

Chapter 28

Starter Advice for Implementing JobshopLean

Learn About the Toyota Production System

I was still an IE faculty at The Ohio State University during the years when I developed JobshopLean. I never had the opportunity to learn from a Toyota sensei about their revolutionary production system and management practices. I did not even know about Ohno's "Stand on the X" practice of forcing managers to stand at a location and observe work being done in an area! So, my only recourse was to read a slew of books about TPS/Lean! In Appendix, 1 I have listed books on TPS/Lean that I read because those books are by authors who have worked at Toyota or been guided by a Toyota sensei. Any individual or team seeking to implement JobshopLean ought to read at least a subset of these books. Given my Industrial Engineering education and applied research on practical IE problems, I quickly realized that the TPS/Lean tools are simple derivatives of the classical IE tools. But, I was ignorant about the "soft" elements of the TPS such as culture development, top-down leadership, employee engagement, employee training, etc.¹ The books by Ohno helped me to appreciate the tremendous importance of engagement by both employees as well as management. For example, at Toyota the CEO has risen through the ranks so he is intimately aware about the TPS/Lean practices. That is far from the case in most US companies!

Will Company Leaders Lead your Transformation?

The primary reason why Lean will fail to "stick" in most organizations is the lack of sustained involvement by senior management with sufficient knowledge about Lean.² In any organization, people with titles like Owner, President, CEO, COO or VP-Operations are the most powerful people in the best position to ensure the success of their Lean transformation. Unfortunately, they usually are never seen walking the floor talking to their employees, participating in kaizens, attending progress meetings, and questioning their middle managers about their projects. For example, in a CNC machine shop that I worked with, I would see either of the two owners on the floor only when they had to ask Shipping about the status of an order or worse, they were themselves hunting for the order! So, instead of trying to implement JobshopLean there, which would have required them to invest time in implementing a pilot cell, I decided to limit what we attempted to "Lean basics" such as 5S to improve WIP organization, Setup Reduction on a large CNC lathe and a white board in the Shipping department that displayed the daily schedule.

In addition, most executives lack patience. They have an incorrect perception about Lean that astounding results will be achieved in no time with little if any active involvement on their part! In fact, the opposite was the case at one of my client companies. Both their CFO and Director of Operations had been actively involved in the implementation of Lean at previous companies where they had worked. The CFO would make it a point to attend the daily morning huddles on the shop floor. He would ask questions of the department managers that demonstrated his grasp of Lean

¹ I humbly say this from personal experience after succeeding and failing in my own efforts to implement JobshopLean! I had spent my entire career in academia! Every IE educator needs to take a job in industry and work for at least 2-3 years to get personal hands-on experience in implementing TPS/Lean. It does not matter how simple or advanced their improvement projects are! All that matters is that they get hands-on experience and first-hand experience in implementing/leading/participating in TPS/Lean implementation projects at a local company. Current IE curricula are loaded with courses that mislead students that the operation of the factory floor can be optimized using quantitative models developed by researchers with no industry experience.

² This is the conclusion I drew after reading some of the online articles I found when I Googled "Why Lean Programs Fail".

metrics. I reported to the Director of Operations, who was later promoted to VP-Operations. He would scrutinize every project I did by asking the employees in the area where it was done if they were benefitted by the work that was done. That is executive-level involvement!

James Gatto, III, a Value Stream Manager/Engineer at Robinson Fans Inc., was one of the reviewers of an earlier draft of this chapter. He had this to say about the role of leadership in a Lean transformation, “From our perspective of being beginners and far from perfect, we would have benefited from additional advice. Based on our starts and stops at attempting to implement Lean, we have learned that it was necessary to have our leadership team create and communicate a shared vision of the future state and be able to communicate how we are moving along this path. We agree that leaders must do gemba walks, but only if they have a purpose that supports moving us toward the future state. In order to enhance their skill in moving the organization ahead, leaders must be willing to have the humility to realize that they themselves may need coaching as this cannot be delegated to others. Furthermore, we realized that we could not drop “Lean” onto our existing organizational structure. If moving information and material across an organization is the goal, why are we so unwilling to consider the need to realign our organizations? Ultimately an organization can be inspired or disengaged by their leaders’ words. But in order for organizations to create new habits and beliefs they must see leaders participating and truly caring for and celebrating their teams. Regardless of any advice you may be given, the real learning only occurs when you try.”

