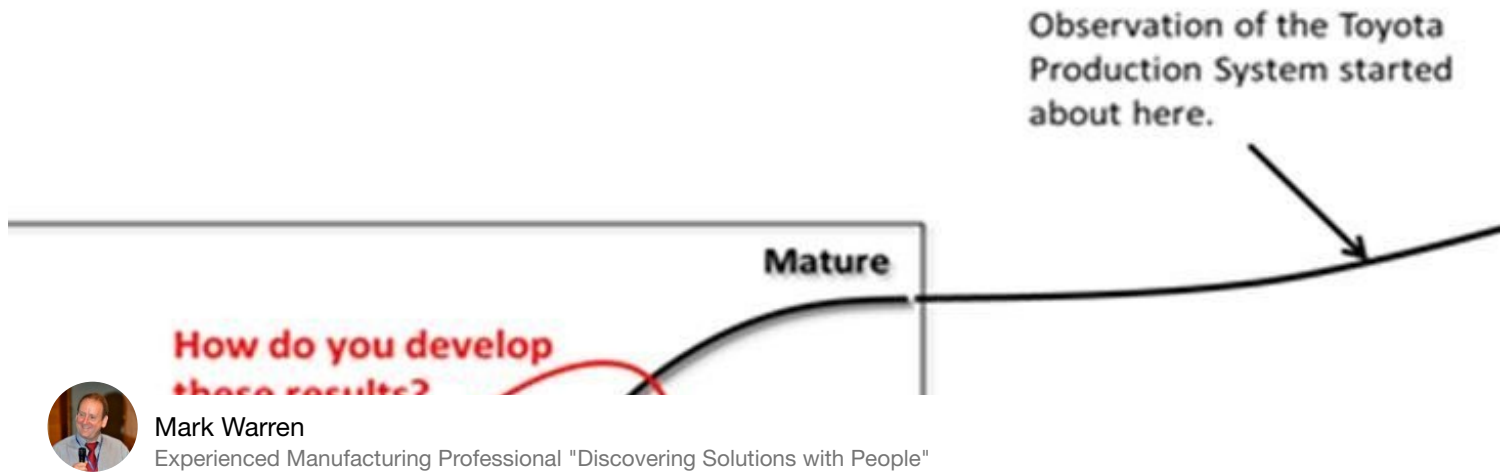




Mark Warren

Experienced Manufacturing Professional "Discovering Solutions with People"

For the Lean Experts...

June 29, 2017 • 7 Likes • 2 Comments

What if we made some mistakes in the beginning?

Yes...

There were mistakes...

But this is normal in any learning curve.

Where did we go wrong?

Our problem is that the original guesses and opinions have been repeated often enough that they are taken as fact.

Original post: 12 June 2017 (<https://medium.com/@mark.tesla2/for-the-lean-experts-54bbe347900b>) continuously editing for clarity in response to reader feedback.

Questions, suggestions, additions needed in the article; please send feedback to:
Mark.Tesla2@gmail.com

What if you could speed up the learning curve of lean and improve the success rate measurably?

We didn't know what we didn't know

Our search for understanding 'Lean' should be put into context in terms of the evolving American view of Japanese industry. This is not going to be in-depth, but a generalized overview. Through the 1960's, except in a couple of industries, "Made in Japan" was connected to cheap products that performed poorly. By the 1970's this began to change, as some of the leading Japanese brands began to displace American producers. Not only were their products less expensive, their performance and reliability began to surpass the American brands. By the 1980's, it seemed that the Japanese business model could take any segment of the market they entered.

It first, we attributed it to the special cultural environment in Japan. A handy excuse for the American CEO when they were failing to compete in their own market. Our experts (consultants and academics) started explaining the differences in our management — *Theory X vs. Theory Y*... and one even proposed a hybrid *Theory Z*. So, American companies dutifully trained their employees in leadership positions on how our *Theory X* management was bad and how we needed to change. To be honest, there was some truth in it and the workplace environment improved, but this was not the ‘*magic bullet*’ we needed to compete with Japan.

So the experts (consultants and academics) told us that “*if only*” we improved our quality we could compete with Japan. The companies dutifully complied by starting training programs on applying SPC (Statistical Process Control) or Dorian Shainin’s Pre-Control process... eventually to converting some of the British Standards (BS) into ISO, and the rush was to become ISO certified. To be honest, most companies improved their quality and reliability of the products to the consumer, but this was not the ‘*magic bullet*’ needed to compete with Japan.

“If Only...” Thinking

So the experts (consultants and academics) told us again, that “*if only*” we used similar production systems as Japan, then we would be competitive with Japan. And the rush was on to try to understand what was so special about the Japanese production systems... not just Toyota. In 1980 Bunzaemon Inoue, (President of Sumitomo Rubber) observed in a letter to Kenneth Hopper, describing the flood of visitors as “*industrial tourists*”; that they would gain little understanding from their visits, beyond seeing some of the tools used. [1]

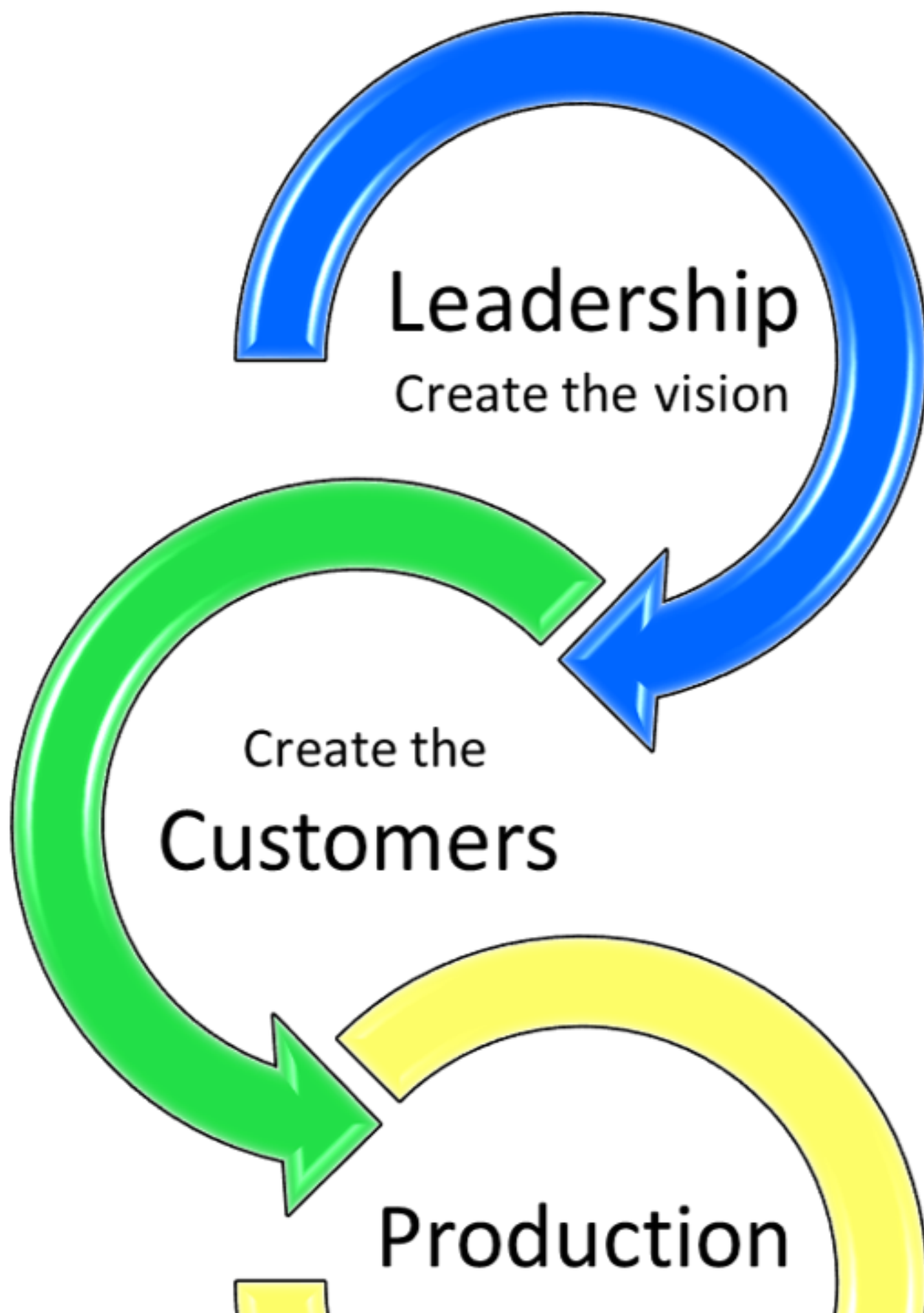
Our concentration on Toyota as the best practice for ‘*lean*’ happened **after** the release of the book “*The Machine that Changed the World*” in 1990. I am aware of only three books available in English that specifically concentrated on Toyota before 1990: The Japan Management Association published Shigeo Shingo’s “*Study of ‘Toyota’ Production System: From an Industrial Engineering Viewpoint*” in 1981; Yasuhiro Monden’s “*Toyota Production System: Practical Approach to Production Management*” was published in 1983; and in 1988 an English translation of Taiichi Ohno’s “*Toyota Production System: Beyond Large-Scale Production*” was published in the US (original release in Japan was in 1978). Norman Bodek acquired the rights to republish Shingo’s “*Study of ‘Toyota’ Production System*” and released a revised version in 1989 that was 100 pages shorter... and much more palatable to the American public.

