

A decorative graphic on the left side of the slide consists of a vertical black line intersecting a horizontal black line. To the left of the intersection are three overlapping squares: a blue one on top, a red one on the left, and a yellow one on the bottom.

Training Within Industry

Essential Skills for Supervisors



TWI Institute a not-for-profit organization located in Syracuse, NY that reintroduced TWI in the U.S. 2001. The Institute has since created a rapidly expanding global network of 500 TWI Institute certified trainers who deliver the TWI Program in the manufacturing, healthcare, construction, and service industries.

Crisis Created a Need

The TWI Service was one of the first emergency services established by the U.S. Government War Production Board after France surrendered to Germany on June 22, 1940.

A national network of professionals was “drafted” from industry to develop techniques to quickly ramp up the production of war materials.

The TWI Mission in 1940

“to help industry to help itself to get out more materials than have ever been thought possible, and at constantly accelerating speed”

“The real job had to be done
by industry, within industry.”

Impact of TWI on the War Effort

Of the 600 client companies monitored by the TWI Service throughout the war:

- 86% increased production by at least 25%
- 100% reduced training time by 25% or more
- 88% reduced labor-hours by over 25%
- 55% reduced scrap by at least 25%
- 100% reduced grievances by more than 25%

The Boeing challenge in 1940

To quickly manufacture the B-17 Flying Fortress bomber in quantities that would be needed by the Allied nations to win the war.

Cornerstones of Boeings' Success *

- ***Management Support***

Committed to having a high-morale, people-dependent system with teams, a great suggestion system and intense training.

- ***Lean Production System***

Engineers “invented” lean concepts with a moving U-shaped final assembly line for flow, Takt time, minimized material handling, max use of dies, etc.

- ***TWI Training***

Half of the new workforce of 33,000 were cowboys, farmers, fishermen, and lumberjacks. The other half were mostly area housewives.

* *What You Can Do When You Have To*, Bill V. Vogt and Robert (Doc) Hall, Target Magazine, First Quarter 1999

Lean changed Supervisors' roles

Problems had to be solved fast to keep lines moving

- The pace of production and frequency of engineering changes required supervisors to be on the shop floor checking and coaching constantly.
- Because they had to show people how to do the work, supervisor training and knowledge of standard work instructions was doubly important.

Supervisors lacked the essential skills that were taught on the job by Training Within Industry (TWI) for them to

- Break down common industrial tasks into easily digested, easily mastered steps to train new people.
- Cross-train employees to promote teamwork and for people to learn how to take on a broader responsibility within their work area.

Impact on production of the B-17

- 60% reduction in man hours per airplane.
- Fly-a way's went from the initial quote of 75/month in 1941 to a peak of 364 in one month (one every 1.6 hours) before shutting down production in 1944.
- Initial cost of \$242,000 per plane in 1940 was reduced to a final cost of \$139,254 in March 1944,
a reduction of 42.46% in 32 months

Impact of TWI on Shipbuilding

Consolidated Steel Corp., Orange, Texas - May 3, 1945

- 18,749 employees
- Every supervisor was certified in one or more of the "J" programs
- The company attributed the following results to TWI over a four year period:
 - Increase in production 45%
 - Reduction in tool breakage 75%
 - Reduction in training time 78%
 - Saving in manpower 45%
 - Reduction in scrap 69%
 - Reduction in accidents 69%

Impact of Shipbuilding on WWII

In the two years following the Battle of Midway,

- Japanese shipbuilders splashed only 6 additional carriers to add to the 2 that survived.
- During the same period, the US shipbuilders added:
 - 17 additional carriers
 - 10 medium carriers
 - 86 escort carriers

“Such numbers, to be repeated in myriad categories of war materiel, spelled doom for Japan.” *

* James Bradley, *Flyboys* (Boston: Back Bay Books/Little, Brown), 120.

Why was TWI dropped after War II?

- Industry viewed TWI as being a war program.
- TWI provided grass-roots attention to how people were treated in the workplace and how work was performed which made management uncomfortable at this time in history.
- The composition of the workforce changed dramatically as millions of people returned to their jobs after leaving the military to displace millions of people trained by the TWI Service.
- US infrastructure was one of the few not damaged by the war enabling manufacturers to quickly shift to the mass production of consumer goods.



We Did It!



TWI finds a new life in Japan

As documented by Dr. Alan Robinson, TWI, Inc. sent four certified trainers with a plan to train and certify trainers to trigger the multiplier effect of TWI.

“When the TWI, Inc. specialists departed Japan, they left behind them 35 certified Institute Conductors. The beginning of a large multiplier effect, which extended to over one million Japanese managers and supervisors by 1966, and to many millions more by 1992.”

Resurgence of TWI in the U.S.

- 1951* - Kenji Ogawa is one of the 35 original TWI Trainers taught and certified in Japan by the TWI, Inc. trainers from the U.S.
- 1960* - Mr. Ogawa trains Kazuhiko Shibuya for SANYO Electric Corporation
- 1980* - Mr. Shibuya, Manager Overseas Training trains newly hired American Patrick Graupp
- 2001* - Patrick Graupp partners with the TWI Institute to Resurrect TWI in the US
- 2012* - Over 500 TWI Institute certified trainers delivering multiple TWI programs for companies around the globe

Five Needs of a Supervisor

Knowledge

unique to the Company and/or the Industry

that supervisors must know to do their job:

1. Knowledge of the Work
2. Knowledge of Responsibilities

Knowledge training is the responsibility of each company and therefore not the focus of TWI.

Skills

that are required for supervisors to perform within their role, *regardless of the industry*:

3. Skill in Leading
4. Skill in Instruction
5. Skill in Methods Improvement



Essential skills

Job Relations Training (JR)

How to evaluate and take proper actions to handle and to prevent people problems.

Job Instruction Training (JI)

How to teach people to quickly learn to do jobs correctly, safely, and conscientiously.