To-Do’s for Executives who want to Implement JobshopLean

- Read two books by former CEOs, Art Byrne³ and George Koenigsaecker⁴, because each was the champion and driver for their company’s Lean transformation.
- Start doing Gemba Walks (“Gemba” is Japanese for “where the actual work is done”) to see and learn first-hand about the “state of their production floor”.⁵ Set aside time every week for these walks and vary your schedule to visit different departments. Make it a point to talk with the employees about their concerns and ask for *their* ideas/suggestions to improve their work places.
- Remain in constant communication with the team to which you have delegated the actual implementation of Lean.
- Entrust the implementation to someone who understands the fundamental differences between Lean and JobshopLean.
- Be patient! Implementing Lean is like embarking on a never-ending journey with many stops and detours. Each stop is a better state of your company that you achieve (or hope to achieve) by improving the current state. Each detour is a change of the original route for the journey which increases the time it takes to reach the final destination. Toyota is the epitome of a company that has made CI (Continuous Improvement) an effective and self-sustaining long-term business strategy.
- Strive to demonstrate to your employees that you genuinely intend to make *how to work better, faster and cheaper* the DNA of your company.

Engage all Departments

At one of my clients, we started by implementing an *Order Status Tracking Board* to monitor the daily production schedule and highlight problems/issues associated with all active orders. The Lean

³ Byrne, A. *The Lean turnaround: How business leaders use Lean principles to create value and transform their business*. McGraw-Hill.

⁴ Koenigsaecker, G. *Leading the Lean Enterprise transformation*. CRC Press.

⁵ I found excellent (and free!) information on *Gemba Walks* available online, including YouTube videos.

Champion conducted a daily Production Meeting at 1 p.m. in the lunch room with every manager in attendance whose department touched an order – Production, Purchasing, Material Control, Engineering, Sales, Quality Control, etc. The Lean Champion would affix Post It's of different colors on the board to indicate which department must address a particular problem/issue with one or more orders. Every meeting saw the managers from all departments talking to each other, chiding each other, offering to help one another, etc. At the end of each meeting, the spreadsheet containing all the current problems/issues would be updated with a stated date for resolution of each issue by the manager responsible for it and emailed to everybody in the room. Yes, the board was a visual crutch for expediting! Yes, expediting is wasteful! But, at least it was a start for the Lean Champion to talk face-to-face with all managers. We replaced stand-off and remote communications by email or phone with face-to-face communications. The board will continue to facilitate and coordinate everybody's efforts to get products out the door.

Next, we plan to install a *CI Project Status Tracking Board* next to the *Order Status Tracking Board*. The projects will address those problems/issues that the group collectively determines as impacting their company's ability to deliver orders on-time and on-budget. We will locate this project noticeboard in the same lunch room. On this board the different managers will post progress milestones and key results for their project/s. On a regular basis, the team will recognize the manager (and employees that assisted him) whose projects produced "wow" results. This "living" noticeboard, or maybe even a company newsletter published by the team, is expected to sustain interest in Lean/JobshopLean.

Get the Employees Involved!

An ant colony collectively executes and completes challenging tasks because of three characteristics:⁶

- Flexibility (the colony can adapt to a changing environment)
- Robustness (even when one or more individuals fail, the group can still perform its tasks)
- Self-Organization (activities are neither centrally controlled nor locally supervised)

It is important to first and foremost encourage *all* employees to undertake improvement projects of *their* choice. Allow them to choose what to improve, where to improve, how much to improve, etc. Do not impose any constraints on them. Have expectations (but not hallucinations!) for results. Much can be achieved simply by asking and empowering each and every employee to offer improvement ideas.