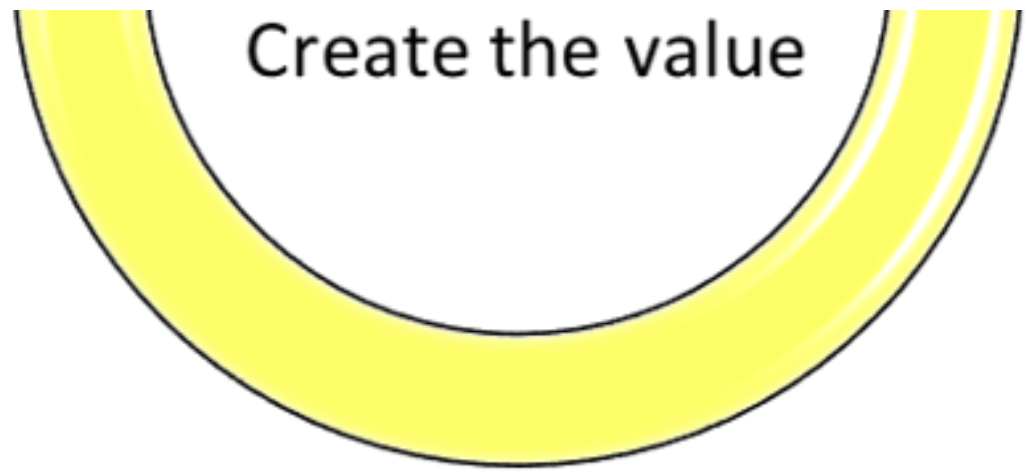
Our “*if only*” thinking led us to assuming that “*if only*” used the same tools and ‘*looked like*’ Toyota we could have the same results. The next decade or two saw a tidal wave of Toyota and ‘*Lean*’ centric books that concentrated on teaching people the tools that Toyota used and what the production lines looked like so we could copy them.

While the earlier published information would tend to skew our interpretation of what we think we are observing, there are missing factors that should influence our interpretation. It is now accepted that Taiichi Ohno is credited with being the ‘*Father of TPS*’ or primary developer. He claims that the development began in earnest in 1951 and the system was stable by 1965. *We tend to overlook the 15–20 years of experimentation and learning that preceded this development period.* We overlook his references to studying Ford, as the academic community has pigeon-holed this as “*Fordism*” without realizing the vast difference between Ford’s River Rouge Plant behaviors and the thinking that drove Ford’s Highland Park Plant innovations. *Ohno’s primary exposure was to the earlier Ford innovations.*

| We must recognize that Taiichi Ohno did not act alone.

Rule of Three



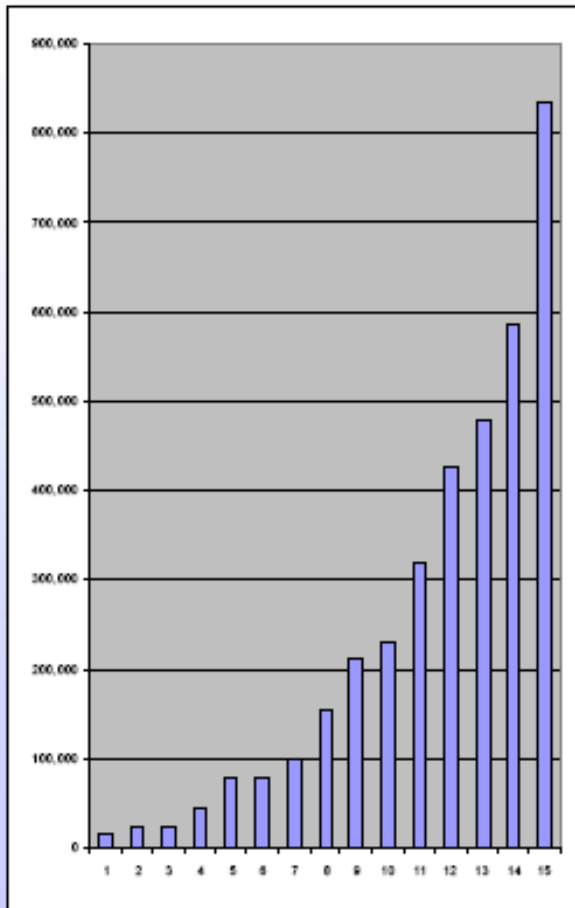


While we studied the production system closely, we mostly overlooked the other two primary contributing factors that were necessary for Ohno to develop TPS. Creating the vision that fostered a protective environment to experiment and growing customer demands that needed a better production system.

First is the leadership portion, *Creating the Vision* — Kiichiro Toyoda expressly wanted to ‘catch-up’ to America’s productivity levels in three years. Eiji Toyoda spent three months at the Ford River Rouge Plant in 1950 and returned home realizing that Ford did not have some secret magical formula for their success. **“Ford’s not doing anything we don’t already know”**.^[2] This emboldened Eiji to create the environment where Ohno could thrive.

Create the Customers — Shotaro Kamiya and his team at Toyota Motor Sales should be credited with developing the customer centric model that drove growth in Toyota. They introduced the customer-centric thinking into the design side, understanding what the customer wanted and what value they put on it. So the first constraint was; how can we deliver this feature at this cost and make a profit? They were the first to create driving schools... people who know how to drive have a desire to have a car.

All Taiichi Ohno needed to do was create an efficient production system model to keep up with the demand. Ohno’s team of early adopters ^[3] created enough success to maintain support for further development.



Over 37% annual
compounded growth
for the next 15 years.

(starting in 1953)

Catch up with the
Americans in three
years (productivity).

Attempts to create joint
ventures to acquire
technology failed.

Growth in demand required innovation of their production system (chart is 1953 = 16,496 to 1967 = 832,130)

Shortly after Taiichi Ohno joined Toyoda Spinning and Weaving in 1932, he was tasked with bench-marking a competitor Nichibo to understand their advantages in the market. One could consider this his first step in developing an *awareness* of flow. Now that he saw the possibilities, he reached out to learn from any source available. Over the next 15 to 20 years, he studied Ford's methods and experimented with the flow principles before adding TWI (Training Within Industry) in 1951.

What if the early observers knew just a little more...?

Ohno's Objective was to Create Flow



From a system with
disruptions and obstacles



...to a system that
flowed smoothly



“Flow where you can, Pull where you can’t”... Taiichi Ohno

Surprised? **Pull** is the **second choice**... the lean tools are countermeasures to implement *pull* until you can create *flow*.

Basic Principles of Flow

1. Put Processes in Sequence
2. Synchronize Processes
3. Balance Work Content
4. Balance Work Pace

What if... the early observers that wrote the first books were not academics or consultants, but people with practical manufacturing experience implementing flow? People like Walter Flanders who reorganized Ford's early plants and taught a small team that went on to develop the assembly line. (The first reorganization for flow created a 10x jump in productivity. The second spurt, when they introduced the moving assembly line, saw another 10x increase in productivity.) Or Charles Sorensen, Henry Ford's “*right hand man*” that designed Willow Run... a factory that made one airplane an hour (this was done during WW2). Or Frank Woollard, who re-organized Morris Motors in England. (Woollard's flow principles were a bit more complicated than the American version, with 18 principles defined.)

What if... they understood the difficulties in explaining how to identify the hidden disruptions to flow? Creating flow in a manufacturing setting cannot be done alone. You must simplify the principles so *every-one can participate*.

7-Wastes...

