Observations and Lessons Learned:
Applications for North American Operations

Japan Lean Study Trip

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Jeff Sipes' Observations and Lessons Learned
Thoughts for Application in North American Operations

Introduction

From October 20 through October 24, 2008 I had the wonderful opportunity to participate in a Japan Lean Study Tour hosted by JMAC (Japan Management Association Consultants). During the week, we visited the following locations/companies:

- JMAC corporate offices in Tokyo for orientation and training
- Toyota body plant and assembly plant in Toyota City
- MIC (Management Innovation Center – Toyota) in Gifu-ken
- Calpis beverage plant in Tatebayashi
- Japan Energy Corporation in Tokyo

Each visit had a Lean focus which helped to channel the tour participants' investigation, questions, and learning. The focused subjects included:

- 5S (Sort, Straighten, Scrub, Standardize, Sustain)
- Flow
- Kanban
- TPS (Toyota Production System)
- Knowledge Innovation

One of the highlights was spending one day with Michinori Takagi, General Manager and master instructor at Toyota's education center. We communicated through a translator. He was gracious during the time he lectured our class and guided us through the Gifu welding and assembly operations (trucks and vans). He was also quite firm in what he described as TPS principles and implementation guidelines.

Additionally, we experienced how people live and travel outside the workplace. The experience included "planes, trains, and automobiles", plus lots of walking around. Part of our time was in Tokyo and part was in a smaller, more rural area. Although there were differences between the large city and the smaller towns, the fundamental common denominator was the cleanliness and orderliness throughout the Japanese society. Clear, visible instructions were evident to guide our travel during the week-long journey.

The following is a list of the Top 9 Things Learned from the Lean Study Tour week:

1. Clean and Orderly

Observations and Data Points: My first impressions of Japan were formed from the time I stepped off the airplane until I got on the shuttle bus to go to first night's hotel. That entire process was clean and orderly – making first impressions that framed how I viewed the balance of my time in Japan. Examples of the orderliness included:

a) A visual line about 4 feet outside the circumference of the baggage carousel that defined the surrounding space. People stood back (as opposed to crowding forward with their carts, kids, and other stuff), observed the bags coming around the carousel, and stepped forward only when their bag(s) was in sight. The result was an efficient and orderly baggage retrieval process (quicker, easier, safer).

b) At the shuttle bus stop, there was a "busy, but clear" sign that indicated which buses would come at what time. The buses were prompt, both in arrival and in departure. I had confidence in the quality of information and in the execution of the process. Also at the shuttle bus stops, there were very clear serpentine flow lines that indicated direction, quantity of people, and distance away from the curb (safety). Amazingly, people conformed to the visual signals on the ground. (see picture #1 in appendix)

c) There were examples of "clean and orderly" in every factory and office we visited. Examples ranged from clear markings for parts delivery and presentation on the assembly line at Toyota, to the "easy to see" flow at the beverage manufacturer, to the uncluttered and spotless offices/conference rooms at the host consulting firm.

d) Clean and orderly was not just for the factory. It seemed to permeate all the ways that the Japanese people conduct themselves…whether on the shop floor, in the office, or at the train station. It is ingrained at an early age. Several people independently described that there are no janitors in the Japanese schools. Instead, students are expected to participate in 20 minutes or so of cleaning each day at school. They carry this forward into business later in life. Compare this to the shock and frustration of trying to get the workforce (that's all of us from the executive suite to farthest corners of the shop floor) to be responsible for planning and execution of "clean and orderly".