Focus on Workplace Safety and Ergonomics

In my previous job, the very first improvement idea came from a shop employee who was concerned about his safety. Ly N. worked in the QRC cell. One day, after my Lean training session that he attended, he walked me over to one of the T-lathes that he operated and demonstrated how loading/unloading heavy parts off the machine could lead to injury. Very soon after this safety hazard was communicated to higher-ups, the Plant Manager (Keith F.), the Maintenance Manager (John S.), the Director of Safety (Frank O.) and the VP of HR (Bruce D.) authorized the repair of a jib crane that could load/unload that machine. Recall that the Toyota Production System was founded on the two pillars of (1) Just In Time (JIT) Production and (2) Respect for People!

Hire a Lean-savvy Plant Manager who Cares about Profits and People

⁶ Bonabeau, E. and Meyer, C. (2001, May). *Swarm Intelligence: A Whole New Way to Think About Business*. Harvard Business Review, 106-114.

Soon after I started on my previous job, they hired a new Plant Manager, Keith F., who was a well-respected individual and very knowledgeable about Lean. He respected each and every employee who reported to him. He started having a weekly all-hands meeting with the shop employees at 7:00 a.m. every Friday. The employees on both shifts were organized into teams. These teams were basically the employees who worked in a manufacturing cell (Quick Response Cell, CNC Packings Cell, Power Rings Cell, Piston Rings Cell, Manual Packings Cell) or a support department (Quality, Maintenance, Shipping, Receiving). He appointed a Lead for each team. At each Friday meeting, he would invite the Leads to report any improvement ideas that they had implemented. I recall doing a simple calculation back then. If every week, each team in each of the two shifts per day implemented one improvement idea in their cell or department, this would result in 18 improvements every week. Assuming approx. 50 working weeks in the year, we would have 900 improvements that would impact our core business goals – Workplace Safety, Job Satisfaction, Speed of Customer Service, Waste Reduction and Sales. If you put a \$ value on the savings from each of those improvements, what would the total savings amount to?

Do “Big Bang” Improvement Projects Also

The media would have us believe that all Continuous Improvement work ought to be implemented only by the employees themselves. Their justification is that this will ensure that the improvement/s will get implemented and are sustained. I will respectfully disagree. Sometimes the project is technically demanding, and involves IT, data mining, and other engineering skills. In my previous job, our Director of Manufacturing Systems (Paul M.) personally led a pilot project in one of our cells to assess if the cell’s team was ready for the introduction of computer-aided shop scheduling and order tracking. He was assisted by one of our Planners, Russell I., who helped to implement the software in the cell. In parallel, the employees in the cell team undertook complementary improvement projects and provided feedback to Paul and Irvine about the user friendliness of their software. For example, they helped to determine the best way to mount the dual-monitor display at each of their work stations, the display format for the active sequence of jobs that the cell should be running, etc. This helped earlier adoption of the computerized shop floor control system!

Hire Industrial Engineers

I owe the success of JobshopLean to the IE students I taught at The Ohio State University! It was those students who did JobshopLean projects and internships in industry over the years who helped me to validate JobshopLean.⁷ A surefire way for a HMLV manufacturer to get ambitious projects done, including Six Sigma projects, is to have as many IE’s on staff as you can. In my previous job, I was very lucky to be able to work with the following IEs:

- *Full-Time Shop Supervisor:* Leonel S. was the Supervisor of both Molding departments. He had BS and MS degrees in Manufacturing Engineering from the University of Texas – Pan American. Previously, he had worked at Seimens where he got to learn and implement Lean. If you were to walk past his departments, you would see considerable evidence that Lean was being practiced. Both departments were clean and well-organized. He would do weekly production huddles with the employees in both departments to address pressing issues. Often, I would see him on the floor assisting his employees. He would write up some of the employees’ projects and recommend them for Employee Achievement Awards. Most noteworthy was the fact that he recognized that the work in either department involved heavy loading/unloading. So he allowed rest breaks that, to outside observers, would make it appear as if the employees were slacking off at their work stations. Finally, the fact that he was Hispanic as were all the

⁷ Please email me at Shahrukhrani1023@yahoo.com if you would be interested in a systematic approach to leverage the different co-curricular or extra-curricular programs of an IE department that allow their students to work in industry.

employees who worked in both departments (except James “Rojo” B.), definitely facilitated communications!