What if... they learned that Ohno's 7-wastes was a breakthrough in helping people '*learn to see*' the symptoms of disruptions to flow? (Or, that there were only four categories of waste in the 1973 TPS manual.)

Ohno's 3-M's

Muda

not useful

Mura

uneven

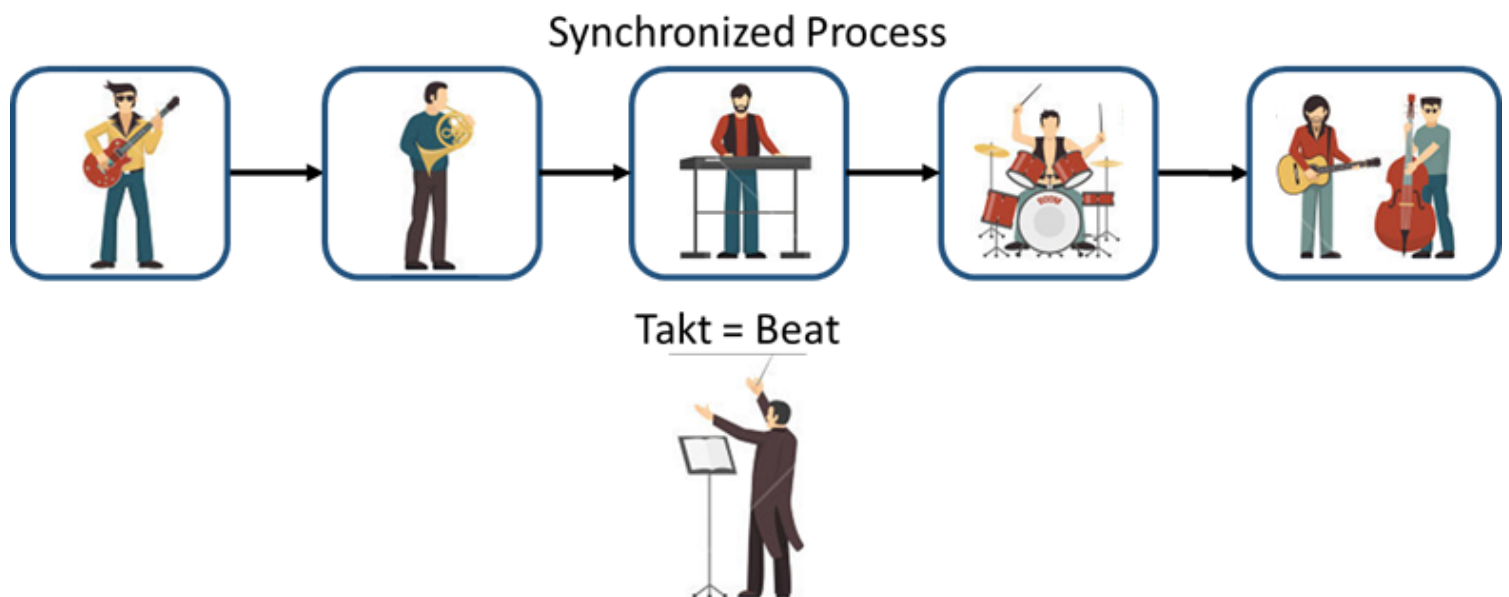
Muri

unreasonable

Ohno's brilliance was in the simplifying the '*learning to see*' process for discovering disruptions to flow. You do want to remove '*waste*', but the objective is not waste removal directly, but creating flow. He essentially pioneered the '*stop doing*' list.

Takt Time...

What if... they were told that "*Takt*" was a German musical term for beat? That the primary reason for defining a *Takt* time was a communication tool to synchronize processes so we could achieve flow. Yes, the pace does need to be fast enough to meet customer demand.



What if... they were told that they adopted the practice from some aircraft engineers that joined the firm after the war because aircraft production was outlawed as part of the surrender? [4]

Andon Cord...



FORD

MEN AND METHODS

BY EDWIN P. NORWOOD



THIS is not the story of cylinders and leaders but of the men who work in the River Rouge plant and the methods which make this marvelous city of machinery the world's greatest industrial laboratory.

Out of a multiplicity of men, power, light and movement at the River Rouge plant and its laboratories Mr. Norwood has woven a story of absorbing interest.



What if... they were told that it was just another way to communicate quickly that the operator had discovered a problem... and they copied it from Ford?

The book was published in 1931 — has chapter detailing the “andon cord” system.

Cells...

What if... they were told that the 3–5 process steps they saw grouped together were segments of the line where they were able to create flow. The ‘U’ shape was to improve performance. The processes were placed closely together to reduce the distance and the spacing eliminated the ability to accumulate stock between each step. Since the buffer stock is only at each end of the ‘cell’, access to aisles is not needed for the intermediate steps. Getting the ‘cell’ out of the traffic pattern also reduces the possibility of disruption to flow.

Single-Piece Flow...

What if... they were told that they were observing a ‘*mixed model flow*’ and that the single pieces they observed were the *countermeasure* used to even out the work content to avoid creating disruptions to flow? While the ideal for a mixed model line flow would be to have balanced work content for every variation, careful mixing of the variations can yield a fairly smooth flow.

There is no ‘single piece flow’... you only have, *Flow or Not Flow*

5-S...

What if... they had been told that Ohno was frustrated with **4-S** (not 5-S) because his supervisors had turned it into a ‘*lining up competition*’? Or, that the origin of 4-S was just part of a suggestion list connected with Job Methods — the process improvement skill?

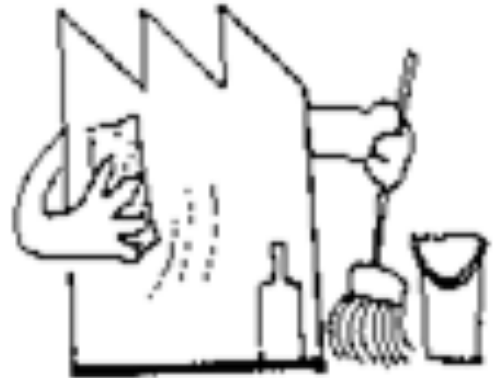
※ 整理



※ 整頓



※ 清掃



清潔

4-S illustration from 1973 TPS manual.

4-S

1. **Seiri** Eliminating everything not required for the work being performed
Job Methods – **ELIMINATE unnecessary** details
 2. **Seiton** Efficient placement and arrangement of equipment and material
Job Methods – **COMBINE** details when practical
Job Methods – **REARRANGE** for better sequence
 3. **Seiso** Tidiness and cleanliness – Discovery of Problems
Job Instruction - Arrange the work area as the employee is expected to keep it
 4. **Seiketsu** Ongoing, standardized, continually improving – Problem Solving
Daily Use of Job Instruction, Job Relations and Job Methods
- The Discipline of Leaders***
5. **Shitsuke** Does the **LEADER** effectively coach on a daily basis using
Job Instruction, Job Relations and Job Methods to improve their work area?

What if... they were told that ‘*real lean*’ was messy... you are always experimenting and trying to improve. This means constant reorganization. The habits in 4-S helped you to see the problems that needed to be resolved.

Kaizen Event...

What if... they were told the ‘*kaizen event*’ they thought they saw was an improvement project using the Job Methods improvement process? That it was part of the *normal day-to-day work* of a supervisor and **not** an event at all. They worked to continuously improve problem processes that were identified as disruptions to flow.