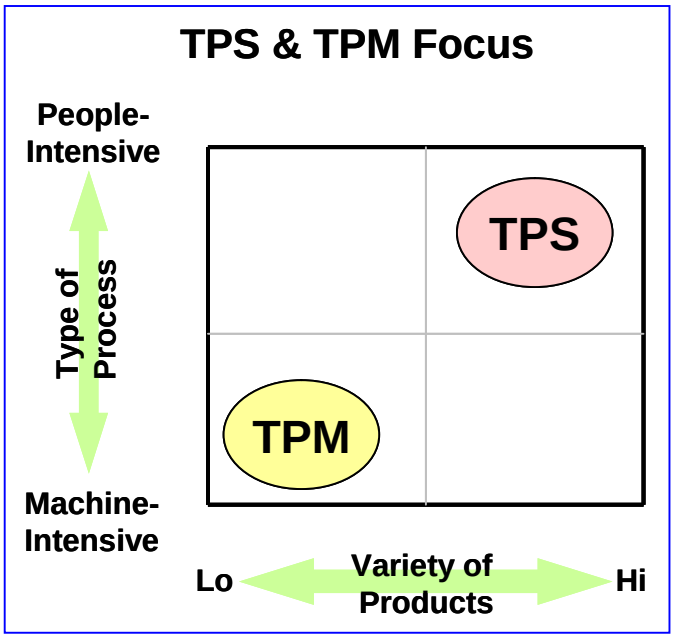
Application to North American Operations: Customers, visitors, suppliers, and recruiting candidates probably form their first impressions about our companies/plants in the first 30 minutes, just like I did at the Tokyo Narita airport. Leaders, managers, and associates have opportunities to create positive first impressions with our customers, visitors, suppliers, and recruiting candidates. Product and process designs should take "clean and orderly" into account now. Training processes for our workforce should include expectations that the operations will be conducted in a "clean and orderly" manner.

2. Distinction Between TPS and TPM --

Observations and Data Points: The plant visits to Toyota Gifu and Toyota City were focused on high volume, repetitive, labor-dependent operations. The TPS (Toyota Production System) tools were evident in their application. We could clearly see examples of visual control, kanban, streamlined flow, and quick changeover. TPS was the way things were done.

In contrast, the beverage company (Calpis) and the refinery (Japan Energy Corporation) were capital-intensive operations with fewer people, relative to the auto plants. At the beverage company, I asked the general manager how TPS applied to his business. At Japan Energy Corporation, the general manager gave unsolicited feedback on how TPS applied to his operation. In both cases, the general managers said they are not automotive companies and, although some of the principles apply, they do not use TPS. Instead, they use TPM (Total Productive Maintenance). They made clear distinction between TPS (high volume, repetitive, labor-dependent) and TPM (capital-intensive, fewer people, less product variety).

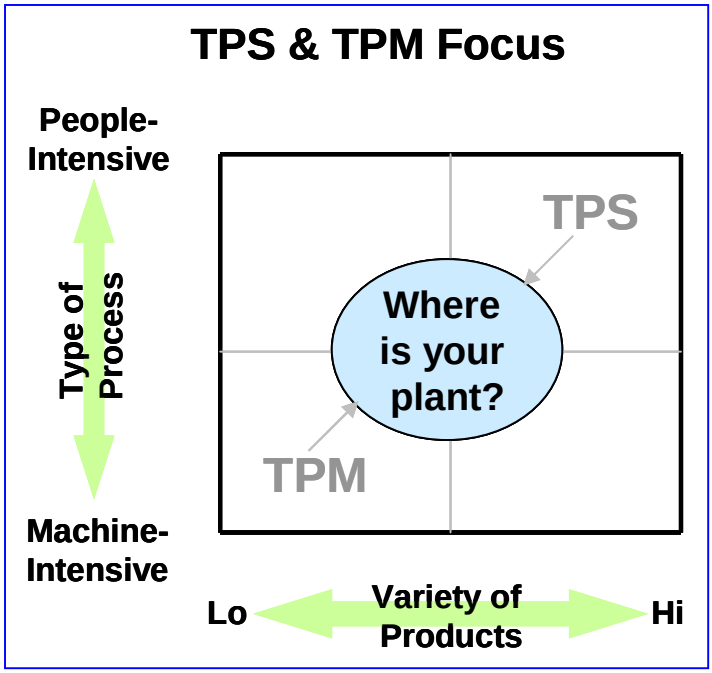
This distinction was also reinforced by Tagaki-san during our training session at Toyota. The graph he drew illustrated, from their perspective, the relationship of TPS and TPM. In North America, we tend to think of Lean being synonymous with TPS. Further, we think of TPM being an element or tool within the Lean body of knowledge. My take-away from the week is that the Lean leaders in Japan view these two technologies as distinct approaches that can be either primary or secondary, depending on the characteristics of the operations.