- *Full-Time Industrial Engineer:* Our Continuous Improvement Engineer (Shalini G.) had an MS degree in Industrial Engineering from the University of Houston. It helped to have a detail-oriented IE like her assisting on some of my projects. In particular, the time studies she did in several work cells helped cost accounting, scheduling and level loading of production. If you have an ERP system, then at the barest minimum you need an IE to populate it with good data!
- *Part-time Interns:* Every year student interns from the Department of Industrial Management at the FH-Joanneum University of Applied Sciences in Austria would spend 4-6 months at one of our US facilities. I was especially fortunate to work with one of them, Thomas L., an undergraduate student who was studying for his BSc in Industrial Management. The two of us became facilitators and assisted several employees with their CI projects. In addition, we did technical projects on production scheduling and design of a flexible layout for the Shipping department. Thomas brought to our company a great work ethic and solid IE preparation. Our company gave him valuable OJT (On the Job Training) by assigning him several meaningful projects and a senior executive as his mentor. Many interns eventually chose to work at our company!

Get Going with the Quick-Start Approach for JobshopLean

If you desire to implement the *Comprehensive Approach for JobshopLean*, then you will need data mining software that would be able to identify the part families in your product mix. But, if you are an HMLV manufacturer and just getting started with JobshopLean, I think that you can achieve much. Now that I have worked in industry full-time for 3+ years, I understand how difficult it is for most small and medium manufacturers to access advanced software that is easily available to students and faculty at any university. Plus there is so much pressure on those tasked with implementing Lean in their companies to show results in a jiffy! So I urge you to get going with a simple approach, the *Quick-Start Approach for JobshopLean*.⁸ It integrates Lean tools (like Value Stream Mapping) with Theory Of Constraints (TOC) and IE tools like Time Studies and Methods Analysis.

With Value Stream Mapping, you focus on a particular product (or product family). But where to start improving the Value Stream? This is where TOC, with its focus on improving operational performance at the bottleneck in the system, proves its worth. Have you read *The Goal* (Eliyahu Goldratt, 2004, ISBN 0884271781)?⁹ Goldratt lists three objectives for running a business: *Maximize Throughput, Minimize Inventories and Minimize Operating Costs*. Recall that Profit Margin = Throughput – (Cost of Inventories + Operating Costs). This is far superior to Lean with its focus on cost reduction through waste elimination. TOC even helps to implement a simple scheduling method to ensure on-time delivery! So would you invest \$1000 to purchase a copy of *The Goal* DVD from The Goldratt Institute (www.goldratt.com)? That would be a true measure of your commitment to education and training of your employees on ideas and methods that are directly relevant to a job shop’s operating conditions. Ask key managers and employees in your company to watch this video over and over again. Maybe you can have them answer a detailed list

⁸ If you Google “Bryan Wang, Quick-Start Approach to JobshopLean”, you will be able to download a copy of a prize-winning paper titled *The Quick-Start Approach to JobshopLean: How to Initiate the Implementation of Lean in aHigh-Mix Low-Volume Manufacturing Facility* that former OSU graduate student, Byran Wang, wrote for a competition sponsored by the Lean Division of the Institute of Industrial Engineers.

⁹ If you feel that *The Goal* is dated, then you may want to read a new book: Jacob, D., Bergland, C. & Cox, J. *Combining Lean, Six Sigma and the Theory Of Constraints to achieve breakthrough performance*. Free Press.

of questions that I have developed to test their learning from the video?¹⁰ Ideally, key managers and shop supervisors should know how to implement *Value Stream Mapping* (Lean) and the *POOGI* (*Process of Ongoing Improvement*) that is central to the Theory Of Constraints.

Do Not Ignore Six Sigma

There is a tendency among manufacturers to fault Six Sigma for its extensive use of statistics. But, for any manufacturer to stay competitive, Quality Control, Statistical Analysis of Data and Design Of Experiments are essential! Personally, I have misgivings about a CI strategy when (1) every improvement project has to be cast in a SS (Six Sigma) framework, (2) the actual problem is sliced and diced to fit the SS framework, (3) the toolkit is limited and (4) other more pressing problems are ignored and a secondary problem is selected because it fits the SS framework.

