead to chastise him for ignoring quality concerns. This leads to a discussion about jidoka, the lesser known pillar of the Toyota Production System and the various techniques associated with building quality into the products: andon, autonomation, poka-yoke, etc.

The overall message of this chapter is that the race to lean is unending. While Phil has reached a new level of performance, he now faces a new order of problems, which have been uncovered precisely by having sorted out the most obvious issues. In terms of lean maturity, this means a coming of age for Phil, who realizes that the true secret of lean success is that regardless of how expert one gets, we remain a learner, and that we all need a sensei.

KEY QUESTIONS

After reading The Gold Mine, and discussing it with your team, ask if you are truly ready to seek out a true sensei to help you in your quest. Seeking a sensei is not an admission of defeat. On the contrary, as this appears in every heroic quest, it is the first sign of real commitment. Seeking a sensei helps you sort out true lean wisdom from mere drivel. And the process will naturally bring your team in contact with the lean community at large, which will have increasing returns as true Lean Thinkers are always eager to share their successes and pass on free advice.

A good place to start is an exploration of jidoka; most self-styled lean experts can talk to you endlessly about JIT, but jidoka has had far less exposure and publication, and the chances are that jidoka knowledge will have been orally passed on in a chain of knowledge.

How to learn about jidoka? Return to the shop floor with your team and watch:

- does the process stop rather than produce non-conforming parts (or services)?
- are operators left alone to face problems?
- does management know right away when there is a problem and come running to work a countermeasure?

"Just as the introduction of lean thinking forces problems and waste to the surface in all operational areas, new organizational problems will inevitably arise as you apply these ideas. As you shrink your traditional functions, which were formerly the key to career paths in your organization, many employees will start to express anxieties about where they are going and whether they will have a 'home.' And as you place more employees in development and production activities relentlessly focused on the here-and-now, you may begin to wonder about their hard technical skills. Are your engineers retaining leading-edge capabilities or are they simply applying over and over what they already know?

"Perhaps most striking, as you take all of the inventories and waste out of your internal values streams, you will become much more aware of the costs and performance problems of firms above and below you along the stream, including your suppliers' suppliers and your distributors' retailers. Offering them technical assistance will be necessary, but it won't be sufficient. To move farther down the path to leanness, it will soon be apparent that you will need to work with all the participants in a value stream in a new way."

James P. Womack and Daniel T. Jones, *Lean Thinking: Banish Waste and Create Wealth in Your Organization*.

A Lean Lexicon for *The Gold Mine*

(Adapted from the *Lean Lexicon: an illustrated glossary for Lean Thinkers*, 2d edition)

Continuous Flow
Producing and moving one item at a time (or a small and consistent batch of items) through a series of processing steps as continuously as possible, with each step making just what is requested by the next step.

Cycle Time
How often a part or product is completed by a process, as timed by observation. This time includes operating time plus the time required to prepare, load, and unload. Also, the time it takes an operator to go through all work elements before repeating them.

Five S
Five related terms, beginning with an *S* sound, describing workplace practices conducive to visual control and lean production. The five terms in Japanese are:
1. Seiri: Separate needed from unneeded items—tools, parts, materials, paperwork—and discard the unneeded.
2. Seiton: Neatly arrange what is left—a place for everything and everything in its place.
3. Seiso: Clean and wash.
4. Seiketsu: Cleanliness resulting from regular performance of the first three Ss.
5. Shitsuke: Discipline, to perform the first four Ss.

Five Whys
The practice of asking why repeatedly whenever a problem is encountered in order to get beyond the obvious symptoms to discover the root cause.

Heijunka
Leveling the type and quantity of production over a fixed period of time. This enables production to efficiently meet customer demands while avoiding batching and results in minimum inventories, capital costs, manpower, and production lead time through the whole value stream. Roughly, it means “levelization” in Japanese.

Inventory
Materials (and information) present along a value stream between processing steps.

Inventory Turns
A measure of how quickly materials are moving through a facility or through an entire value stream, calculated by dividing some measure of cost of goods by the amount of inventory on hand.

Jidoka
Providing machines and operators the ability to detect when an abnormal condition has occurred and immediately stop work. This enables operations to build in quality at each process and to separate men and machines for more efficient work. Jidoka is one of the two pillars of the Toyota Production System along with just-in-time. It’s related to the Japanese word for automation, but with the connotations of humanistic and creating value.

Kaizen
Continuous improvement of an entire value stream or an individual process to create more value with less waste. The word is Japanese for gradual, continuous improvement. There are two levels of kaizen:
1. System or flow kaizen focusing on the overall value stream. This is kaizen for management.
2. Process kaizen focusing on individual processes. This is kaizen for work teams and team leaders.

Kanban

A kanban is a signaling device that gives authorization and instructions for the production or withdrawal (conveyance) of items in a pull system. The term is Japanese for “sign” or “signboard.” Kanban cards are the best-known and most common example of these signals.

Muda, Mura, Muri
Three Japanese terms often used together in the Toyota Production System (and called the Three Ms) that collectively describe wasteful practices to be eliminated.

- Muda: Any activity that consumes resources without creating value for the customer.
- Mura: Unevenness in an operation; for example, an uneven work pace in an operation causing operators to hurry and then wait.
- Muri: Overburdening equipment or operators.

Pull Production
A method of production control in which downstream activities signal their needs to upstream activities. Pull production strives to eliminate overproduction and is one of the three major components of a complete just-in-time production system, along with takt time and continuous flow.

Sensei
The Japanese term for “teacher.” Used by Lean Thinkers to denote a master of lean knowledge as a result of years of experience

Seven Wastes
The categorization of the seven major wastes typically found in mass production:
1. Overproduction: Producing ahead of what’s actually needed by the next process or customer. The worst form of waste because it contributes to the other six.
2. Waiting: Operators standing idle as machines cycle, equipment fails, needed parts fail to arrive, etc.
3. Conveyance: Moving parts and products unnecessarily, such as from a processing step to a warehouse to a subsequent processing step when the second step instead could be located immediately adjacent to the first step.
4. Processing: Performing unnecessary or incorrect processing, typically from poor tool or product design.
5. Inventory: Having more than the minimum stocks necessary for a precisely controlled pull system.
6. Motion: Operators making movements that are straining or unnecessary, such as looking for parts, tools, documents, etc.
7. Correction: Inspection, rework, and scrap.

Standardized Work
Establishing precise procedures for each operator’s work in a production process, based on three elements:
1. Takt time, which is the rate at which products must be made in a process to meet customer demand.
2. The precise work sequence in which an operator performs tasks within takt time.
3. The standard inventory, including units in machines, required to keep the process operating smoothly.

Takt time
The available production time divided by customer demand. For example, if a widget factory operates 480 minutes per day and customers demand 240 widgets per day, takt time is two minutes. Takt is German for a precise interval of time.

Total Productive Maintenance
A set of techniques, originally pioneered by Denso in the Toyota Group in Japan, to ensure that every machine in a production process always is able to perform its required tasks.

Value Stream Mapping
A simple diagram of every step involved in the material and information flows needed to bring a product from order to delivery. The first step is to draw a visual representation of every step in a process, including key data, such as the customer demand rate, quality, and machine reliability. Next, draw an improved future-state map showing how the product or service could flow if the steps that add no value were eliminated. Finally, create and implement a plan for achieving the future state.

Waste
Any activity that consumes resources but creates no value for the customer.