Hands-on Execution of Lean Principles - (H.E.L.P.)

Luis Loya
Director, Operational Excellence MBB Program
Master Black Belt
May 14, 2014
Agenda

Background / Structure
5S: A Visual Management System
Lean Standard Work: SOS
Takt: A Plan vs. Actual Control
Lean 5S Game
Q&A
Background (FY 2009 – 2010)

• Quarterly to semi-quarterly series of conference calls about Lean concepts.
  – Templates and instructional materials developed by MBBs and posted to Warehouse Operations SharePoint site.
  – Sites designated a “Champion” for each topic prior to national calls.

• Limitations
  – Conference call format limited depth of coverage and no one-on-one teaching.
  – With no “live” environment training – Operations teams were left to apply material on their own.
Background (FY 2011): How Do We Learn?

Teaching Techniques

- Presentation - 5%
- Reading - 10%
- Audio-Visual - 20%
- Demonstration - 30%
- Discussion Group - 50%
- Practice with Feedback - 75%
- Teach Others / Immediate Use - 80%

Retention Rate

Learner Focused & Interactive
Background (FY 2011) : The Goal

- Develop & pilot an interactive hands-on learning experience for targeted Lean concepts:
  - 5S
  - Standard Work
  - Takt
Background: The House of Lean

Philosophy

Leadership

Daily Management

Level Scheduling

Standard Work

DMAIC

Stability

Impact

Results

Assessment

Pillars

Foundation

Culture

Business Profit
Shareholder Satisfaction
Customer Satisfaction
Employee Engagement

Goals:
Greatest Safety
Highest Quality
Lowest Cost
Shortest Lead Time

Lean Roadmap To Success

Just-In-Time
Right Item
Right Time
Right Quantity

Continuous Flow
- Takt Time
- Pull System
- One-Piece Flow
- Min Batch Size
- Value Stream Map
- Process Map

People & Teamwork
Cross Training
Ergonomics
Empowerment
Consensus
Gembata

Built-In-Quality
Jidoka
- Poke-Yoke
- Process Stability
- Design-for-Lean
- 5 Why’s
- Andon Signals
- Control Charts (SPC)
- PDCA

Level Scheduling
- Managed Inventory
- Smoothed demand
- Build to order

Standard Work
- Visual Management
- SOS
- 5S

DMAIC
- Kaizen / JDI / BB
- Waste Reduction
- Genchi Genbutsu

(1) Automation with human interaction, (2) Error proofing, (3) Go to where the value is, (4) Heijunka, (5) Go see the problem

Background:
The House of Lean

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**Background** (FY 2011 - 2012): The Plan & Execution

- Classroom 1-2 hrs. by topic
- Leads and above
- One department at a time

**Topics and Lead Trainers**
- 5S – Paul Scheuer (Coach: Frank Limones)
- Standard Work – Luis Loya & Craig Shockency (Coach: Tom Morgan)
- Takt – Luis Loya

**Content Development**
- Expand on existing lean templates
- Training materials:
  - Module Presentations
  - Town Hall decks
  - Hands-on Exercises

**Proof-of-Concept**
- April – May, 2011
- Sacramento FDC
  - Rx Outbound

**Training Delivery (Black Belt / MBB)**
- June 13-24, 2011
  - 2 Sessions
- Field onsite black belts serve as primary training source
- Bring in other regional black belts or MBBs as needed
- Rx
- OTC
- Receiving
- Other

**Sequential Rollout by Area**
- Each DC required to implement four areas in FY12

**HELP Tracker**
- BB’s will update Tracker monthly
- Operations Scorecard
Background (FY 2013) : The Evolution

• Updated 5S:
  - New exercise = Letter’s Game
  - New Audit & Results Report
Background (FY 2013): The Evolution

- Updated SW:
  - New SOS format
Background (FY 2014): The Evolution

- Updated Takt:
  - Added case studies to link Standard Work & Takt
Class Size & Room Setting