2. PRESENT METHOD BREAKDOWN STEP I - Breakdown the Job		3. QUESTIONING AND DEVELOPMENT OF NEW METHOD STEP II - QUESTION EVERY DETAIL - LIST YOUR IDEAS - DON'T TRUST MEMORY			3. STEP III DEVELOP
LIST ALL DETAILS A detail is every single thing that is done including every inspection and every delay or waiting period. Be sure details include all material handling, machine work, and hand work.	NOTES List all distances, tolerances, safety, scrap, time used, weights, etc. Also list long reaches, tugging, holding, stooping, bending, or awkward moves.	CHALLENGE YOURSELF WHY is this detail necessary? WHAT useful purpose does this detail serve? Does this detail add quality? Cut cost? Improve safety? Increase production? If not - can I do my job without this detail?	BE SPECIFIC WHERE should this detail be done? Which machine, bench, equipment? WHEN should this detail be done? Before some other detail? After the? WHO is qualified to do this detail? From standpoint of experience? Skill? Physical strength? Who is available?	THERE MAY BE A BETTER WAY HOW is the best way to do this detail? Can you improve on the materials, machines, equipment, tools, product design, work place, safety, or housekeeping? (See your notes) CAN YOU MAKE THE WORK EASIER OR SAFER BY USING JIGS OR FIXTURES, BOTH HANDS, OR GRAVITY FEED HOPPER OR DROP DELIVERY SHUTES? CAN YOU POSITION IN PROPER WORK AREA?	RENUMBER YOUR DETAILS
1. What operation or handling precedes your job? Piles of brass and copper sheets brought by Material Handler from steaming drift and put in bins 16 ft from operator.	16 ft - empty handed	Not necessary if sheet moved nearer bench from drift.	from bench - just left in waiting	use both hands - pickup brass in one hand and copper in the other - leave sheet on bench in proper line. Use material handler's position shift to on bench. Inspect when packing up - use both hands - use sheet for proportional bank for scrap disposal.	E 3 R.M.H. 4 5
2. Pickup copper sheets	15 to 20 sheets - reach stoop		use wrong hand or left hand cap		
3. Carry copper sheets to bench	6 ft - not heavy		bring directly to bench from steaming drift - make a handle just before handling (inspect)		
4. Insert and layout copper sheets	for scratches and dents - 12 scrap bins - awkward	Not necessary to layout if sheets located on bench. If not necessary if sheet located on bench.			
5. Carry across to bins	6 ft - stoop - reach				
6. Drop brass and copper					
7. Repeat 1 to 6 for brass sheets	same				
8. Move to bench	6 ft - empty handed	Not necessary if sheet located on bench.			
9. Stack sets brought to receiver	intentionally - careful - awkward		immediately before handling up on bench - keep will slightly move material handle stack just before lining up	use both hands - pickup brass in one hand and copper in the other - make a handle for easier pickup in convenient position. Use a jig to hold piles of brass and copper. Use both hands - pickup both sides of sheet. Make a handle to hold sheet to prevent some sheets from falling to floor and use some sheets to hold sheet to prevent some sheets from falling to floor.	E 1 2 C 6 7 E
10. Pickup first set of sheets	1005 m edges - difficult to hold	Not necessary to move if can use two rollers.	woman or handicapped	use picture to hold two rollers and guides to hold up and hold sheets in position.	
11. Insert in riveter	careful - hold rigidly - brace positioning difficult - hold	Not necessary to move if can use two rollers.		use picture to hold two rollers and guides to hold up and hold sheets in position.	
12. Revet top left corner	careful	Not necessary to move if can use two rollers.		same picture as above.	
13. Move sheets	positioning difficult - hold	Not necessary to move if can use two rollers.		same picture as above.	
14. Revet top right corner	careful	Not necessary to move if can use two rollers.		same picture as above.	
15. Remove and reverse assembly	positioning difficult - hold	Not necessary to move if can use two rollers.		same picture as above.	
16. Insert in riveter	careful - brace on top	Not necessary to move if can use two rollers.		same picture as above.	
17. Revet bottom right corner	positioning difficult - hold	Not necessary to move if can use two rollers.		same picture as above.	
18. Move assembly	careful	Not necessary to move if can use two rollers.		same picture as above.	
19. Revet bottom left corner	positioning difficult - hold	Not necessary to move if can use two rollers.		same picture as above.	
20. Remove from riveter	careful	Not necessary to move if can use two rollers.		same picture as above.	
21. Stoop top in lower left corner	specification - brace on top	Not necessary to move if can use two rollers.		same picture as above.	
22. Replace stamp	replace stamp	Not necessary to move if can use two rollers.		same picture as above.	
23. Repeat 1 to 20 for 11 other assemblies	same	Not necessary to move if can use two rollers.		same picture as above.	
24. Pickup pile of finished assemblies	12 shields	Not necessary to move if can use two rollers.		same picture as above.	
25. Carry assemblies to tote box	10 ft - not heavy	Not necessary to move if can use two rollers.		same picture as above.	
26. Place assemblies in tote box	careful - stoop - reach	Not necessary to move if can use two rollers.		same picture as above.	
27. Move back to bench	10 ft - empty handed	Not necessary to move if can use two rollers.		same picture as above.	
28. Repeat 1 to 31 until tote box is filled	same	Not necessary to move if can use two rollers.		same picture as above.	
29. Pickup finished boxes	heavy 75 lbs. stoop - awkward	Not necessary to move if can use two rollers.		same picture as above.	
30. Carry full tote box to scale	50 ft - heavy 75 lbs. down aisle	Not necessary to move if can use two rollers.		same picture as above.	
31. Place full tote box on scale	scale used by other dept. hazardous - stoop - heavy 75 lbs. manipulate weights	Not necessary to move if can use two rollers.		same picture as above.	
32. Weigh full tote box	manipulate weights	Not necessary to move if can use two rollers.		same picture as above.	
33. Weigh full tote box	manipulate weights	Not necessary to move if can use two rollers.		same picture as above.	
34. Put weight on floor by scale	15 lbs. lift - heavy - stoop - heavy	Not necessary to move if can use two rollers.		same picture as above.	
35. Move back to bench	20 ft - empty handed	Not necessary to move if can use two rollers.		same picture as above.	
What is the next operation or where does material go from here? Material handler takes tote box 100 ft to packing dept. Packs parts 200 shields in packing case. 1 close case - weigh and make case ready for shipment.		ELIMINATE ALL UNNECESSARY DETAILS CROSS THEM OUT	COMBINE and REARRANGE FOR BETTER SEQUENCE WHEN PRACTICAL C. OR R. in right hand column	SIMPLIFY ALL NECESSARY DETAILS RENUMBER DETAILS IN NEW ORDER IN RIGHT HAND COLUMN	

1945 Job Methods Job Breakdown Sheet

Yes, this is the original A3 form...(blank - notice the ECRS fields)

Present Method Breakdown Step 1 - Breakdown the Job		Questioning and Development of New Method Step 2 - Question every detail - List your ideas - Don't trust memory			Step 3 Develop
List all details A detail is every single thing that is done including every inspection and every delay or waiting period. Be sure details include all material handling, machine work, and hand work.	Notes List all distances, tolerances, safety, scrap, time used, weights, etc. Also list long reaches, tugging, holding, stooping, bending, or awkward moves.	Challenge Yourself WHY is this detail necessary? WHAT useful purpose does this detail serve? Does this detail add quality? Cut cost? Improve safety? Increase production? If not - can I do my job without this detail?	Be Specific WHERE should this detail be done? Which machine, bench, equipment? WHEN should this detail be done? Before some other detail? Another time? WHO is qualified to do this detail? From standpoint of experience? Skill? Physical strength? Who is available?	There May Be A Better Way HOW is the best way to do this detail? Can you improve on the materials, machines, equipment, tool, product design, workplace, safety, or housekeeping? Can you make the work easier or safer by using jigs or fixtures, both hands, or gravity feed hoppers or drop delivery shutters? Can you pre-position in proper work area?	Renumber your details
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
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14					
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What is the next operation or where does material go from here?		ELIMINATE all unnecessary details cross them out	COMBINE and REARRANGE for better sequence when practical C. OR R. in right hand column	SIMPLIFY ALL NECESSARY DETAILS Renumber details in new order in right hand column	

Setup Reduction — SMED...

What if... they knew that about 1960, Toyota purchased several *Quick Change Die* machines from Danly Corporation (in America). **Within a couple of years Toyota's average changeover was about 15 minutes and dropping.** Single Minute Exchange of Die — meaning it took less than 10 minutes... into single digits.



Danly QDC (Quick Change Die) machine at Toyota — image courtesy of Art Smalley

What if... they were told that the focus on setup reduction times was to reduce the disruption to flow that plagues mixed model production environments? The *'get-ready'* times and *'put-away'* times for a process barriers to flow — setup reduction is a countermeasure to minimize these barriers.

Deliberate Practice...

What if... they were aware of the effects of deliberate practice?

“Ripple Effect”

At this point your culture has ingrained the WHAT and HOW, but probably forgotten the WHY

Katas

These are the outcomes of your experience.

When the majority of the leaders in a company develop these behaviors, it becomes their

Culture

The habit becomes an unconscious act and is merged with your other habits to make up your

Behavior

You were instructed to practice these actions until they become a

Habit

(daily use)

Job Instruction, Job Relations, and Job Methods define the

Action

steps to be taken.