Put Your ERP Vendor's "Feet to the Fire"

For decades, HMLV manufacturers have relied on "Lean Production" methods to plan production and schedule their production systems. They have no choice because their ERP (Enterprise Resource Planning) system cannot produce a daily schedule subject to **finite** capacity constraints. In reality, if state-of-the-art current software (Finite Capacity Scheduling, Manufacturing Execution Systems) and hardware (RFID, smart phones, mobile computers mounted on forklift trucks, electronic displays for dynamic visual communications) are placed in the hands of employees who are tech-savvy and motivated, these age-old limitations of ERP could be overcome. Besides, there are Lean practices such as daily production meetings, water striders, etc. to complement the technology and the people using that technology. Every HMLV manufacturer needs to challenge their ERP vendor by asking, "Why do we not get a working schedule from our ERP?" and demand that the vendor eliminate the limitations of their ERP!

Determine How Many Businesses You Are Trying To Manage

This is important because a job shop needs to see their business in its entirety, and confirm whether one or more businesses are being run under the same roof. This is essential if they wish to plan to improve one, or all, of them. If they do not do this, they run the risk of financing a large number of kaizens with no focus on the key problems ailing their business! Use the method of *Product Mix Segmentation* to break up your product mix into different business segments based on Volume, Revenue, Demand Repetition and Routing Similarity. Segmenting the product mix based only on Volume and Demand Stability will identify segments such as *Runners*, *Repeaters* and *Strangers*. Segmenting the product mix based only on Revenue will identify segments such as *Stars*, *Questions*, *Cash Cows* and *Dogs*. But what about the product families based on Routing Similarities? Ideally, each segment of the product mix should be managed as a separate business, maybe even produced in a separate area of the same facility. In the typical job shop, two or more businesses are allowed to intermingle, so they tend to interfere and compete with each other. **This** is what makes it much harder to implement Lean in a job shop, as compared to any Toyota factory!

Explore the Role of Group Technology

Group Technology (GT) is based on a general principle that many problems are similar and by grouping similar problems, a single solution can be found to a set of problems, this saving time and effort. The concept of the *part family* based on similarities in design and manufacturing is central to Group Technology. GT has universal applications across an enterprise, such as design of manufacturing cells, design of flexible automation, employee cross-training, cost estimation, RFQ

¹⁰ Please email me at ShahrukhIrani1023@yahoo.com if you are interested in my list of questions on *The Goal* video that I used in the Production Control and Scheduling course that I taught at The Ohio State University.

generation, etc. If you are a HMLV manufacturer, I urge you to develop a GT Classification and Coding system suited to your product mix!

Is Your Facility Layout Able to Support Flow?

You need to know if your facility layout is a problem. As soon as you can, have a team meeting to do this assessment. Simply update your facility layout, take a full-scale printout off your CAD printer and mount this drawing on a conference wall. Bring to that meeting a set of at least 20+ multi-color marker pens. Ask your team to make a list of 20-25 different part numbers that are Runners or Repeaters. For each of these parts, agree on the current routing for making that part. Then have a volunteer trace that complete routing on the facility layout. Repeat the process for all the part numbers that the team selected. Does the resulting Flow Diagram look like a bowl of colorful spaghetti?

Do Not Ignore Historically “UnLean” Processes --- Think Right-sized Equipment!¹¹

Heat treatment, extrusion, plating, etching, painting, washing --- these are the so-called “unLean” processes that, unlike machining or stamping, defy the standard Lean practices of Single Piece Flow and Cellular Manufacturing. If you have these processes, please do not ignore the changeover times, idle times, reject rates, etc. on them. This brings to mind a project we did for a high-mix pipe fabricator. They had thousands of SKU’s in inventory (by diameter, thickness, material, length, shape, etc.). If my memory serves me right, they had three warehouses that were full of inventory. *They had a single wash tank located in the middle of their facility.* **Every** batch of pipes they produced **had** to be washed in that tank. The tank was undoubtedly a monument, the obvious “Herbie” (aka bottleneck) in their system. Operators continually changed cleaning solutions between batches. And it was common practice to group orders for the same type of pipe into a single batch in order to save changeover time (even if they always saw large batches in queue at the tank for days!). We went blue in the face advising their management to “right-size” that tank and replace it with several smaller tanks based on size of the parts, order quantity, type of washing needed based on oils used on the benders, etc. We even showed them the chapter in Lean Thinking where James Womack and Daniel Jones contrast how Toyota bought two commercial dishwashers to do the same washing that one of their Big Three competitors opted to do using an extremely complicated flexible washing “monument” that had an OEE (Overall Equipment Effectiveness) of only about 60%. All to no avail! We even found out that the Sales department had made no attempt to show their agents how uncontrolled diversity of incoming orders was creating a production bottleneck at the wash tank. All to no avail!