- 8 to 16 Participants
- U-shape setting with a spacious conference room
The Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Day 1</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-9 am</td>
<td>8:30 am Start</td>
<td>8:30 am Start</td>
</tr>
<tr>
<td></td>
<td>Introductions</td>
<td>Review 5S &amp; SW</td>
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<td></td>
<td>Expectations</td>
<td>SOS Exercise</td>
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<tr>
<td>9-10 am</td>
<td><strong>5S Module</strong></td>
<td>create standard work</td>
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<td></td>
<td>with Letters Game</td>
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<td></td>
<td>Exercise</td>
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<td>10-11 am</td>
<td>Boeing Video</td>
<td>Leader Standard Work</td>
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<td>Lunch</td>
<td>draft personal LSW</td>
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<td>11-12 pm</td>
<td>Standard Work Module</td>
<td>Takt Module</td>
</tr>
<tr>
<td></td>
<td>with Draw a House Exercise</td>
<td>Takt Time Challenge</td>
</tr>
<tr>
<td>12-1pm</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>1-2 pm</td>
<td><strong>Takt Module</strong></td>
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<tr>
<td></td>
<td>with Draw a House Exercise</td>
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<tr>
<td>2-3 pm</td>
<td>Group Ex. Observation</td>
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<tr>
<td></td>
<td>Group Ex. Stop Watch</td>
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<tr>
<td>3-4 pm</td>
<td>Cycle Time Exercise</td>
<td>Takt Tools &amp; Exercises</td>
</tr>
<tr>
<td></td>
<td>Time Observation Form</td>
<td>bringing 5S, SW &amp; Takt together</td>
</tr>
<tr>
<td>4-5 pm</td>
<td>4:30 pm End (estimated)</td>
<td>4:30 pm End (estimated)</td>
</tr>
</tbody>
</table>
5S: A Visual Management System
(A Hands-on Experience Learning Module)

• Sort
• Set in Order
• Shine
• Standardize
• Sustain

Operating Model – Continuing Education
Hands-on Execution of Lean Principles (H.E.L.P.)
Luis Loya, Operational Excellence Deployment
February 2013 (updated Jan 2014)
5S Module: with Exercise Game

WIIFM

No 5S Exercise

Sort

Set in Order

Shine

Standardize

Sustain

Presentation

Practice and Discussion
Sorting: Red Tag

Syracuse: Forward Distribution Center
Little Rock’s 1st Semi-Annual Red Tag Event

• Do you have unnecessary items on, in or around your desk?
• The next week is your opportunity to remove these unnecessary items

- What is a Red Tag Event?
- What could be considered?
- How should I determine?
- Where do I take these?
Pit Stops From 1950 & 2013: Video
Shine:

- Key component to Preventive Maintenance
- Clean to Inspect
- 5S Responsibility Board
RCPS: Closing the Loop

1) Score Each Question on 5S Audit Tool

2) Enter Date of Miss on Miss Tracker

3) Take Action @ Red Line

4) Complete 5 Why Sheet

5) Post Countermeasure

6) Implement Countermeasure & Shade In

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Boeing 5S: Video
Lean Standard Work

(A Hands-on Experience Learning Module)
Standard Work

“Where there is no standard, there can be no kaizen.”

- Taiichi Ohno

Businessman: father of Toyota Production System
The True Meaning of Kaizen: Video

Lean Lingo Explained
Why Standard Work: The Wedge to Sustain
Why Standard Work: Promotes Teamwork
Draw a Lean House: Exercise

VOC

Customer Requirements:

- Draw a house centered on the page. (front profile only)
- The house must be large enough to touch all four inner edges of the graph area.
- The house must have a chimney.
- The house must have a door centered.
- Quality counts
- Takt Time = 60 sec.