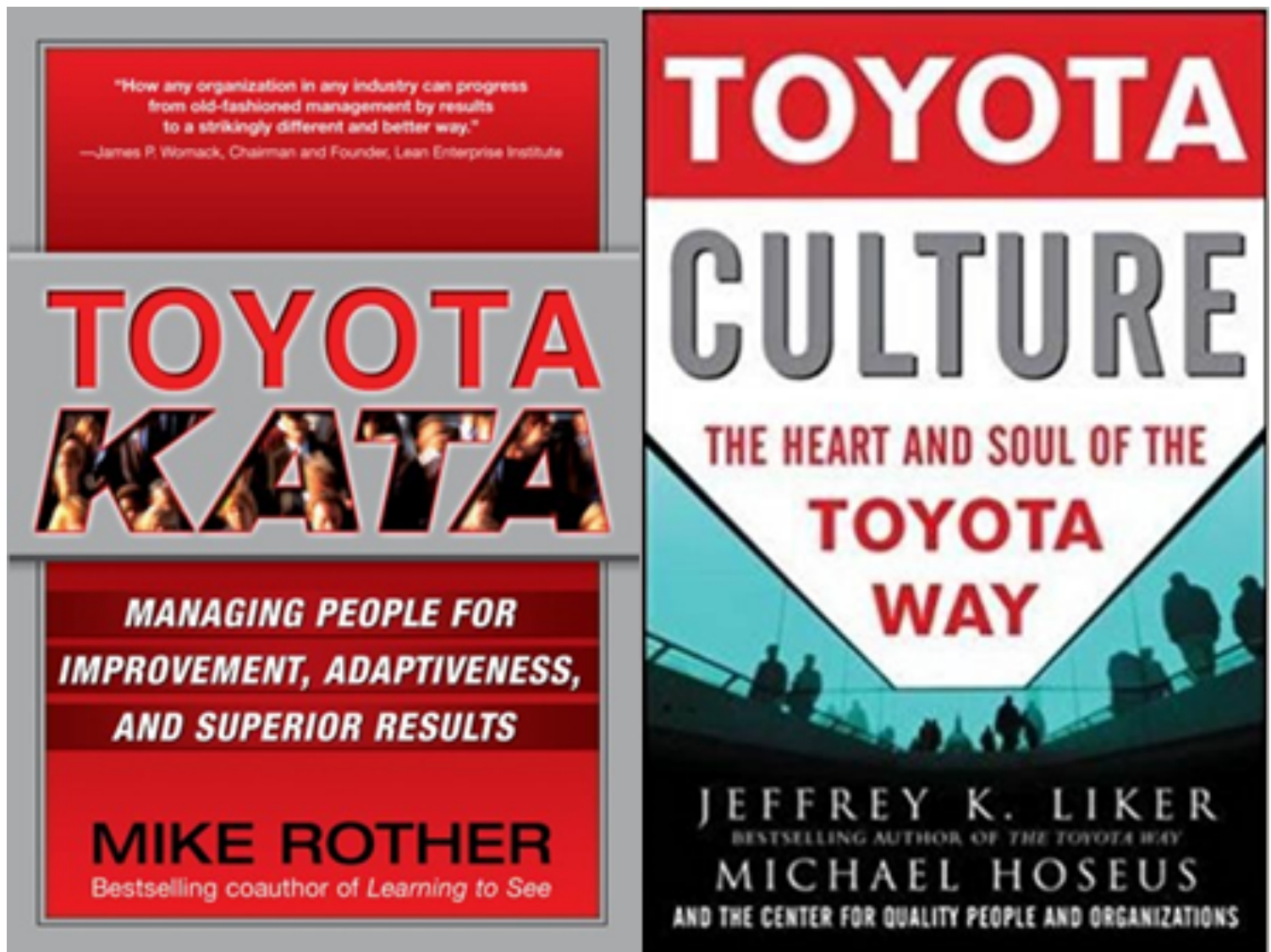
Job Instruction, Job Relations, and Job Methods defined the basic

Patterns

to be applied.

■ *The effect of Deliberate Practice of the TWI skills creates the Lean Culture we are seeking*

What if... they were told that *deliberate practice* and daily application of the TWI skills could create a culture that we are trying to emulate? (We had more than a decade of ‘lean’ Toyota books before we began to understand that Ohno used the TWI skills as a foundation for building the structure into TPS.)



These are the outcomes of extended deliberate practice

What if... they were told that the culture was developed over time as the majority of the leaders adopted a core set of skills. These are skills they practiced as team leaders and supervisors... before becoming managers or directors.

What if... people understood the mastery of the coaching kata starts with mastering the basic 'katas' first (the TWI skills). Only after mastery are you able to improvise and coach to the current situation.

What if... there was a simple way to understand the effects of deliberate practice of the TWI skills?

PROBLEM SOLVING DETERMINE OBJECTIVES	"Problem Discovery"
STEP 1 - GET THE FACTS See for yourself, first-hand information. Review the records. What policies, rules, and regulations apply? Talk with all individuals concerned and get opinions and feelings. Be sure you have the whole story. STEP 2 - WEIGH AND DECIDE Fit the facts together and consider their bearing on each other. What possible actions are there?(3 minimum) Check each action against objectives weighing effect on individual, group, and production. Select the best actions. Fill out Action Sheet for planning. Don't jump to conclusions. STEP 3 - TAKE ACTION Should I handle this myself or involve my manager? Who else can help in handling? Consider proper time and place. Immediate action is preferred. Explain and get acceptance. Don't pass the buck. STEP 4 - FOLLOW UP ON RESULTS How soon and how often will I check? Watch for changes in output, attitudes, and relationships. Did my actions help production? WERE OBJECTIVES ACCOMPLISHED?	1. Go to the Workplace regularly Avoid Surprises Do not work from memory. 2. Observe Check for MUDA, MURA, MURI More than one sample. Be patient, use all of your senses to observe, not just your eyes. 3. Question Develop understanding, not blame. 5-Whys to discover root causes. Look for patterns, abnormalities. 4. Get the Facts Validation process using F.O.G. (Fact - Opinion - Guess). Experiment to validate guesses Is the fact useful to make a decision? 5. Classify Problems- People/process Use templates to organize the facts collected.



First set of practice exercises

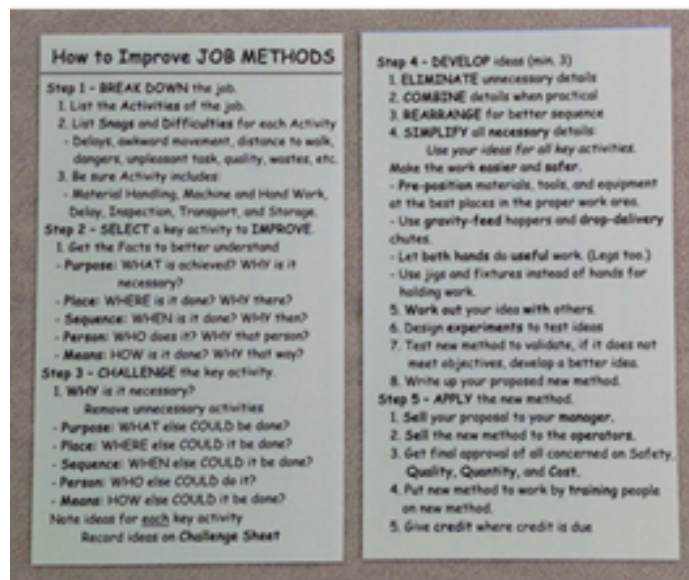
What if... they understood the first series of practice exercises were mostly '*learning to see*' the disruptions to flow (problems) and getting facts, not guesses and opinions?

JOB INSTRUCTION How to Get Ready to Instruct	JOB INSTRUCTION HOW TO INSTRUCT
Before instructing people on how to do a job: 1. HAVE AN ACTIVITY SHEET Define objective: Who is to be trained ... What skill is to be trained ... When training is to be completed ... 2. BREAK DOWN THE JOB • List Important Steps • Pick out Key Points and Reasons • Safety is always a Key Point Define Coaching Units 3. HAVE EVERYTHING READY Have the right equipment, tools, materials, and supplies. • Everything needed to instruct. 4. ARRANGE THE WORK AREA Just as in actual working conditions and how the employee is expected to keep it.	STEP 1 - PREPARE THE LEARNER • Put the person at ease • State the job • Find out what the person already knows • Get the person interested in learning the job • Put the person in correct position STEP 2 - PRESENT THE OPERATION • Tell, show and illustrate - one IMPORTANT STEP at a time • Do it again - Stress KEY POINTS and REASONS Instruct clearly, completely, and patiently giving no more than they can master at one time STEP 3 - TRY OUT PERFORMANCE • Have the person do the job - stating IMPORTANT STEPS - correct for errors • Have the person do the job again - explaining KEY POINTS and REASONS Make sure the person understands Continue until YOU know THEY know STEP 4 - FOLLOW UP • Put the person on their own • Designate to whom they go to for help • Check frequently • Encourage questions • Taper off extra coaching and close follow-up IF THE PERSON HASN'T LEARNED, THE INSTRUCTOR HASN'T TAUGHT



Second set of practice exercises

What if... they understood the second series of practice exercises concentrated on developing your communication skills? To clearly transfer knowledge and expectations...