Job Methods Training (JM)

How to analyze jobs to make the best use of the resources currently available.

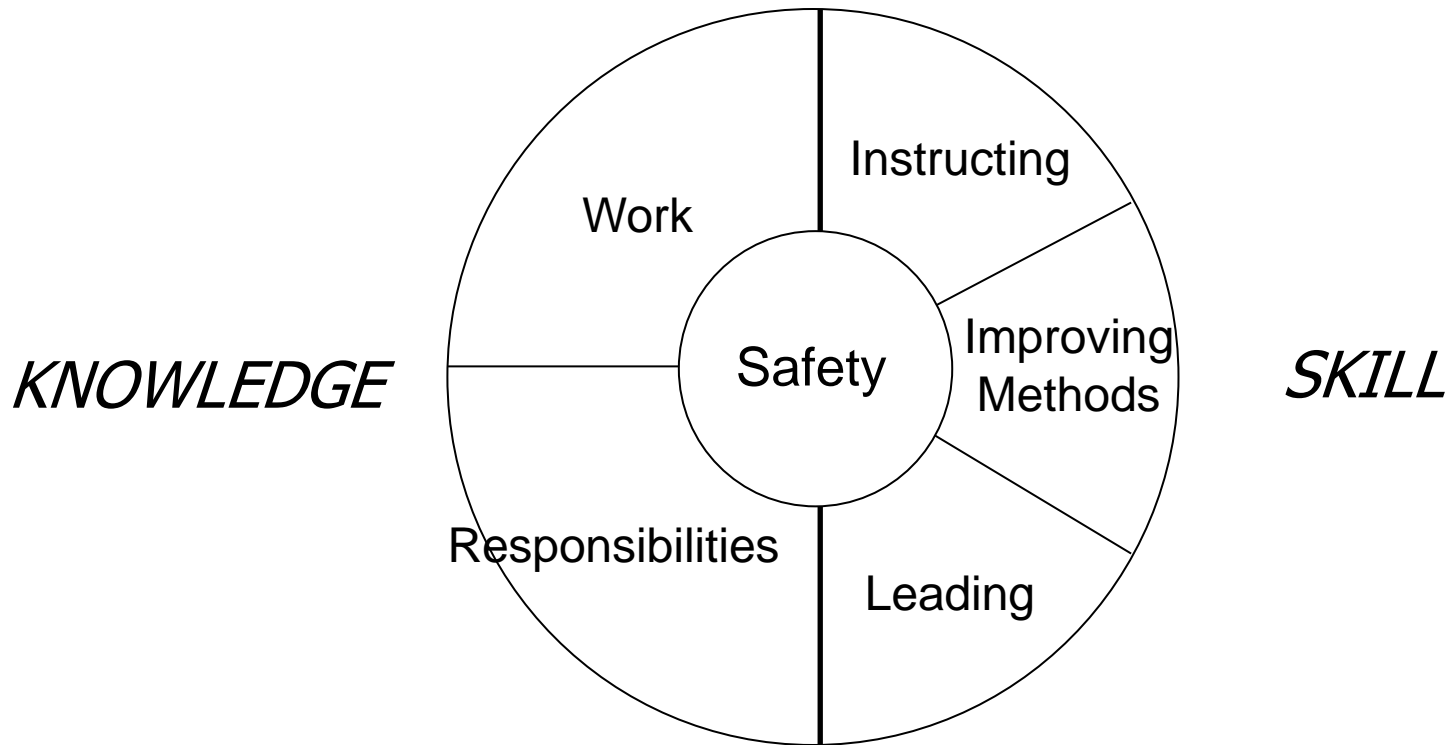


Job Safety (JS)

"ACCIDENTS ARE CAUSED, BREAK THE CHAIN"

Created in Japan in the standard "TWI Format."
The objective for JS is to prevent incidents from happening, not to resolve the aftermath of accidents.

Five Needs Model



The Four-Step Learning Process*

1. Preparation

Make the learner think to aid comprehension of the new idea.

2. Presentation

Add the new idea to those already in the learner's mind.

3. Application

Train the learner to apply what was presented and check the results.

4. Testing

Test the ability of the learner to apply the new idea on their own.

Standardized Delivery

- Each program has a similar 4-Step Method.
- Each method is stated in shop terms.
- Compact scheduling of five 2-hour meetings to keep the subject fresh and not keep people away from their jobs over long periods of time.
- Small groups of 10 to “learn by doing”.
- Each participant must demonstrate in class that they know how to use the method.

“Learn by Doing”

The TWI approach is not a matter of schools or classes or lessons –

TWI is about individual and/or group work on *current day problems* of output, quality, lost-time, scrap, re-work, maintenance, and working relations.



Job Instruction Training (JI)

How to teach people to quickly learn to do a job correctly, safely, and conscientiously.

JI 4-Step Method

Step 1 - Prepare the Worker

Step 2 - Present the Operation

Step 3 - Try-out Performance

Step 4 - Follow-up

**“If the worker hasn’t learned
the instructor hasn’t taught.”**

No. _____

JOB INSTRUCTION BREAKDOWN SHEET

Operation: _____

Parts: _____

Tools & Materials: _____

IMPORTANT STEPS	KEY POINTS	REASONS
A logical segment of the operation when something happens to advance the work.	Anything in a step that might— 1. Make or break the job 2. Injure the worker 3. Make the work easier to do, i.e. "knack", "trick", special timing, bit of special information	Reasons for each key point

JI breakdown method

Important Steps

What

A logical segment of the operation when something happens to advance the work.

Putting a new blade in hack saw.

Key Points

How

Anything in a step that might—

- Make or break the job
- Injure the worker
- Make the work easier to do, i.e. “knack”, “trick”, special timing, bit of special information, etc.

That 5 or 10% of a the hard or tricky parts of a job.

Reasons

Why

The reason for each Key Point

People learn better when they know why they do things.