Tagaki-san's Graph – Toyota Training Session

Application to North American Operations: A key take-away from this observation is that we must understand our specific manufacturing strategy. Plants with discrete operations (piece part makers and assemblers) have different needs and priorities compared to plants with continuous processes (refinery or brewery). Even within the discrete operations, a plant that is focused on low volume, high mix will have different needs compared to a high volume, low mix operation. Where a plant is placed on Tagaki-san's graph will help to determine the relative priority for TPS and/or TPM application.

In short, one plant or company cannot merely copy the approach of another plant or company. We need to understand the specific and unique operational needs of the plant. Additionally, we need to be cautious about doing work exactly the way our new people did at their last job (force fitting the way we did it at the last company). North American leaders will be wise to think through how to apply Lean, TPS, and/or TPM so that it becomes the right way for a given plant at a particular stage of a plant's evolution.



Adaptation of Tagaki-san's Graph – Where is Your Plant?

3. Use of Visual Techniques –

Observations and Data Points: There was heavy use of visual techniques, both in the factories and in day-to-day experience outside the factories. I've already described how visual technique was used for queuing and organizing at the train stations and baggage carousel. An additional example of day-to-day experience includes technique used by every taxi cab I saw in Tokyo and in outlying areas. The taxi cabs had white cloth covers on seats and headrests. (see picture #4 in appendix) This provided a visual way for the driver and his passengers to tell if the seats were becoming soiled. It would be painfully evident if there was soilage…and I saw none!

In the factories there was evidence that visual techniques are a way of life. These did not stand out as something beyond the norm, but rather the techniques were integrated into the operation. Although the technique is mundane and elementary, the way they executed the technique was exceptional. Exemplary execution of the mundane separates winners and losers! Examples include:

a. Work areas and cells were clearly defined with taped lines on the floor to show placement of totes, racks, conveyance devices, etc.

b. Process visual boards were used to define the cells, lines, and work areas. Some of the boards included LED takt time based counters showing expected production and actual production. At any point during the day, you could tell the line's performance to schedule and the relationship to takt time.

c. Parts locations in bins and gravity feed racks were clearly labeled. There is no confusion about what parts go in which location.

d. A room was set up for visual planning and problem-solving. The room included a series of 4' x 8' moveable panels that showed elements of structured problem-solving, a section for feedback and comments, and visual graphics to clarify issues. The focus was on visual techniques to get everybody on the same page so that scarce resources are not diluted. This was used for both tactical problem-solving and planning for strategic initiatives.

Mr. Tagaki made three points during the training at Toyota Gifu that guide the way Toyota manages their operations. The simplicity of these points hide the powerful impact they can have on effectiveness of managers and leaders. The points were:

1.) If rules are clear, then you do not need as many levels of organization and management;

2.) Standardize so you do not need to manage on a daily basis (provides more time for improving); and

3.) Simplify to flatten.

Application to North American Operations: Visual controls and techniques help to instill discipline into our operations. This Lean method is as powerful as it is basic. Use of visual techniques can help to organize so that things that belong are in the right place, identify things that do not belong, and create standard work and processes. Also, using the three points above may help us to avoid over-complicating the processes being designed. In cases where current layouts show little space available for parts presentation at the lines and little space for supermarkets at certain places along the value stream (for example, between component production and 1st operations on weld & assembly lines), visual controls clearly define how space should be used.

Other forms of visual controls, such as line stoppage instructions, kanban signals, and production control boards, help to define the rules of engagement for a cell or line. This supports Mr. Tagaki's three points above.

"Now" is a great time to begin discussing and implementing "standards" which will be expected across all lines (particularly if you are installing new lines/cells or doing redesign of existing lines/cells. The "standards" would be the non-negotiable aspects of the operations. These standard items might include:

a. Procedures (5 minute shift start and end meetings);
b. Techniques (standard visual boards); and,
c. Policies (who does the backflush operation).