Practice and Discussion

Round 1

No Standard Exercise

Round 2

Create detailed SOS

Standard Operating Sheet

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Foundation</td>
<td>Draw a rectangle starting at point (A,0) then (A,1), to (K,1), to (K,0), back to (A,0)</td>
</tr>
<tr>
<td>2</td>
<td>Left Wall</td>
<td>Draw a line from point (B,1) to (B,5)</td>
</tr>
<tr>
<td>3</td>
<td>Right Wall</td>
<td>Draw a line from point (J,1) to (J,5)</td>
</tr>
<tr>
<td>4</td>
<td>Door</td>
<td>Draw a line from point (E,1) to (E,3) to (G,3) then end at (G,1)</td>
</tr>
<tr>
<td>5</td>
<td>Roof</td>
<td>Draw a triangle starting at point (F,7) to (A, 5) to (K,5) then end at (F,7)</td>
</tr>
<tr>
<td>6</td>
<td>Chimney</td>
<td>Draw a line starting near (C,6) to (C,7), (D,7) then end near (D,6)</td>
</tr>
</tbody>
</table>

Round 3

Create SOS with visuals

Standard Operating Sheet

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Foundation</td>
<td>Draw a rectangle starting at point (A,0) then (A,1), to (K,1), to (K,0), back to (A,0)</td>
</tr>
<tr>
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<td>Door</td>
<td>Draw a line from point (E,1) to (E,3) to (G,3) then end at (G,1)</td>
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<tr>
<td>5</td>
<td>Roof</td>
<td>Draw a triangle starting at point (F,7) to (A, 5) to (K,5) then end at (F,7)</td>
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<tr>
<td>6</td>
<td>Chimney</td>
<td>Draw a line starting near (C,6) to (C,7), (D,7) then end near (D,6)</td>
</tr>
</tbody>
</table>
The Power of Observation

• One of our best tools = *our eyes*
• Gemba
• Genchi Genbutsu = *go see the problem*
• Gemba Walks
• Waste Walks

* Where the action takes place
### Time Observation Form

**Process Name:** ______________________

**Product Name:** ______________________

**Operator:** ______________________

**Process WIP:** ______________________

**Observer:** ______________________

**Shift/Time:** ______________________

(Common Unit of Measure)

<table>
<thead>
<tr>
<th>Step No.</th>
<th>Step Elements</th>
<th>Observations</th>
<th>Average Time</th>
<th>Average Number of Times in 1 Process Cycle for the Designated Process WIP</th>
<th>Total Time for 1 Process Cycle</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
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**Total for 1 cycle:**

|          |              |              |          |                                                  |                               |       |
| 1        |               |              |          |                                                  |                               |       |
| 2        |               |              |          |                                                  |                               |       |
| 3        |               |              |          |                                                  |                               |       |
| 4        |               |              |          |                                                  |                               |       |
| 5        |               |              |          |                                                  |                               |       |
| 6        |               |              |          |                                                  |                               |       |
| 7        |               |              |          |                                                  |                               |       |
| 8        |               |              |          |                                                  |                               |       |
| 9        |               |              |          |                                                  |                               |       |
| 10       |               |              |          |                                                  |                               |       |

**Total process time for 1 process cycle:**
Time Observation Form

• To Average or Not to Average?

1986 Geography Graduates from UNC

Mean: $250,000
Median: $22,000

“The Michael Jordan Effect”
SOS: The Structure

Heading:
Approvals
Document Control Legend
- Cycle Time Data
- Takt
- WIP

Repeatable Steps

Periodic Functions

Visual / Diagram Area

Equip/Tools Required

QRA Change Approval

QRA Change Approval

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SOS: Audit & Change Control

Document Change Control Record section

Audit Record section

Change Details

Observations
Notes
Comments

<table>
<thead>
<tr>
<th>Date</th>
<th>Auditor / Reviewer</th>
<th>Operator</th>
<th>Observations / Comments</th>
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Batch vs. 1 Piece Flow: Exercise

Batch Process

Customer needs 10 envelopes delivered.