JI Training Timetable

Name: Jones Dept.: 2 nd Electrical Dept. Date: (today's date)	Breakdown No.	Smith	Lark	Morse	Taylor	Massy	Peters	Baker		Changes In Production
Assembling Parts		✓	✓	✓	✓		✓	✓		
Wiring		✓	✓	✓	✓					
Combining		✓	✓	✓		✓	✓			
Knot tying	123	✓	✓	✓	✓	✓		X/X		Need 1 more worker at end of (month).
Clamping		✓	✓	✓	* x/x	✓	✓			
Adjustment		✓	X/X	✓						
Turnover Work Performance				Scheduled to retire on xxxx	Needs more training					



Job Relations Training (JR)

Trains supervisors/team leaders on how to evaluate and take proper actions to solve and to prevent problems with people.

JR 4-Step Method

Define Your Objective

Step 1 - Get The Facts

Get the whole story (opinions & feelings)

Step 2 - Weigh And Decide

Don't jump to conclusions

Step 3 - Take Action

Don't pass the buck

Step 4 - Check Results

Did your action help production?

Did you accomplish your objective?

JR Guide to Prevent Problems

- Let each worker know how he/she is doing
- Give credit when credit is due
- Tell people in advance about changes that will affect them
- Make the best use of each person's ability



Job Safety (JS)

Teaches people how to identify the causes of incidents and injuries and then to prevent accidents from happening by eliminating those causes.

JS 4-Step Method

Step 1 – Spot the Causes of Accidents

Step 2 – Decide on Countermeasures

Step 3 – Enforce Countermeasures

Step 4 – Check Results

Job Methods Training (JM)

Trains supervisors/team leaders on how to analyze jobs to make the best use of the *people, machines, and materials now available.*

JM 4-Step Method

Step 1 – Breakdown the Job

Step 2 – Question Every Detail

Step 3 – Develop the New Method

Step 4 – Apply the New Method

Step 2 - Question Every Detail

Why is it necessary?

What is its purpose?

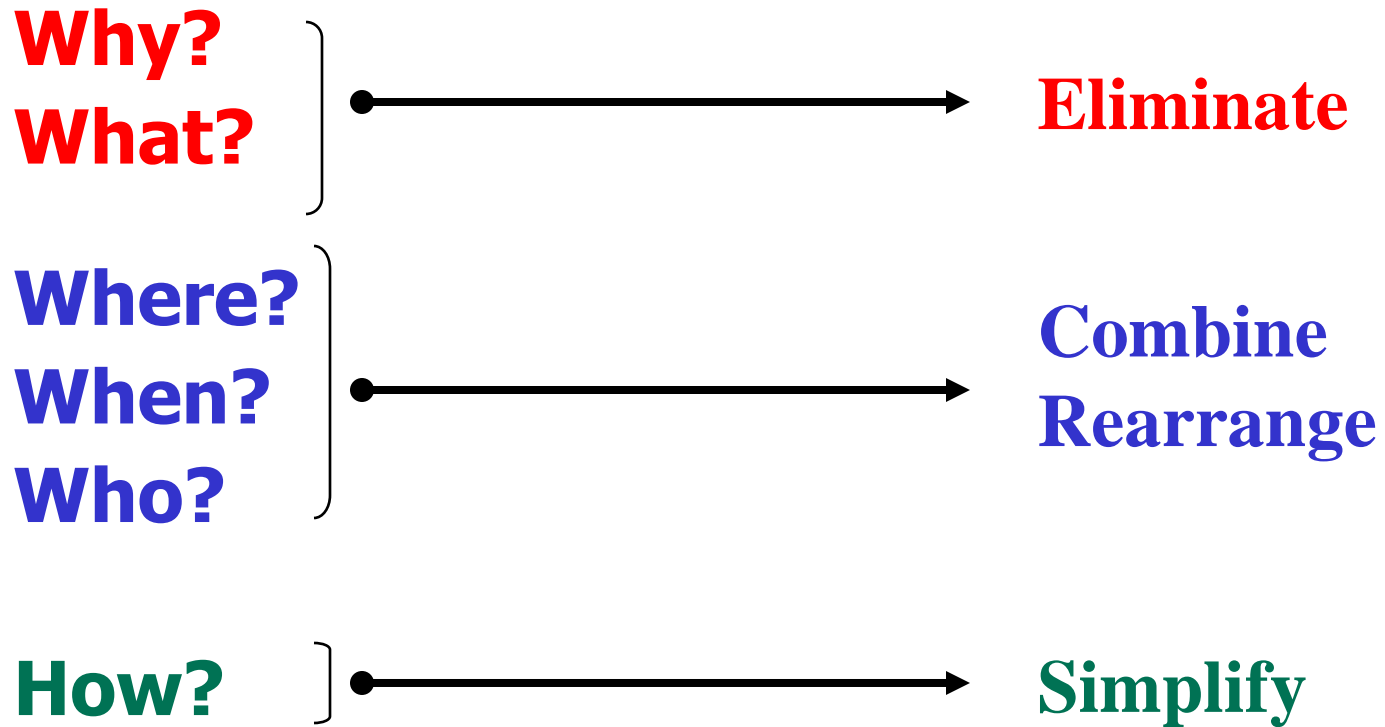
Where should it be done?

When should it be done?

Who is best qualified to do it?

How is “the best way” to do it?

Step 3 - Develop the New Method



JM Improvement Proposal

Improvement Proposal Sheet

Submitted to:

Made by:

Product/Part:

Operations:

Department:

Date:

The following are proposed improvements on the above operations.

1. Summary

--

2. Results

	Before Improvement	After Improvement
Production (one worker per day)		
Machine Use (one machine per day)		
Reject Rate		
Number of Operators		
Other		

3. Content

<p>www.TWI-Institute.org</p>

Step 4 - Apply the New Method

1. Sell the change to others
2. Obtain necessary approvals
3. Put the new method to use right away
4. Credit those involved

The three TWI programs work together like a three-legged stool — take one leg away and the stool falls down.

