TRAINING WITHIN INDUSTRY
JOB INSTRUCTION & JOB METHODS
Energizer Mission

Keep Going & Keep Growing …
About Energizer
Energizer Global Operation

- Annual Battery Production – > 6 Billion
- 20 Manufacturing & Packaging Facilities in 13 Countries on 4 Continents
- Products sold in 165+ Countries
- 2005 Net Sales $2.99 billion (including SWS)
- Colleagues – 9,963 Worldwide
- Full Product Line – Alkaline, CZ, Miniature, Industrial, Rechargeable, Lithium, Lighting Products and Energi-to-Go
A Global Production Presence

- Kenya
- Sri Lanka
- Singapore
- Malaysia
- Philippines
- Indonesia
- Tianjin, China
- La Chaux De Fonds, Switzerland
- Asheboro, NC
- St. Albans VT
- Bennington VT
- Walkerton, Canada
- Caudebec, France
- Bogang, China
- Egypt
- Maryville, MO
- Garrettsville, OH
- Marietta, OH
- Egypt
- Tianjin, China
- Philippines
- Singapore
- Sri Lanka
- Walkerton, Canada
- Bogang, China
- Egypt
- Maryville, MO
- Garrettsville, OH
- Marietta, OH
Presenter Bio – Bryan Lund

Industry connection:
Energizer Battery, Global Lean Coordinator

CI Experience:
8 years of process improvement in various industries: consumer goods mfg, equipment manufacturing and cable harness and electrical cabinet mfg.

Professional affiliations:
Current chair of AME/SME/Shingo Lean Certification Oversight and Appeals Committee
Current chair of SME #204 Green Mountain Chapter
Chapter #204’s Lean Hypothesis

- Members’ comprised of many years of “American Lean” experience.
  - Kaizen event, kaizen event, kaizen event and when that doesn’t work do another kaizen event.
- Question: why doesn’t some of this really successful stuff always stick?
- Question: if Toyota is so good at this stuff, how do they make it stick?
- Hypothesis: “American Lean” is missing something in its Lean Portfolio.
  - Standard Work: What is it, really?
  - Problem Solving & Kaizen: How does it support standard work?
  - More importantly, how do we drive this thinking into ALL levels of the organization?
Discover TWI through Jim Huntzinger’s “Roots of Lean” article.


Alan Robinson’s research extremely helpful in providing the TWI connections to post-war Japan.

Don Dinero taught us how to fish.

Two trips to National Archives in College Park, MD.

Various other publications researched

- Charles Allen, Walter Dietz, Channing Dooley, Virgil Rowland

Many Toyota references to TWI

- *The Toyota Way, Toyota Talent, Kaizen Teian Series, 40 Years, 20 Million Ideas.*
Learning by Doing at Energizer Battery Mfg.

Case Studies of Job Instruction & Job Methods
Example #1

Training New Hires
Understanding the Problem

- Skill shortage
- Turnover
- Few concrete work standards in the area
- Training program that had good intentions

Problem Statement: “Currently, trainees require four weeks of OJT. When complete, we are not 100% confident that training was effective. We have new people coming soon and want to ensure that our training is 100% effective. “
Countermeasures

- **Planning**
  - Conducted 5 day, 2 hour JI Sessions
  - Lead operators created the Job Breakdown Sheets (JBS)
  - Lead operators created training timetable

- **Doing**
  - Lead operators conducted training using timetable and JBS.

- **Check**
  - Supervisors followed up with new people and checked performance against JBS.

- **Adjust**
  - Additional training and coaching as deviations from standard were identified.
  - Update JBS as errors, omissions or improvements were discovered.
  - Repeat training for updates.
Process Check – doing the right things?

- People stayed in the job longer.
- Operators devised a safer way to do routine machine gate checks.