Invest in Employee Training and Development

I am going to assume that you have on staff (or will hire) an Industrial Engineer from a recognized IE departments whose curriculum incorporates a Lean Six Sigma Green Belt Certification. An IE (or MfgE) who understands the theory and practice of Lean, TOC and Six Sigma can benefit a manufacturer regardless of company size!¹² If hiring a full-time IE is unacceptable, then at least hire an IE intern on a semester-by-semester basis. A good IE ought not to find it too difficult to help their employer save, or earn new business, every year that is equal to his/her annual salary with benefits.

¹¹ Zelinski, P. *Why Boeing is Big on Right-size Machine Tools*. Modern Machine Shop, 2/2/2006.

¹² Please Google “Integrated TOC Lean Six Sigma” to access considerable online literature on how to integrate the three well-known improvement strategies – TOC, Lean and Six Sigma – because they are complementary to each other.

Having hired this IE, nurture him/her to become your company's full-time Lean Champion. His/her responsibility will be to support kaizen events, develop training materials, program spreadsheets for data mining, etc. Put aside a travel budget for the IE to attend annual conferences and cutting-edge workshops. Accompany him/her on benchmarking visits to local companies that have successfully implemented Lean in their high-mix low-volume operations.

Put the IE in charge of a Lean Resource Office (LRO) that will support employees on their CI (Continuous Improvement) projects. To help your employees learn the Why?, How? And What? about Lean, equip this office with resources such as:

- CD's
- Books
- Posters
- Project reports submitted by interns
- DVD's
- A subscription to www.GembaAcademy.com or www.ToolingU.com
- Learning games
- Good (and free!) information available online from websites like www.TOCforMe.com and <http://www.strategosinc.com/>
- etc..

Keep enhancing the learning and training resources housed in the LRO with materials developed from the projects and implementations that your own employees do. Nothing breeds a thirst for more success than seeing one's own success being recognized.

Lastly, you may want to consider the TWI (Training Within Industry) Program for employee training and development. The TWI workforce training program was developed by US manufacturers and taught to Toyota soon after World War II. Toyota mastered it, improved it and built their Toyota Production System on it. Somewhere I read that at Toyota every employee, from the President down to the line operator, comes to work thinking how they could make improvements in their current work processes. If you desire more information on TWI, please visit the website of The TWI Institute (<http://www.twi-institute.org/>).