4. Use of Temporary Resources –

Observations and Data Points: All of the locations we visited used temporary resources. They use this type of worker to flex the workforce up or down. One way they use the temporary people differently than most North American manufacturers is that they contract with the temporary person for one year at a time. The contract can be renewed two times (for total period of temporary employment of three years). If the contract employee is not hired full time by the end of three years, the relationship is terminated.

Also, they described one other type of workforce participant. This is the "freeter" (free-ter). This is a person who does not want to work on a permanent basis, plans to work on assignments for a relatively short period of time, and does not want to settle down with one company. The freeter tends to be very flexible to work assignments and assignment duration during his/her time with the company.

Application to North American Operations: This is generally reinforces the way we use temporary resources in North America. They did make it clear that Toyota invests in providing necessary training to the temporary workforce. The North American management might challenge if both the quantity and the content is consistent with the expected "career path" of the temporary workforce. Will our North American companies treat our temps like the Toyota temporary or the Toyota "freeter"? Are there opportunities to use the freeter concept for selected jobs (focused job, short duration, lower skill requirement)?

5. Dunnage was Hodge-Podge of Sizes, Shapes, and Colors --

Observations and Data Points: I observed the receipt and handling of supplier dunnage at both the Toyota Gifu truck/van plant and the Toyota City car assembly plant. First observation at the receiving dock was that the incoming trucks had a wide variety of sizes, shapes, and colors of dunnage. (see picture #2 in appendix) Almost all were smaller dunnage units. Where larger piece parts were concerned, there was specialized dunnage (some steel, some plastic). I did not see any of the standard 45" x 48" plastic knockdown containers we tend to use.

In the component parts and subassembly area at Toyota Gifu, there was no fork truck traffic. The parts were moved around by people moving containers on dollies. Again, there was lot of variety of container sizes and shapes.

Application to North American Operations: The small parts containers allowed Toyota to present parts close to the point-of-use at the assembler's or machine operator's stations. Many of our North American operations would benefit from more rigorous assessment of how parts are presented. Poor parts presentation results in ineffective use of space, higher risk of mixed parts, and increased motion muda. One difference between the plants I saw in Japan and here in North America is that the Japanese suppliers are nearby, which facilitates more aggressively using the wide variety of smaller dunnage.

Generally, North American manufacturers are trying to standardize on a few common types of dunnage and to build unique transportation devices for internal movement of subassemblies. This makes our approach a hybrid between Toyota's infinite dunnage and Germany's "one size only" gittyboxen (universal wire basket container).

I continue to believe the standard dunnage strategy makes sense. This takes a huge variable out of most plants. Using cross-functional teams (packaging engineer, logistics, plant materials people, and purchasing) is an effective way to develop dunnage standards, where appropriate, and specialized dunnage, where necessary.

6. Use of AGVs –

Observations and Data Points: The Toyota plants used AGVs (automated guided vehicles) extensively in their assembly processes. In some cases, there were completely unmanned drops; in other cases, the drops involved a person to unhook one trailer and rehook another. They used the AGVs in a very flexible way. Instead of the guidewire being embedded in the floor (cut into the concrete), they used short "durable strips" that were taped to the floor. If they needed to modify or alter the AGV route, they simply pull up the tape, move the strip, and retape the strip to the floor. Some of the applications were in high traffic areas, but the tape application seemed to hold up OK. It was not pretty, but it was effective!

Application to North American Operations: This flexible AGV technology and application might be a way to connect disconnected subassembly operations to their point-of-use on the weld and/or assembly lines. Another application for the AGV is to use them on short routes "across or down an aisle" on frequently repeated routes. In this case, the AGV would become a kanban device for the operation.

The benefits of this AGV application would include flexible and quick process redesign, reduced dependency on fork trucks, improved flow compared to the monuments created by fixed conveyors, and ability to adjust speed to match takt time.