<table>
<thead>
<tr>
<th>Element</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training effectiveness</td>
<td>99% confident in plan</td>
</tr>
<tr>
<td>Training time</td>
<td>-75</td>
</tr>
</tbody>
</table>
Example #2

Maintenance
Understanding the Problem

- Varying rebuild methods
- Unclear on frequency of rebuilds
- Unclear on degree of rebuild required
- Defects believed to be a cause of poor maintenance.
- Rework being done during changeovers

 Problem Statement: “A lack of rebuild standards is the main cause of defects and long changeovers. We want the rebuilds to be right the first time, so changeovers go smoothly the first time, and minimal, if not zero, adjustment is needed.”
Countermeasures

- Planning
  - Team applied SMED
  - Conducted 5 day, 2 hr sessions of JI

- Doing
  - Mechanics & engineers agreed on the best way to do the job.
  - Used 5S to support the Job Instruction sheets and SMED
  - All mechanics were trained in new changeover and rebuild procedure.

- Checking
  - Supervisors followed up with mechanics and checked performance against JBS.

- Adjusting
  - Additional training and coaching as needed.
  - Update JBS as needed
  - Repeat training for updates.
Process checks

- Mechanics more satisfied with work area.
- People following the standards.
- Safety improvements were identified and made.
- Supervisors and engineers are 99% confident that the rebuilds are consistent.
- Troubleshooting problems (the other 1%) with the rebuild is as simple as following the JBS while observing the job and adopting a questioning attitude.

<table>
<thead>
<tr>
<th>Element</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup time</td>
<td>-25</td>
</tr>
<tr>
<td>Defects (ppk)</td>
<td>-70</td>
</tr>
<tr>
<td>Walking</td>
<td>-74</td>
</tr>
</tbody>
</table>
Example #3

Using Job Methods
and Standardized Work
Takt Time
Work Sequence
WIP
Welder fails “all the time”!
Why does the welder fail?
Machine arcs, causing us to clean the tips!
Why does the machine arc?
The tips get dirty!
Why do the tips get dirty?
It’s part of the welding process!

Hmmm...can’t argue with that!

Let’s “go and see” what is happening....
Understanding...
JM Step I – List all Details

### Job Methods Analysis Sheet

<table>
<thead>
<tr>
<th>Operation: <em>CR10 Welding</em></th>
<th>Product or Area:</th>
<th>Team or Department:</th>
<th>Originator:</th>
<th>Assisted By: <em>Justin, Ashley, Kelly</em></th>
<th>Date and Shift:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>List All Details for the (Present/Proposed) Method</th>
<th>Value Add</th>
<th>Waste</th>
<th>Lazy</th>
<th>Inspection</th>
<th>Distance</th>
<th>Time</th>
<th>Notes</th>
<th>WHY?</th>
<th>WHERE?</th>
<th>WHEN?</th>
<th>WHO?</th>
<th>IDEAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pick up five raw cells in tray LH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Palm trick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Write them down now - Don’t trust to memory!!</td>
</tr>
<tr>
<td>Move LH to welder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Load five cells in fixture LH to RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Palm transfer trick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Move LH to tray</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pick up five more raw cells</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Move LH to welder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load five cells in fixture LH to RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Palm transfer trick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grab handful of tabs LH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load five tabs on cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Place extra tabs into tray</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>RH-grab fixture handle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH move to air button</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press air LH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Releases fixture cylinder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Move fixture one step RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>To next weld position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Locks fixture inplace</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press pedal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Weld</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press air LH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Page 1 of 10, 12/1/07 JM-PR-Rev10*
### Understanding...

**Step 1 – Cont...**

<table>
<thead>
<tr>
<th>Move fixture one step RH</th>
<th>○ ▼ ▲ ▲</th>
<th>1</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release air</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Press pedal</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Press air LH</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Release air RH</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Press pedal RH</td>
<td>○ ▼ ▲ ▲</td>
<td>.5</td>
<td>X</td>
</tr>
<tr>
<td>Press air LH RH</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Move fixture one step RH</td>
<td>○ ▼ ▲ ▲</td>
<td>1</td>
<td>SPARK!</td>
</tr>
<tr>
<td>Release air LH</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Press pedal</td>
<td>○ ▼ ▲ ▲</td>
<td>.5</td>
<td>Why do we batch five cells?</td>
</tr>
<tr>
<td>Press air LH</td>
<td>○ ▼ ▲ ▲</td>
<td>X</td>
<td>What if we did one battery at a time?</td>
</tr>
</tbody>
</table>