JR – Positive Culture

JI – Standardized Work

JM – Continuous Improvement

JS – Safe workplace



Adaptations to Sustain TWI

Follow-up and Coaching for JI, JM, and JR

Guidance and training on how to develop and sustain TWI as a practical operating program.

Problem Solving Training (PS)

Created by TWI, Inc. in 1955, PST is a simple and practical pattern on how to use the JI, JR and JM skills to solve production problems.

The Reality of Tactical Lean

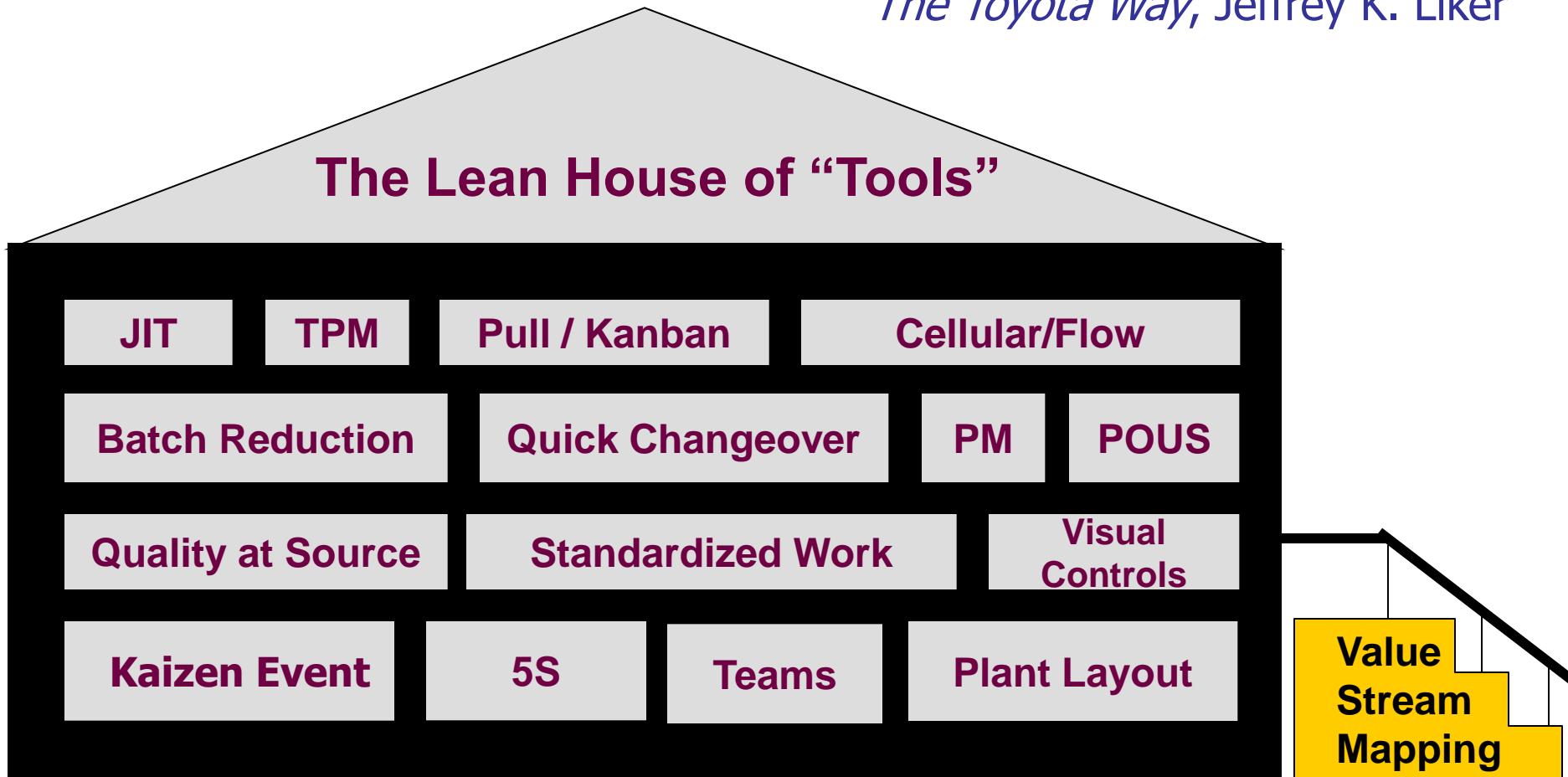
Continuous Improvement

never seems to be continuous

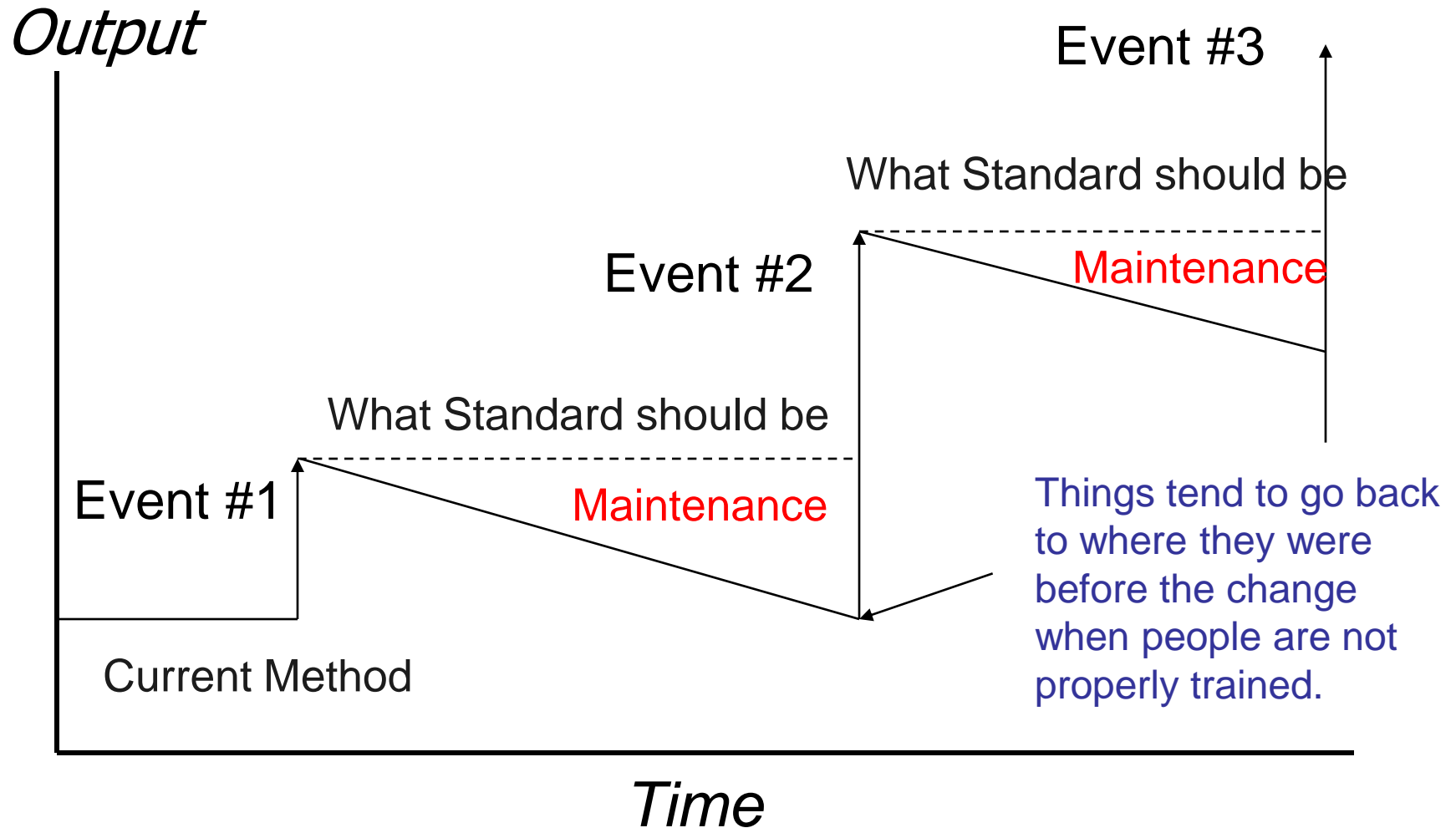
- People resist change and this mindset will cause people to backslide and abandon improvement.
- People typically rely on others for improvements.
- Even when people want to improve they don't have improvement skills.
- Companies tend to rely on "scheduled events" to make even small changes.
- Supervisors and operators end up leaving improvement until after "making the numbers."

“Most companies have focused too heavily on tools...without understanding lean as an entire system that must permeate an organization’s culture.”

The Toyota Way, Jeffrey K. Liker



Impact of Tactical Lean

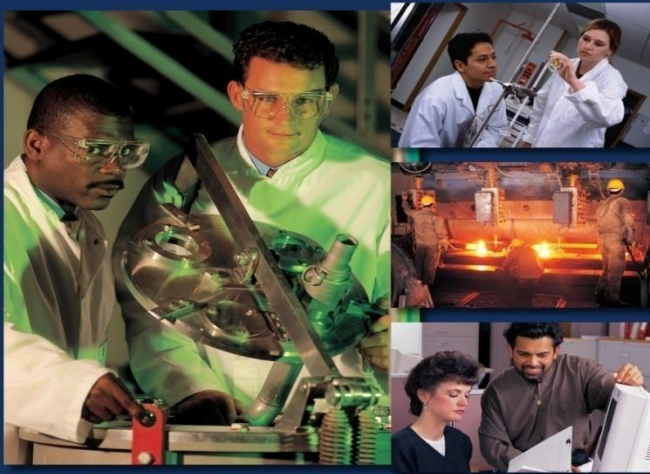


The Countermeasure

TWI Training Within Industry

Leveraging the role of supervisors and team leaders

- *Standardize Work*
- *Increase Productivity & Quality*
- *Reduce Training Time*
- *Work Safely*
- *Improve Morale*
- *Solve Problems*



TWI
Training Within Industry
TWI Institute

- Indoctrinates people into an “improvement” frame of mind.
- Teaches people how to identify opportunities for improving their jobs.
- Trains people how to generate ideas to take advantage of these opportunities.
- Shows people how to get these ideas into practice right away.
- Creates ownership for people to maintain standard work.

“The Origin of Kaizen.”

Supervisors' Roles in Gemba *

- JR** ■ Create a good working environment
- JS** ■ Dealing with workplace disruptions

- JJ** ■ Prepare work standards
- Provide training to ensure operators do their work according to standards

- JM** ■ Improve status quo by improving standards

- PS** ■ Notice abnormalities and address immediately to keep the process under control

* *GEMBA KAIZEN*, Masaaki Imai, 1997; page 113

Supervisors' Roles in Lean



- Supervisors must learn to:
 - Manage and communicate with people
 - Accept responsibility for improvement
 - Develop teams to involve their people
 - Delegate responsibility and train others
- So that people can:
 - Accept responsibility for their work
 - Participate in the improvement process
 - Learn how to interact as part of a team
 - Increase their level of job satisfaction