Appendix 1

Informative Books on the Toyota Production System

Title of Book	Why I Like this Book
Ohno, T. 1988. <i>Toyota Production System: Beyond large-scale production</i> . Productivity Press.	These books are translations of the original writings of the mastermind who designed and personally led the enterprise-wide implementation of TPS. These books are a must read if you want to understand the real why's and how's at the heart of TPS/Lean.
Ohno, T. 2012. <i>Taiichi Ohno's workplace management</i> . McGraw-Hill Education.	
Tsukuda, R. 2006. <i>The illustrated Toyota Production System – Part 1: A Lean transformation primer</i> . Gemba Press.	Each book is a collection of 2-page lessons about the ideas and tools underlying the TPS. Each lesson contains graphics that improves its readability. These lessons “can be applied again and again to reduce waste and improve productivity, safety and quality”. That is what you want every manager and employee to do every day when they are at work!
Tsukuda, R. 2006. <i>The illustrated Toyota Production System – Part 2: A process improvement methodology</i> . Gemba Press.	
Japan Management Association. 1986. <i>Kanban (Just-In-Time at Toyota: Management begins at the workplace)</i> . Productivity Press.	I like this book because it discusses <i>both</i> the operational and managerial aspects of the Toyota Production System.
Womack, J. P. & Jones, D.T. <i>Lean thinking: Banish waste and create wealth in your corporation</i> . Simon & Schuster.	I got hooked on TPS/Lean thanks to this book. Prof. Blaine L., a colleague of mine at The Ohio State University, who was teaching a course on Lean, recommended to me that I read this book. I did and the rest is history. Thank you, Blaine!
Shingo, S. 1989. <i>A study of the Toyota Production System from an Industrial Engineering Viewpoint</i> . Productivity Press.	This book should be the basis for re-designing the undergraduate IE curriculum at every IE department in the world!
Markovitz, D. 2012. <i>A Factory of One: Applying Lean Principles to Banish Waste and Improve your Personal Performance</i> . CRC Press.	The central theme of this book is that every employee is capable of ideas to improve the work he/she does. Just let him/her do it! ¹³
Rother, M. 2010. <i>Toyota kata: Managing people for improvement, adaptiveness, and superior results</i> . Mc-Graw-Hill.	“Kata” is a Japanese word that means “an individual training exercise in karate and other martial arts”. This book offers complete instruction on (1) how an individual employee can make work improvement a routine and (2) how the teacher/coach would initially facilitate any employee trainee. This book complements Markovitz's book.

¹³ The one-cell-at-a-time approach to implementing JobshopLean builds on this concept by (1) focusing on a Value Stream (or Part Family), (2) physically co-locating the employees that will produce the Part Family into a manufacturing cell, (3) training the employees on ***all*** of Lean/IE tools that improve the operational performance of the cell and (4) placing expectations on the team that they optimize KPI's (Key Performance Indicators) for the Quality, Cost and Delivery of orders loaded on the cell.

<p>Imai, M. 1997. <i>Gemba kaizen: A common-sense low-cost approach to management</i>. McGraw-Hill.</p>	<p>“Kaizen” is a Japanese word that means “change for the good”. This book complements Markovitz’s book.</p>
<p>Kato, I. and Smalley, A. 2011. <i>Toyota Kaizen Methods: Six Steps to Improvement</i>. CRC Press.</p>	<p>I would use these books to create lectures and examples to teach specific Lean tools to employees and managers.</p>
<p>Ishiwata, J. 1991. <i>IE for the Shop Floor: Productivity through Process Analysis</i>. Productivity Press.</p>	<p>I have included the two books on the quintessential IE skills – Process Analysis and Time and Motion Study – required to map and measure any and all work for subsequent improvement.</p>
<p>Kato, K. 1991. <i>IE for the Shop Floor: Productivity through Motion Study</i>. Productivity Press.</p>	<p>I like the concept underlying this series of books. But they lack real EXAMPLES to accompany the generic instructional content. You may want to develop your own in-house training guides based on these books.</p>
<p><i>Lean for Operators Shopfloor Series</i>. Productivity Press.</p>	<p>This book could be an alternative reference that provides a good overview of all the popular Lean tools that are frequently used to improve work processes.</p>
<p>Pascal, D. 2007. <i>Lean Production Simplified: A Plain-Language Guide to the World’s Most Powerful Production System</i>. CRC Press.</p>	<p>This book is a must-read for managers and executives.</p>
<p>Liker, J.K. 2004. <i>The Toyota Way: 14 management principles from the world’s greatest manufacturer</i>. McGraw-Hill.</p>	<p>David Meier is a former employee of Toyota who has led a large number of Lean implementations. That makes him a much-needed co-author for this book that teaches the Lean tools.</p>
<p>Liker, J.K. and Meier, D. 2006. <i>The Toyota Way fieldbook: A practical guide for implementing Toyota’s 4P’s</i>. McGraw-Hill.</p>	<p>This book teaches how employees who work in a manufacturing (or service) cell can become a cohesive and results-driven team.</p>
<p>Fisher, K. 2000. <i>Leading self-directed work teams: A guide to developing new team leadership skills</i>. McGraw-Hill.</p>	<p>This book is a must-read for both implementers and managers.</p>
<p>Mann, D. 2010. <i>Creating a Lean culture</i>. CRC Press.</p>	<p></p>