- **Repeat weld cycle 6 more times**

<table>
<thead>
<tr>
<th>Press air LH</th>
<th>○ ▼ ▲ ▲</th>
<th>Hold button</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move fixture all the way back</td>
<td>○ ▼ ▲ ▲</td>
<td>10</td>
<td>.5</td>
</tr>
<tr>
<td>Remove five welded CRV3 batteries RH</td>
<td>○ ▼ ▲ ▲</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Move batteries to &quot;sticker&quot; RH</td>
<td>○ ▼ ▲ ▲</td>
<td>24</td>
<td>2</td>
</tr>
</tbody>
</table>

**Totals:** ○ = 10, ▼ = 30, ▲ = _________, ▲ = _________, Distance = ___16"/13"__, Time = ___36 s____

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*Pop left 1/1/2007, MM/Year: 0*
Understanding…

JM Step II – Question Every Detail

Causal Thinking:

As described by Jeffrey Liker in The Toyota Way Field book.

Why does the welder fail?
  Machine arcs, causing us to clean the tips.
  Why does the machine arc?
    Tips are coming down on tab hold downs
      Why are the tips coming down on the tab hold downs?
        Sometimes the three step sequence gets fouled up.
          Why does the sequence sometimes get fouled up?
            Welder must go fast to keep up with the rest of the line.
              Why does the operator have to go fast?
                Welder does five cells, everyone else does one at a time.
                  Why do we weld five cells at a time?
                    The machine is designed that way and I was trained to weld this way. (Root cause)
                      Weld one at a time. (Solution)

Therefore
  Welder makes one cell at a time, pace is matched.
  Therefore
    Operator doesn’t have to rush when welding one at a time.
  Therefore
    The three step sequence is easy to do correctly.
  Therefore
    The tips don’t come down on the hold down tabs.
  Therefore
    The welder doesn’t arc.
  Therefore
    The welder doesn’t fail

Problem Statement: Not able to meet customer demands (QCD) due to poor workflow and unreliable equipment. We are trying JIT but can’t support it with unreliable equipment.
Countermeasures

JM Step III – Develop New Methods

“This principles of the Job Methods plan is nothing new. They were developed over thirty years ago.”

Job Methods Training Manual, pg. 37, 1943

- **Planning**
  - One piece flow
  - Determine takt time
  - Line balancing and Work Combination Tables
  - Conduct 5 day, 2 hr JI session

- **Doing**
  - Lock in each workstation with Job Instruction
    - Work sequence reflects Work Combinations
    - Key points
      - Related to QCDS
  - Daily follow up on DBH board
  - Checking performance to JBS

- **Checking**
  - Rebalancing line for different staffing levels
  - Rewriting JBS to reflect Work Combinations

- **Adjusting**
Process Check
JM Step IV – Sell the New Method

“Get the operators’ cooperation and ideas on all improvements.”

PUT the new method TO WORK-use it until a better WAY is developed.”

Job Methods Training Manual, pg. 32, 1943

- Operators developed new method
- Operators tested the new method
- Operators refined the method
- Operators trained others in the new method.

<table>
<thead>
<tr>
<th>Element</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor hours</td>
<td>-42</td>
</tr>
<tr>
<td>Productivity</td>
<td>+67</td>
</tr>
<tr>
<td>Welder arcs</td>
<td>-95</td>
</tr>
</tbody>
</table>
Example #4

Increasing productivity
Understanding the Problem

First – WHY is it necessary?

We ask this question first, it is often the hardest to answer properly.”

Job Methods Training Manual, pg. 17, 1943

- Low utilization of equipment
- Batching
  - Damage of raw materials
  - Massive rework if new person doesn’t do it right.
    - Training not adequate
  - Wasting labor hours
- Space not well utilized

- Problem Statement: Not able to meet QCDS goals with the current process. We want to free up some space by better utilizing our equipment, and free up a person so that a constant supply of materials, in the right quantities is brought to this line and others. We feel this approach will help us meet our QCDS goals.
Countermeasures

- Second – WHAT is its purpose?
  - We want to find out if the detail has a useful purpose or adds quality to the product?