7. Use Light Plastic Gravity Flow Racks –

Observations and Data Points: Parts presentation in the component manufacturing and the assembly line operations in the automobile plants was focused around light-duty, plastic "tube and elbow" gravity flow racks. There was very little of the heavy-duty, angle-iron type flow racks. Parts were delivered to the lines in small tote containers that could be handled by hand. Again, there were no fork trucks in the areas where the lines were replenished. The light-duty plastic gravity racks are relatively economical and highly flexible. (see picture #3 in appendix)

Application to North American Operations: When space will be at a premium, due to the amount and size of production equipment, the defined space between bay posts, and the number of parts to be presented, the way parts are delivered and presented becomes especially critical. The light-duty, plastic "tube and elbow" gravity flow racks might be a way to minimize floorspace and maximize density in areas where smaller parts are consumed. Operators or team leaders could adjust the flow racks on the fly rather than waiting for an engineer review, work order, and heavy duty welding. This would enhance flexibility to adapt to process changes.

8. Use of Waterspiders and No Fork Trucks in the Plants –

Observations and Data Points: For the size and complexity of both the product and the plants, it was amazing that there where no fork trucks inside the production operations. Fork trucks were used at receiving and shipping, but far and few in between. Parts were "transported" by AGVs, mobile devices that could be moved by hand , and fixed transporation devices (overhead conveyors and slides). This is in contrast to many North American operations where we tend to congest the operations with fork trucks. Additionally, we create process dependency where the process stops if the fork truck is not available when the container is full/empty.

They used waterspiders to present parts to the operators and assemblers so that the people who were adding value could stay focused on adding value. The waterspiders had defined routes or customers (operators and assemblers). Just like the operators and assemblers, the waterspiders operated to takt time.

Application to North American Operations: We need to aggressively challenge our dependency on fork trucks. They drive space consumption, track dirt into the process, increase congestion, and induce minor stops. More extensive use of waterspiders and tuggers may be part of the answer to reduce the dependency on fork trucks. Also, the waterspiders can absorb the unanticipated disruptions and minor stops the subassembly and feeder operations will experience that could result in whipsaw at the final weld and/or assembly lines. Depending on the scope of the waterspider's responsibilities, that person could become the "eyes and ears" for the team leader.

9. Pace and Hustle –

Observations and Data Points: They hustled with purpose! It appeared that all movements and motions were by design and were focused. For the most part, people were working at steady, but comfortable paces. There was very little slack time. Only in a couple of cases did we see operators, assemblers, or support people working at unreasonably fast paces. However, we did see maintenance personnel respond to addon light signals at a jog. There was high sense of urgency.

Application to North American Operations: The pace needs to be realistic and all motions need to be meaningful. "Pace and hustle" are as much about culture and mindset as about rules and procedures. Some of our North American plants will have opportunities to reinvent themselves (big step-function levels of improvement). Other plants will have to improve incrementally (lots of minor improvements). In either case, the way we address "pace and hustle" will influence our success. The manufacturing

engineers should design processes with pace and hustle as a design principle (meaningful motion, effective parts presentation, and proper tools and assist devices) and the plant management team (HR and Operations) should recruit and train personnel, both existing workforce and future workforce) with pace and hustle as a design principle (up-front training that defines and reinforces expectations, hands-on training and simulation areas, and performance feedback system that gives the workforce honest and actionable feedback). In the ideal state, every move should be a move with purpose!