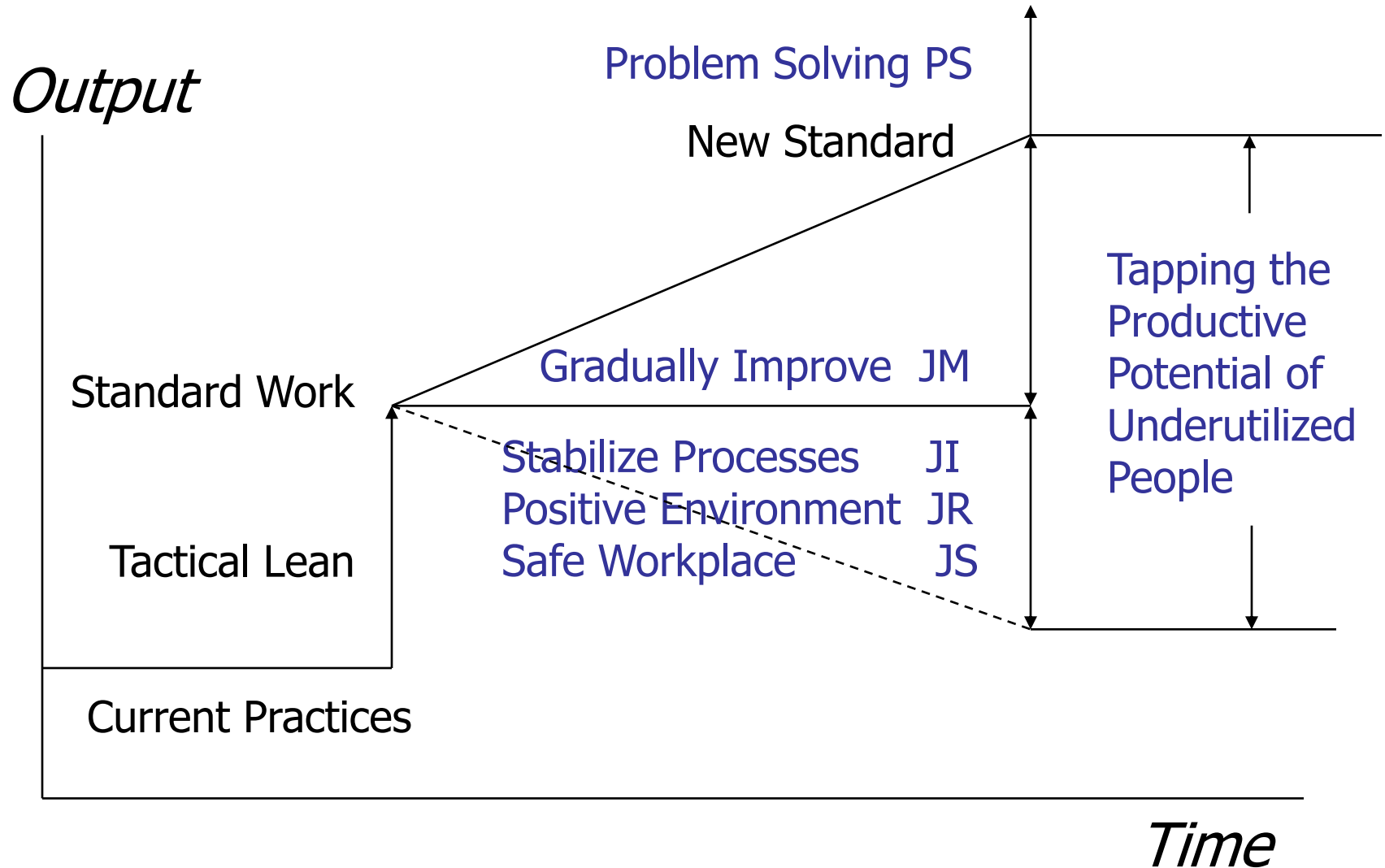
Benchmarking the TOYOTA WAY

“The Toyota Way of going to the source, observing in detail, and learning by doing were all very much influenced by TWI and became the backbone of Toyota’s standardization philosophy....

that standardized work should be a cooperative effort between the foreman and the worker.”

The Toyota Way, Jeffrey Liker 2004, pg. 141

Stabilize, Standardize, Sustain



What is Stability?

We learn from Art Smalley that stability begins with a well trained workforce.

A well trained workforce is one that does their job the same way from person to person, shift to shift and plant to plant.

Knowing that jobs are always done the same way helps to establish a predictable process before going too far down the path with the other elements of standardized work such as machine up time, availability of material, flow and takt time.

What is Standardized Work?*

Work Standards – unit-cost-focused manufacturing

Creating a cost standard as the objective to achieve which precludes the possibility of improvement.

Standardized Work – the basis for lean waste reduction

“...the best possible work method, with the least amount of waste, producing the best quality product at the lowest cost.”

“The establishment of standardized processes and procedures is the greatest key to creating consistent performance.”

* The Toyota Way Fieldbook, Jeffrey Liker & David Meier, 2006, p111-114

Standardized Work Chart - *What to Do*

STANDARDIZED WORK CHART		PROCESS		Cycle Time	TAKT Time	SAFETY	QUALITY	IN PROCESS
		Glost Kiln Operator Cycle		30-minutes	1-cycle / 90-minutes	+	◆	●
Element Number	Description	Work Time	Walk Time	WORK AREA LAYOUT				
1	Walk to GK #3 Exit		1.0					
2+	Discharge Car from GK#3	5.0						
3+	Discharge Car from GK#4	5.0	1.2					
4	Record GK#4 car numbers and temps	1.0	0.7					
5◆	Charge GK#4	5.0	0.3					
6◆	Charge GK#3	5.0	1.0					
7	Record GK#3 car numbers and temps	1.0	0.6					
8	Return to loading		0.6					
Total (min):		22	5.4					
COMMENTS: Safety: Use high temp gloves, pusher to move cars and be mindful for oily/slick surfaces Quality: Inspect kiln cars and repair downed ware and refractory. Use care not to damage gla								