Job Methods Training Manual, pg. 17, 1943

- Planning
  - Work cell overview training
  - Conduct 5 day, 2 hr JI/JM Session Combination

- Doing
  - Standard Work tools
    - JM
    - Takt time
    - Work Sequence
    - WIP

- Checking
  - Conducted two days of trials using new method
  - Locked in the changes using JI

- Adjust
  - Using JM, identified the bottleneck policy that helped breakthrough to large improvement.
Process Check

- Third – Where should it be done?
- Fourth – When should it be done?
- Fifth – Who is best qualified to do it?
- Sixth – HOW is the best way to do it?

- Created work flow, eliminated batching
- Clear job roles
  - Operator freed up to do material handling.
- Improved training
- Operators felt better about the job, didn’t have to rush to get the work done.

<table>
<thead>
<tr>
<th>Element</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equip Util.</td>
<td>+28</td>
</tr>
<tr>
<td>Productivity</td>
<td>+30</td>
</tr>
<tr>
<td>Labor hours</td>
<td>-20</td>
</tr>
<tr>
<td>Floor Space</td>
<td>-25</td>
</tr>
</tbody>
</table>

Job Methods Training Manual, pg. 18, 1943
Example #5

Standardized Work in a Craftsperson's workplace.
Understanding the Problem

“Improvements can be made on any job which includes one or more of three basic types of work:

- Material Handling
- Machine Work
- Hand work”

Job Methods Training Manual, pg. 8, 1943

- Difficult to keep up with customer needs during busy periods, but somehow we manage with additional labor.
- Staffing needs and the best time to increase or decrease staffing not well understood.
- Different people work to different standards.
- People batch their work in the mornings, so they can firefight in the afternoon.
- Shift change can be frustrating and not smooth.
Problem Statement

- We don’t understand the work content of the job and how that affects the concept of flow. This causes us to rely on varying abilities of people to get the job done. As a result, people created a system that calls for work to be done in the morning, leaving idle time in the afternoon to recover from problems. (Batching of work.) Not every day has problems to deal with late in the day, so we feel like additional labor in the busy season is wasted. How do we get a handle on this process?

“If there is a job to be done, there exists a repeatable process waiting to be discovered.”

Don Dinero, 2005

“It’s not that I’m so smart, it’s just that I stay with problems longer.”

Albert Einstein
Countermeasures

“Tackle only one specific need at a time.”

Program Development Pocket Card

- Planning
  - Conduct 5 day, 2 hr Ji sessions
    - Created JBS for major tasks in the process
    - Standardized the major elements of the job.
  - Determined takt time in regards to the pacemaker.
    - Relevant units of measure
      - Use pitch instead of unit takt time.
      - E.g. # of unloads per day vs. # of units molded in a batch process.
Countermeasures

- **Doing**
  - Applied production smoothing to the job
  - Created standard work routines based on takt time

- **Checking**
  - Piloted the standard work routines over a three day period

- **Adjusted the smoothed schedule**
  - Addressed any problems that popped up
  - Cross-trained individuals to assist in meeting smoothed schedule.
Process Checks

- Operators much happier on the job.
- “I’m not rushed, but I’m still busy.”
- Retaining temporary labor for longer periods
- Clear understanding of staffing levels using takt time/cycle time concept.
- No longer depend on temporary labor in busy seasons.
“This discussion of ‘training’ is based on a concept of training as a way used by the plant management to solve a specific production problem which involves people.”

“The success of any improvement depends on our ability to develop a questioning attitude.”

“The answers to our questions will give the information we need to make improvements.”
“Confidence and resourcefulness in how to proceed, not standardized solutions and rules, are developed.”

*Job Methods Training Manual, Training Within Industry Service, 1943*
Thank you

Questions??
Learn more about Kaizen & TWI

Books:

Kaizen Teian I
Kaizen Teian II
The Improvement Engine, (previously Kaizen Teian III)
40 Years, 20 Million Ideas: The Toyota Suggestion System.
Continuous Improvement in Operations
Gemba Kaizen
The Toyota Way Field book
Toyota Talent

SME Chapter #204 Website:
http://chapters.sme.org/204/TWI_Materials/TWIPage.htm