Third set of practice exercises

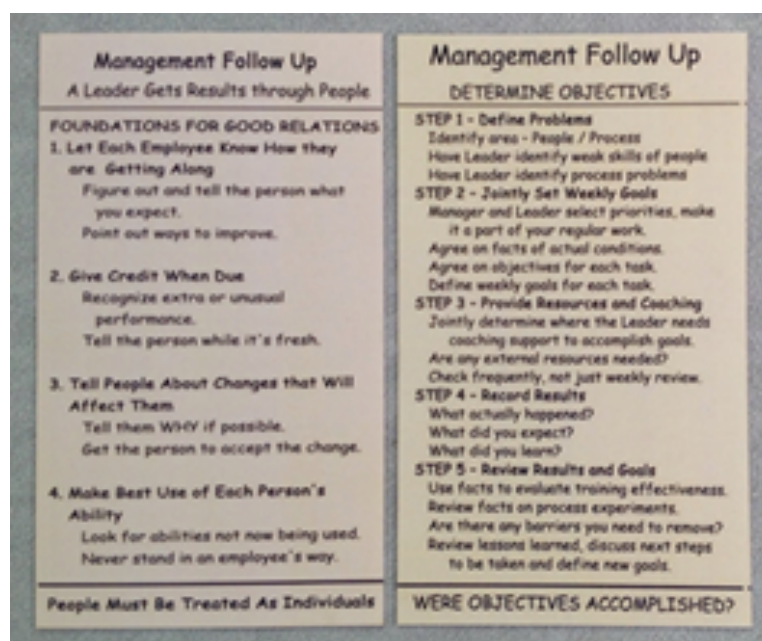
What if... they understood the third series of practice exercises concentrated on developing your improvement skills?

(Karate Kid movie images are owned by Columbia Pictures Industries, Inc.)

Gemba Walks...

What if... they were told that the 'gemba walk' was a coaching exercise for the leader to observe the approach to problem solving by the people they were responsible for? The leader concentrates on *teaching the thinking patterns* so people can grow.

What if... they were told that this is about developing your leadership skills by showing 'respect for people'?



Coaching exercise

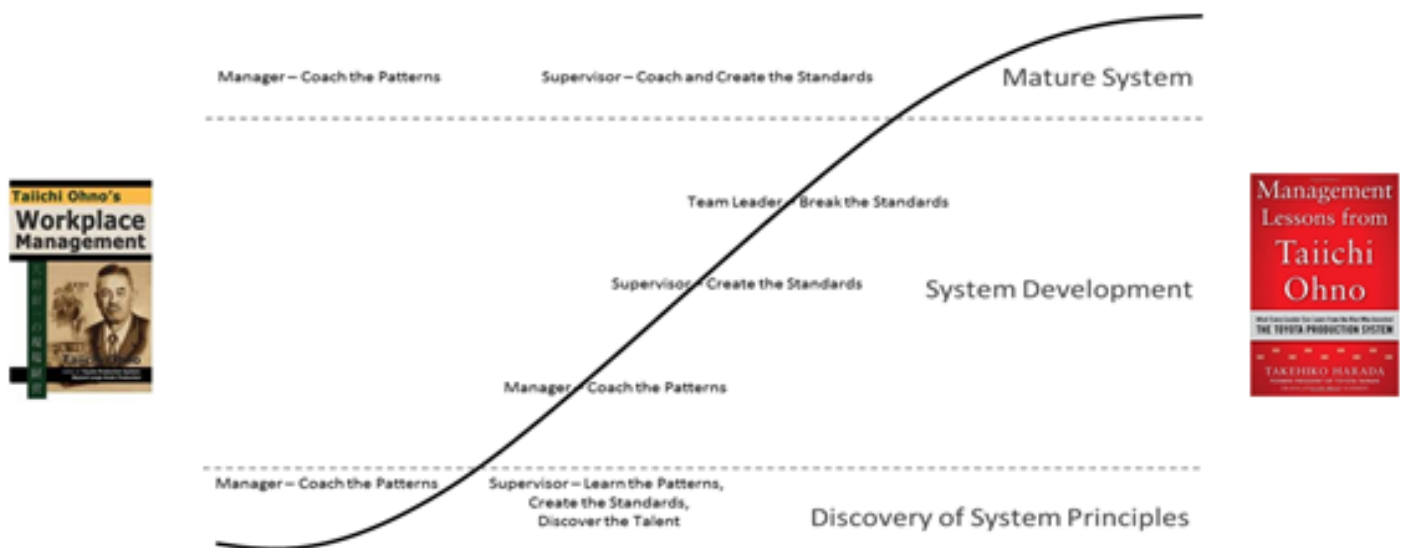
The Production System Evolved

What if... they were told that the mature system they were observing did not look the same during the development process. That first they had to create some basic structure to develop stability. When they had

process stability, then they focused on simplification.

The System Evolves

Shifting Role of Leaders



15

Observation: There are a few quotes from Ohno interviews that suggest that he was concerned that people might understand the simplicity of the system... his competitive advantage. However, there is nothing to indicate that he deliberately misled people, but he was concerned that his secrets might be uncovered.

We didn't know what we didn't know... and possibly still don't.

"Before enlightenment chop wood and carry water. After enlightenment, chop wood and carry water." – Wu Li

When you have mastered the secrets to creating flow... you still must practice as if you are a student.

A new starting point...

You now know that creating flow was Ohno's necessary objective to improve the production system...

What if... you had an exercise that people could practice *'learning to see'* as they walk through the process flow sequence?

THE SEVEN WASTES

Waste Symptom	Observed
Overproduction – early or extra production of materials, and producing unordered goods.	<i>TWO WEEKS WORTH OF CASTINGS HAVE ARRIVED FROM THE SUPPLIER INSTEAD OF TWO DAYS OF INVENTORY. CASTING SUPPLIER DOES PRODUCTION RUNS MORE THAN A MONTH AHEAD OF DELIVERY DATES</i>
Waiting – idle time waiting on machine, materials or people.	<i>THE PUMP ASSEMBLY OPERATOR SPENDS ABOUT 2 HOURS A DAY WAITING ON HOUSING FROM THE MACHINING DEPARTMENT</i>
Transportation – handling more than once, delays in moving materials, unnecessary moving or handling.	<i>THE CASTINGS ARE DELIVERED TO THE DOCK, THEN MOVED TO BE CHECKED BY ACCOUNTING, THEN MOVED TO INSPECTION BEFORE DELIVERY TO THE MACHINING DEPARTMENT</i>
Inventory - unnecessary raw materials in stores, work in process (WIP), and finished stocks.	<i>MACHINING DOES NOT MOVE THE FINISHED CASTING TO ASSEMBLY AT REGULAR INTERVALS. IT CAN BE FROM 4 TO 6 HOURS OF PRODUCTION (MAY BE CAUSING THE WAIT TIMES IN ASSEMBLY)</i>
Motion – extra unnecessary movement of equipment or people.	
Over-processing – unnecessary processing or procedures.	
Defects – producing and reworking, or scrap.	<i>MACHINING IS HAVING ABOUT 10% SCRAP BECAUSE THEY ARE NOT MOUNTING THE RAW CASTING PROPERLY</i>

Step 1. Discover Waste Symptom

Step 2. Understand Why it is there (5 Whys + FOG)

Step 3. Improve Flow (solve and implement countermeasures)

What if... your first questions about the problems observed were; “*Have we clearly defined our expectations for the task*”, and “*Do we have a process?*” (Clear training instructions that the staff know and follow.) If the answer is no, then start by developing a Job Breakdown (JBS) that is your current ‘*one best way*’. The best practice is to have 2–3 of the best operators to define the job, then practice training each other until the delivery is consistent and no key points have been missed.