TAKT TIME	440	CYCLE TIME	430	SEC.
ELEMENTS OF PROCESS				
KEYPOINT #	ELEMENT #	DESCRIPTION	WORK TIME	WALK TIME
1	1	Exit van at ladeline, proceed to car	5	5
2	2	Verification Prior to Exiting Loadingline	20	0
3	3	Follow Driving Pattern in Yard	75	0
4	4	Pull up to terminal, 'Load' car in NPPS	25	0
5	5	Drive up ramp and enter railcar	16	0
6	6	Drive through railcars at a maximum speed of 15 km/h <i>Environmental - Significant Noise Impact</i>	40	0
7	7	Park car to CPAAR/TLS audit specifications	5	0
7a	7a	Car in 'home position', transmission in neutral, parking brake on (AAR standard)	5	0
7b	7b	Exit car with door under control	5	0
8	8	Chock down front tire of vehicle	45	4
8a	8a	Chock down rear tire of vehicle	45	2
9	9	Spot following T.M. before exiting railcar	5	0
9a	9a	If required, lower hingedecks (loading A-deck)	10	0
9b	9b	If required, remove bridgeplates from C-deck (loading B-deck)		
9c	9c	If required, remove bridgeplates/close up railcar (loading B-deck)		
10	10	Exit Railcar	5	
10a	10a	Get ride from shuttle	115	
		During inactivity or downtime, SS or do jobs as assigned		
		Repeat procedure until break, take-down or shift end		
			411	19

TOYOTA MOTOR MANUFACTURING CANADA INC.

STANDARDIZED WORK CHART

OPERATION NAME: Rail Loading Process OPERATION NUMBER: _____


REVISION DATE	SIGNATURE	KEYPOINT	JOB ELEMENT

KEYPOINTS:
 *Do not spin tires *Radios are not to be on while loading *Do not lean or place hands on vehicle *Place door edge protector at top of door frame when loading C deck (Corolla) *Drive at 35 km/h in yard *Keep 2 car lengths away from vehicle in front *No stopping on bridgeplates *Keep vehicle positioned in railcar 1' to 2' from tie-down rail. If unsure of positioning STOP vehicle and check. *Rail loading at high speeds may cause a high noise impact *Make sure chock strap is centered on tire and not touching the strut behind tire (check with hand) *Ensure straps are not twisted *Ratchet chocks firmly but do not bulge tire *Visually check to see if pin is locked in *Use the 3 point contact rule when climbing down the ladder *Carry ratchet in hand away from vehicle, put in pocket when climbing down ladders *Make sure hinge decks are locked in when lowered
 *When Loading 2 Destinations with 2 Crews:
 *Be aware of other crew, know what they are loading and drive with caution when approaching ladeline or terminal scanners
 *Concrete locations marked with red dots to ensure safe approach to same

NOTE PLACE: **i** ● ◆ + A ENVIRONMENTAL "SIGNIFICANT NOISE IMPACT"

PAGE 1 OF 1

JI Breakdown – *How to Do It*

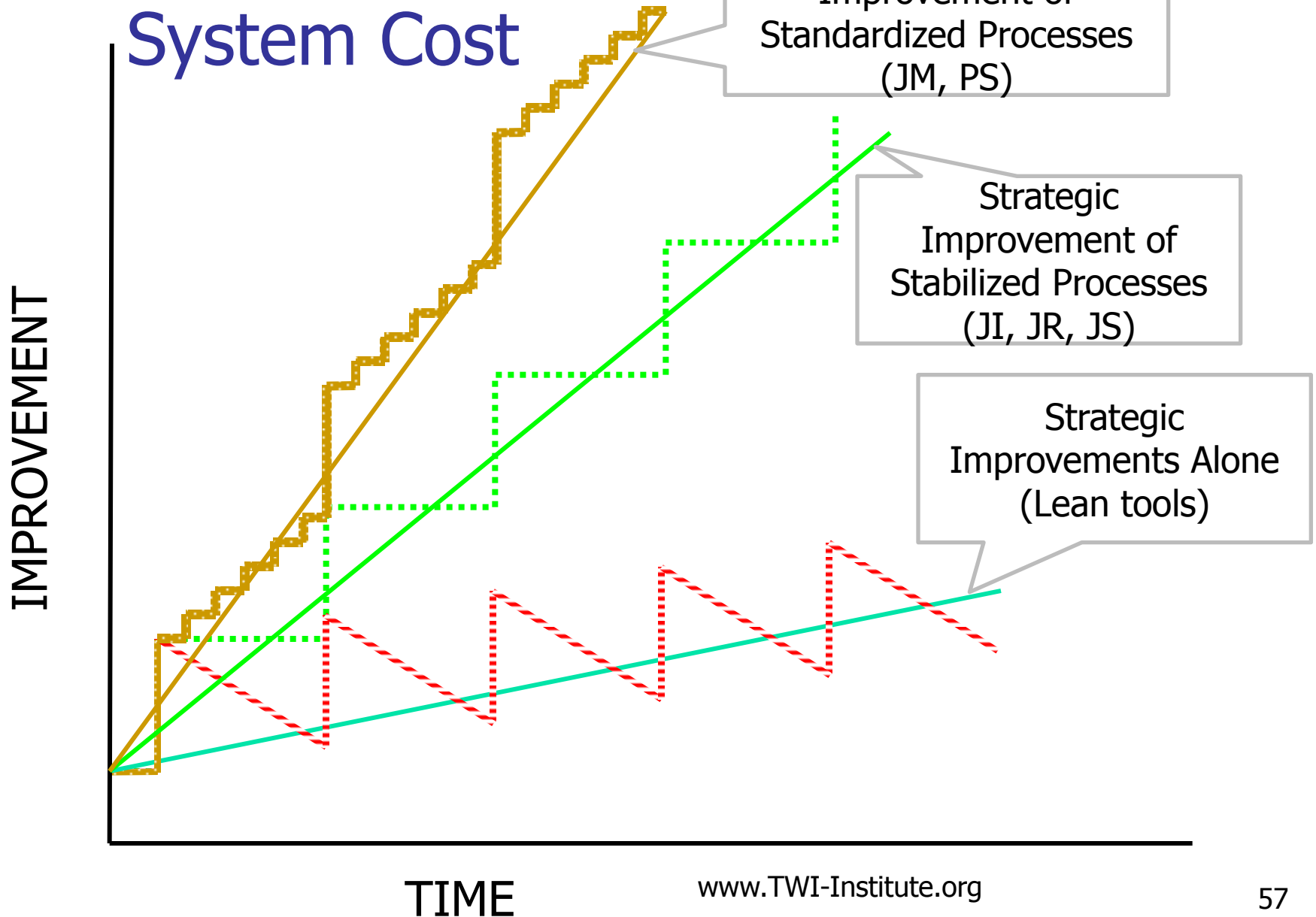
No. _____		
 JOB INSTRUCTION BREAKDOWN SHEET		
Operation: <u>Glost Kiln Operator Cycle</u>		
Parts: <u>None</u>		
Tools & Materials: <u>Kiln Gloves</u>		
IMPORTANT STEPS	KEY POINTS	REASONS
A logical segment of the operation when something happens to advance the work.	Anything in a step that might— 1. Make or break the job 2. Injure the worker 3. Make the work easier to do, i.e. "knack", "trick", special timing, bit of special information	Reasons for the key points
1. Discharge GK #3	1. Use kiln gloves 2. Pull at correct time	1. Burn hazard 2. Kiln control
2. Charge GK #3	1. Fix downed ware 2. Do not slam transfer	1. Defect prevention 2. Defect prevention
3. Record car data		
4. Check kiln temperatures	1. Call Ceramic Tech if 50°F delta in zones	1. Proper kiln control
5. Charge GK #3	1. Fix downed ware 2. Do not slam transfer	1. Defect prevention 2. Defect prevention
6. Discharge GK #3	1. Use kiln gloves 2. Pull at correct time	1. Burn hazard 2. Kiln control
7. Record car data		
8. Check kiln temperatures	1. Call Ceramic Tech if 50°F delta in zones	1. Proper kiln control