Appendix

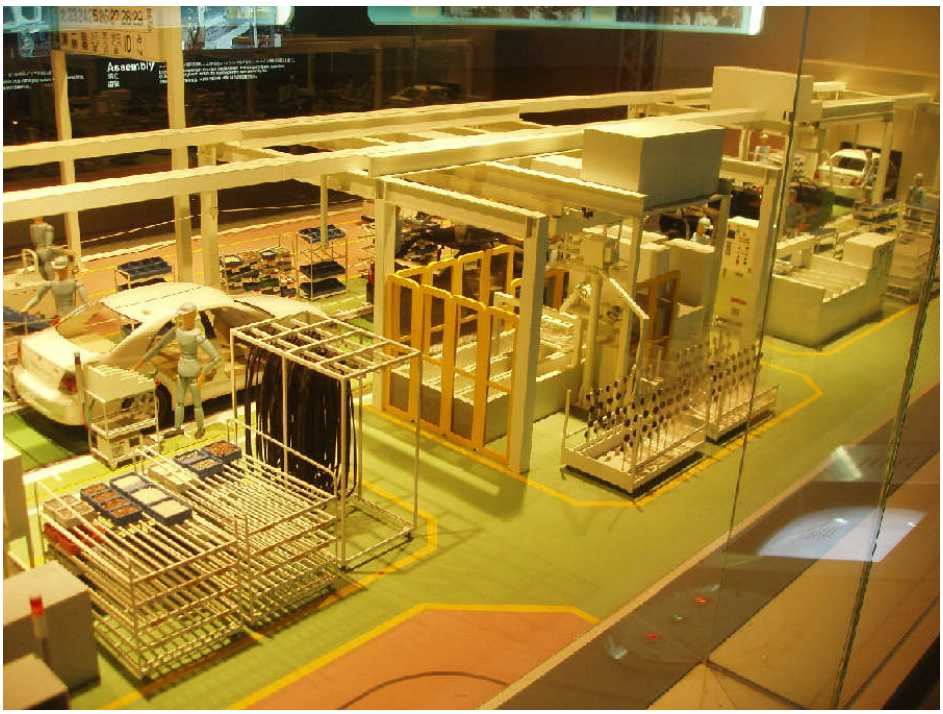
Picture #1: Visual Controls at Train Station

Picture #2: Toyota Production Line Model – Parts Presentation Examples

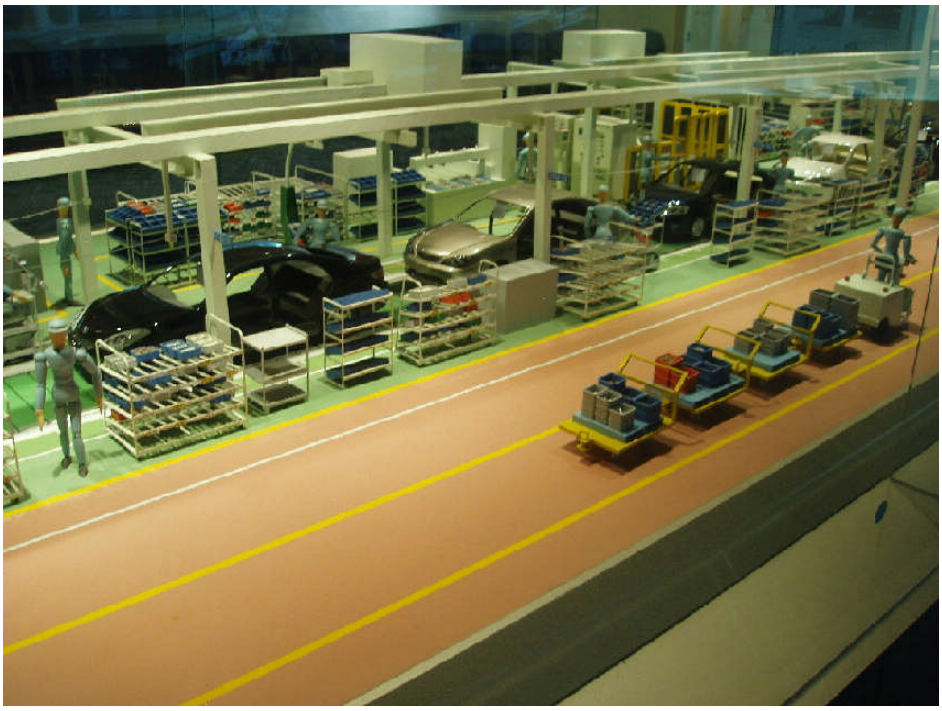
Picture #3: Toyota Production Line Model – Waterspider and Tugger

Picture #4: White Cloth in Taxi to Show Soiling

#1. Visual Controls at Train Station



#2. Toyota Production Line Model – Parts Presentation Examples



#3. Toyota Production Line Model – Waterspider and Tugger

#4. White Cloth in Taxi to Show Soiling