[illegible]



Materials Required:					
Tools, Supplies, Info:					
Common Key Point:		Porosity defects 30%			
WHAT	<u>Important Steps:</u> Logical sequence of steps which advance the work	HOW	<u>Key Points:</u> Make or break the job, make the job easier, can injure the worker	WHY	<u>Reasons:</u> Explains the key points
Check Sand Core		Uniform coating		Affects finish of casting	
		Parting line cleaning – smooth		Affects finish of casting	
		Damage profile check		The blemishes may cause part to be rejected or require rework	
		Hollow of core		Break during casting	
Preheat Sand Core		To a minimum of 110° C.		Drive off any remaining moisture	
		15-20 minutes		Ensure no moisture in core – moisture contributes to porosity	
Placing Sand Core		Core print are seating position (pins in location)		To ensure that the core is properly located	
		Blowing air		To remove loose sand from mold area	
		Check core for cracks		Core can break while placing in die. Crack will leave a parting line and casting will be rejected.	

What if... you grew the employees skills as a first step, before you started changing the process or equipment? (Getting to the ‘one best way’ with your local experts creates the first level of improvements.)

What if... instead if a ‘kaizen event’, you continued to hone the skills that you were practicing with ‘learning to see’ the seven wastes and other disruptions to flow. Use this as a starting point to recognize barriers to flow that needed to be resolved? When you walk the process flow of a department or a product through multiple departments, use the form below for making notes to yourself. **Step 1** is listing the activities. **Step 2** is listing all the snags and barriers (7-wastes, muda, muri, mura) for each activity. **Step 3** is to select the key activity that most needs improvement, the one that would have the biggest impact of

the outcomes (*cost, quality, productivity, safety, morale*).

JOB METHODS ACTIVITY SHEET		CHECKLIST																															
Job:		An ACTIVITY is																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Activities</th> <th style="width: 50%; text-align: center;">Snags and Difficulties</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>		Activities	Snags and Difficulties																							Every single thing that is done: Operation Inspection Transport Storage Delay It helps to find activities if you think in terms of: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tbody> <tr> <td style="width: 50%; padding: 2px;">Getting or Placing temporarily</td> <td style="width: 50%; padding: 2px;">GET READY activities</td> </tr> <tr> <td style="padding: 2px;">Working on or Checking</td> <td style="padding: 2px;">KEY activities</td> </tr> <tr> <td style="padding: 2px;">Placing temporarily Placing finally</td> <td style="padding: 2px;">PUT AWAY activities</td> </tr> </tbody> </table>		Getting or Placing temporarily	GET READY activities	Working on or Checking	KEY activities	Placing temporarily Placing finally	PUT AWAY activities
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Snags and Difficulties - Key Points - ' <i>positives</i> ' you must remember - Snags and Difficulties - ' <i>negatives</i> ' you work to remove. Examples are: Effects of delays Awkward movements Distances to walk Reaching (over shoulder level, lifting below knees) Dangers Unpleasant tasks Quality affected (one only some people can master) Waste, etc.		"KEY activity" - One that produces a significant change in the material being worked on - KEY activities are to be tackled <u>first</u> - Weak activity in system - Bottleneck activity, limits capacity of system																															
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Step 4 — Challenge the key activity that you have selected using the questions in the form below to uncover possible improvements.

JOB METHODS CHALLENGE SHEET			
Key Activity:		Date:	
	UNDERSTAND - DEFINE	QUESTION	Ideas for a BETTER way:
Purposes:	WHAT is achieved?	WHY is it necessary?	WHAT also COULD be done?
Places:	WHERE is it done?	WHY there?	WHERE else COULD it be done?
Sequence:	WHEN is it done?	WHY then?	WHEN else COULD it be done?
Persons:	WHO should do it?	WHY that person?	WHO else COULD do it?

	HOW is it done?	WHY that way?	HOW else COULD it be done?
Means:			

HINTS FOR IMPROVING METHODS:

Don't reinvent the wheel

Is/Is Not

Is there an internal solution for this problem?
Is there a similar internal process that does not have this snag?
Is there an existing external solution for this problem?

Safety

Is this method the safest as well as the easiest?
Does it conform to safety rules?
Has proper safety equipment been provided to the operator?
Does the operator understand all safety rules and precautions?

Materials

Can better, less expensive, or less scarce materials be used? *
Can scrap or waste be reduced, or used for another job? *
Have defects and scrap been reduced to a minimum?
Are the material specifications entirely clear and definite?

Machines

Is bottleneck machine operating at maximum capacity?
Is machine in good operating condition?
Are they serviced regularly?
Is this the best machine for the operation?
Is the set up time optimized?

Layout

Is there a minimum of back tracking?
Are the number of handlings and distances traveled at a minimum?
Are aisles wide enough and placed to optimize flow?
Is space being used to advantage?
Is everything in the convenient work area?

Workplace

Is everything in the proper work area?
Can gravity feed hoppers or drop delivery chutes be used?
Are both hands doing useful work?
Has all hand holding of material been eliminated? (clamps or fixtures)

Housekeeping

Are working and storage areas are clean and orderly?
Is junk taking up space that could be used for productive work?
Do away with anything that is unnecessary.
Are necessary things in proper place?
See that good housekeeping reduces delays, waste and accidents.

Flow

Can you put processes in better sequence?
Can you synchronize processes better?
Can you balance work content better?
Can you balance the demand pace better?

Product Design

Would slight change of design or specification of product or equipment improve quality, save materials or time?
Is the quality standard correct for this job? (correct tolerances and finish)

Equipment and Tools

Are suitable equipment and tools available?
Have they been supplied to the operators?
How about gauges, jigs and fixtures?
Can holding devices be used?
Can gravity aids help?
Have equipment, tools and fixtures been properly positioned to permit effective work?
Is other equipment available within the organization?

Paper Work

Could duplications of work be reduced?
Can sorting, summarizing, recording, copying, checking, be reduced or simplified?
Can the design of the form be improved?
Standardization to reduce work?

* Material utilization – for example, with sheet stock, using trimming pieces for another part.

Step 5 is evaluating the possible solutions or ideas that you have generated. To make sure the ideas work as planned, or you learn something new that triggers an even better idea, following a structured process to validate the idea is suggested.

EXPERIMENT RECORD

Investigator:	Process:
Team:	Date:
Problem (symptoms):	
(Idea) If we do...	

Then we expect...

Experimental Design: (Site, duration, variables, procedure, resources needed)

What:

When:

How many trials:

Resources used:

Results (success or failure)

Impact on process:

Impact on system: (downstream processes
and/or customer)

Approved by:

Reviewed by:

What if... you had a checklist you could follow as you practiced your 'gemba walks'?

COACHING ACTION SHEET	
Yellow Card – Problem Discovery Process Describe 5 problems that need to be addressed.	
1.	
☐ Observe ☐ Blue Card	☐ Question ☐ Validate ☐ Green Card ☐ Classify next step
2.	
☐ Observe ☐ Blue Card	☐ Question ☐ Validate ☐ Green Card ☐ Classify next step
3.	
☐ Observe ☐ Blue Card	☐ Question ☐ Validate ☐ Green Card ☐ Classify next step
4.	
☐ Observe ☐ Blue Card	☐ Question ☐ Validate ☐ Green Card ☐ Classify next step
5.	
☐ Observe ☐ Blue Card	☐ Question ☐ Validate ☐ Green Card ☐ Classify next step

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Blue Card – Job Breakdown	
1.	
2.	
Blue Card – Training	
What – Coaching Unit	Who – to be trained
1.	
2.	
3.	
Green Card – Challenge and Idea Development	
1.	
2.	
Green Card – Experiments	
1.	

Did you accomplish your objectives?

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"LEARNING BY DOING" WORKBOOK

Above is a sample form that was designed to be updated weekly. The front of the form is to list the problems you are gathering data (facts) on and the back is divided into two parts — creating or updating a Job Breakdown for a process and the training that needs to be done; then the processes you are challenging to improve as well as defining the experiments you are doing to validate the improvement.