- Train all operators to do work according to the standard
- Monitor for continued use to eliminate variation in how jobs are performed
- Focus operators on takt time and quality at the source vs. just keeping up
- Involve people to solve problems and implement countermeasures to continuously improve

TWI Continuous Improvement Cycle



Reduce Total System Cost



A lesson from Toyota*

"Create a Structure to Support Standard Work

Toyota has a system of group leaders and team leaders. The team leaders are hourly and are responsible for supporting about five to seven associates. They audit the work procedures of employees to detect deviations from standard work...and provide the necessary structure to fill in for absences. They are often involved in developing standard work for new models.

They are a key to turning standard work from good looking wall hangings to true tools for continuous improvement. Interestingly, the team leader role is exactly what is missing in most companies." *

* *The Toyota Way Fieldbook*, Jeffrey K. Liker and David Meier, McGraw-Hill, 2006, pg 117

Structure to Sustain TWI

Management	PROVIDE SUPPORT
Managers	PRODUCE RESULTS
Group Leader	MAKE SURE TWI IS USED
Team Leader	USE TWI TO TRAIN
Team Member	USE TWI TO IMPROVE

Develop Certified Trainers

When the four TWI, Inc. specialists departed Japan in 1951, they left behind them 35 certified Institute Trainers. That was the beginning of a large multiplier effect, which extended to over one million Japanese managers and supervisors by 1966, to many millions more by 1992, and millions of others to this day.

A new multiplier effect began in 2002 has resulted in over 500 certified Institute Trainers that have trained hundreds of thousands of managers, supervisors and operators by 2012 to which thousands are being added to the list every day.



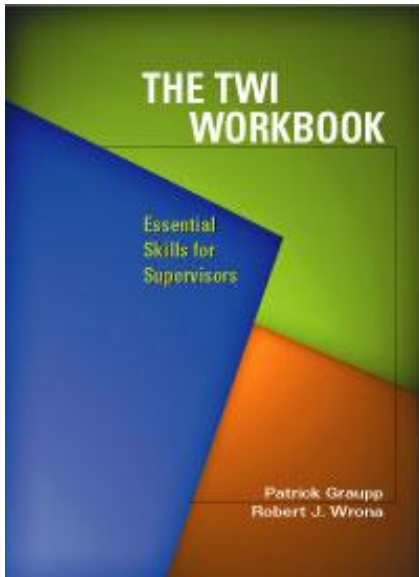
Certified Trainer Program

- Prerequisites:
 - Completion of the 10-hour program (JI, JM, JR, JS) for which you want to become a trainer
 - Sufficient experience with using the method in the workplace to gain practical application experience
- Each program training module (JI, JM, JR, JS)
 - 40-hours to understand and to practice delivery as dictated in each Training Delivery Manual
 - Small classes that range in size from 4 to 6 people

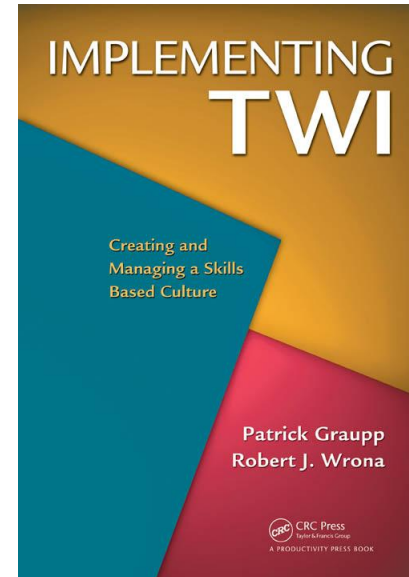
Why Certified Trainers?

- “When a program is being operated nationally, quality control is necessary so that there can be a guaranteed quality standard, nation wide.”
 - 1945 TWI Report, page 178

- “There is a formal certification process to become a trainer that includes being certified in the individual tasks taught to students.”
 - Toyota Talent (Liker & Meier, 2007), page 22



Questions
315-412-0303



*The TWI Workbook:
Essential Skills for Supervisors*
Productivity Press, Shingo Prize 2007
Patrick Graupp and Robert J. Wrona

*Implementing TWI: Creating and
Managing a Skills Based Culture*
CRC Press, October 2010
Patrick Graupp and Robert J. Wrona