PROBLEM SOLVING PROCESS			
SELECT OBJECTIVE TO ACCOMPLISH			
PLAN	Identify the problems associated with the objectives. Use problem discovery steps. Discuss the problem with all concerned. Decide Approach to each problem. Use Guidelines: Barriers: Yellow card. Skill Deficit: Blue card. Process Snags: Green card. Set follow on assignments. Fix completion and review dates. Be firm on deadlines.	DO	Deal with one problem at a time. Start immediate action. Coach; offer suggestions if needed. Provide resources, assistance and permission where and when needed.
Problem Discovery – Select a Problem			
1. GO TO THE WORKPLACE REGULARLY Avoid Surprises Do not work from memory. 2. OBSERVE Be patient, use all of your senses to observe, not just your eyes. (More than one sample.) Check for: Scrap, breakages, damages, stock write offs, stock holdings, rejects, rework, production targets, holdups, bottlenecks, morale, lack of communication, customer complaints, product returns. 3. QUESTION Talk to people concerned, get opinions, develop understanding, never blame. Discover possible impacts – Safety, Quality, Quantity, Cost.		4. RECORD THE FACTS Validation process using F.D.G. Experiment to validate guesses. Capture all details revealed. Is the fact relevant to the problem? 5. CLASSIFY AND STATE PROBLEMS People – skills, attitude Method – process, machine, materials, layout flow, suppliers. List out all the problems you see with evidence. Arrange in easily understandable way. Avoid too much of information. NO PROBLEM, IS A PROBLEM	
SELECT APPROACH			
Barriers, Relations Issues, Ad Hoc Issues, uncertain cause DETERMINE OBJECTIVES GET AND ANALYZE THE FACTS See for yourself. Get hard information.		Skill deficit, Nonstandard work methods GET READY TO INSTRUCT 1. Prepare the Workplace a. Get specific tools, materials, equipment	Process snags, unstable process ANALYZE AND RECORD Select appropriate unit, Watch the job being done, list all details

PLAN (PREPARE)	Review the records. Select manageable problem bit. Collect general and specific information; isolate and examine critical facts. What policies, rules, and regulations apply? Fit the facts together and consider their bearing on each other. Identify <u>all</u> possible root causes. Talk with all individuals concerned and get opinions, feelings and advice. Be sure you have the whole story WEIGH POSSIBLE ACTIONS and DECIDE What possible actions can be taken? (minimum of 3 options suggested) Check if actions are possible, practical and immediately implementable. Consider temporary countermeasures as well as long term solutions. Check each action's impact against objectives; weighing effect on individual, group, and production. Select all required actions to be done. Check if <u>instruction</u> or method change is needed. List out steps and details for each action. Don't jump to conclusions	b. Arrange for best efficiency 2. Prepare yourself a. Plan the instruction – Check out New Appointment, Transfer, Temporary absences, Resignations, Promotions, Accidents, Mistakes, Damage, Damage to equipment, Excessive time taken, Low output, Attitudes – Who is to be trained, in what skill, by what date b. Breakdown the job for instruction – Breakdown into coaching units – List important steps – List the key points and reasons for each step – Use the help of experienced workers c. Do a dry run first, ensure you can do and explain the job correctly 3. Prepare the Learner a. Put him at ease b. State job, learn his experience, interest him in learning c. Explain use of tools, equipment, safeguards, etc. d. Position learner for learning	Material Handling, Machine and Hand Work, Delay, Inspection, Transport, and Storage Note snags and difficulties. Delays, Awkward Movement, Distance to Walk, Dangers, Unpleasant Task, Quality, Waste, etc. Select Key Activities to improve UNDERSTAND & CHALLENGE EACH KEY ACTIVITY Why is it done? Is it necessary? When – Where – Who – How is it done? Why that way? Is there a better way? Note all ideas. Use aids below Question snags and difficulties with a view to their elimination. Get full appreciation of present method. Note all ideas for each key activity on <u>Challenge Sheet</u> USE THESE AIDS SAFETY: Is it the safest method? Does it conform to safety rules? EQUIPMENT: Is your equipment correct, fully used, and in good working condition? Is other equipment available within the organization? Can holding devices be used? Can gravity aids help? LAYOUT: Is space being used to advantage? Is everything in the convenient work area? Can both hands do useful work? MATERIALS: Can better, less expensive or less scarce materials be used? Can scrap or waste be reduced or used for another job? DESIGN: Could improvement be obtained by alteration of design of product or equipment? PAPERWORK: Could duplications of work be reduced? Can sorting, summarizing, recording, copying, checking, be reduced or simplified? Can the design of the form be improved? HOUSEKEEPING: Are working and storage areas clean and orderly? Is junk taking up space that could be used for productive work? Are necessary things in proper place? Always enlist the help of those doing the job. Work out your ideas with others.
	DO (EXECUTE) TAKE ACTION Work on countermeasures and long term solutions. Should I handle this myself or request help? (Who else can help in handling problem?) Consider proper time and place. Immediate action is preferred. Explain and get acceptance of all concerned. Don't delay or pass the buck	INSTRUCT THE LEARNER 1. Instruct Tell, show, illustrate one step at a time. Stress key points with reasons, test understanding 2. Try out learner's performance Have him do the job Have him repeat, Telling what he is showing, stressing key points with reasons, test understanding with Why - questions 3. Put him on his own Stress quality and safety Encourage questions about the job Tell him who to ask for help CHECK AND EVALUATE RESULTS 1. Assess performance of trainee 2. Check for conformance to safety, quality, quantity 3. Inform all concerned regarding practice and production results IF THE PERSON HASN'T LEARNED, THE INSTRUCTOR HASN'T TAUGHT	DEVELOP NEW METHOD Review ideas for all key activities. Eliminate unnecessary activities. Simplify means for remaining necessary activities. Combine / Rearrange - sequence, place, person Note all possible new methods. Choose best new method to introduce. List details of improved method. Do trial run (experiment to validate idea) INSTALL AND MAINTAIN NEW METHOD Submit for approval: Safety, Quality, Quantity, Cost. Convince and train users. Check results, give credit Transfer follow up to senior supervision. Maintain register of proposals - for your own follow up THERE IS ALWAYS A BETTER METHOD
	SEE (VALIDATE) FOLLOW UP ON RESULTS How soon and how often will I check? Watch for changes in output, attitudes, and relationships. Did my actions help production? WERE OBJECTIVES ACCOMPLISHED?	SEE Record actions and results Review records, check workplace. What did you expect? What did you learn? Did you achieve desired objective?	
REPEATED USE OF CONTINUOUS IMPROVEMENT CYCLE LEADS TO DESIRED RESULTS			

Did I miss anything? Contact info: Mark.Tesla2@gmail.com

[1] Claremont Graduate University : Drucker School of Management has the archive collection of Kenneth Hopper's research and letters.

[2] "Toyota: Fifty Years in Motion", pg. 155, by Eiji Toyoda.

[3] Yukio Arima, Itsuo Mamiya, Kikuo Suzumura, Takeo Watanabe, Masanobu Morita (list provided by Art Smalley)

[4] Aircraft manufacture especially needed to use flow because of space constraints. In 1937 the Toyota research department was studying aircraft design; by 1942 their aircraft department was copying a

Beechcraft. This department was later separated into a subsidiary, Tokai Aircraft, with Kawasaki Aircraft contributing most of the engineers and designs. Between 1923 and 1933, Kawasaki Aircraft Engineering Company's head designer was a German, Dr. Richard Vogt, who returned to Germany in 1933. (*Toyota: Fifty Years in Motion*, Eiji Toyoda, pg 66) To complicate matters, in 1944 Mitsubishi (Zero) moved in with Toyota because their facility had been destroyed. (*Toyota: Fifty Years in Motion*, Eiji Toyoda, pg 67) Mitsubishi learned lessons from Germany, first by working with the aircraft designer Alexander Baumann; then through collaboration with the German firm of Junkers. Tokai Aircraft was later renamed Aisin Seiki and changed from making aircraft engines to automobile transmissions, brakes and other components after the war. Because of Toyota's connection with the aircraft industry and the prohibition on war material related industries in Japan after the US occupation, Toyota had a unique advantage. They could hire many highly qualified engineers, which resulted in a generally unrecognized massive technology transfer. Tatsuo Hasegawa, who was the first generation Corolla project manager, was once the chief designer of Tachikawa Aircraft. Technologies attributed to the aircraft industry by Hasegawa and adopted by Toyota include aerodynamics, *monocoque* structure (which developed into what we know as the unibody), weight reduction technology, standards for structural strength, chief designer systems, and product planning methods. (*The Evolution of a Manufacturing System at Toyota*, Takahiro Fujimoto, pg. 74)

Written by



Mark Warren
Experienced Manufacturing Professional "Discovering Solutions with People"

2 comments

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NeelakanteswaraSwamy Bhavikatti
Actively seeking Sr/Mid level assignment in...

... 1w

Each areas of improvement methodology has been thoroughly studied,corroborated which took place in different time limes.Appreciate the great research work compilation .

Like **Reply** | **1 Like**



Tony Polidori
Senior Director of TPS OMCD

... 4mo

Really well written, Mark. Congratulations on your aggressive learning approach.

Like **Reply** | **1 Like**