Process:

• Fold 10, then
• Stuff 10, then
• Seal 10, then
• Stamp 10

Standard Operating Sheet

<table>
<thead>
<tr>
<th>Step</th>
<th>Desc.</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fold</td>
<td>Get paper &amp; fold in thirds, 10X</td>
</tr>
<tr>
<td>2</td>
<td>Stuff</td>
<td>Get envelop &amp; stuff folded paper, 10X</td>
</tr>
<tr>
<td>3</td>
<td>Seal</td>
<td>Simulate sealing envelope, 10X</td>
</tr>
<tr>
<td>4</td>
<td>Stamp</td>
<td>Get stamp &amp; place on envelope, 10X</td>
</tr>
<tr>
<td>5</td>
<td>Finish</td>
<td>Place envelope, 10X</td>
</tr>
</tbody>
</table>
Batch vs. 1 Piece Flow: Video & Exercise

Batch Process

Customer needs 10 envelopes delivered.

Observations:

- Waiting
- Inventory (WIP)
- Defect potential
- Large batching = Chaos
- 5S
- Cycle Time: 4:25
Batch vs. 1 Piece Flow: Video & Exercise

1 Piece Flow Process

Customer needs 10 envelopes delivered.

Observations:

- Waiting
- Inventory (WIP)
- Defect potential
- Large batching = Chaos
- 5S
- Cycle Time: **3:29**
Full Cycle Time

Cycle Time

Start
Walking
Waiting
Setting Up

Finish
The Stopwatch: Exercise (practice)

<table>
<thead>
<tr>
<th>No.</th>
<th>Step</th>
<th>Step Elements</th>
<th>Observations</th>
<th>Avg Time (WIP)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fold</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stuff</td>
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<td>3</td>
<td>Seal</td>
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<tr>
<td>4</td>
<td>Stamp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Finish</td>
<td>Place envelope aside</td>
<td>#DIV/0!</td>
<td>#DIV/0!</td>
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<tr>
<td>6</td>
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</tbody>
</table>

Total process time for 1 process cycle: 260.9
The Stopwatch: Exercise (Pack-out Station)
# Leader Standard Work

<table>
<thead>
<tr>
<th>Role</th>
<th>% time spent daily on Standard Work</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Operations</td>
<td>10%</td>
<td>Time on the production floor to verify the chain of standard work is upheld and the production process is stable and improving.</td>
</tr>
<tr>
<td>Managers</td>
<td>25%</td>
<td>Monitor and support supervisors in their ability to carry out their standard work.</td>
</tr>
<tr>
<td>Supervisors</td>
<td>50%</td>
<td>Monitor and support leads in their ability to carry out their standard work.</td>
</tr>
<tr>
<td>Leads</td>
<td>80%</td>
<td>Maintain production and ensure standard work is followed by employees.</td>
</tr>
<tr>
<td>Employee</td>
<td>95%</td>
<td>Perform production activities described in standard work.</td>
</tr>
</tbody>
</table>
## Leader Standard Work

### Monthly Frequency
- **Daily**
- **Weekly**
- **Semi-Weekly**
- **Monthly**
- **Quarterly**
- **Annual**

### Task Notes
- If completed, place an “X” or “√” in the box below the day #.
- If completed, place an “X” or “√” in the box below the week #.
- If completed, place an “X” or “√” in the box below the week #.

### Manager Reviews

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Notes, Comments, Observations</th>
</tr>
</thead>
</table>

**Leader Standard Work Reviews & Signatures**

<table>
<thead>
<tr>
<th>Date</th>
<th>Manager</th>
<th>Notes, Comments, Observations</th>
</tr>
</thead>
</table>

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Takt: A Plan vs. Actual Control
(A Hands-on Experience Learning Module)
Pre-Readings

1. Plan vs. Actual – The Swiss Army Knife of Charts

2. Takt Time vs. Cycle Time

3. Does Your Cycle Time Have A Weight Problem?

4. Ban the Stop Watch!

5. Takt Time in Service Operations
Takt Time Challenge: Example

Assumptions:
- Produce 1 Product
- Run 1 Shift
- Work 5 Days / Week
- Work 9 Hours / Day
- 75 min of Non-Productive Time
  - 30 min Lunch
  - 30 min Break
  - 15 min Planned Down Time

What’s The Takt Time?

Not as easy as Lean books make it out to be!
The Formulas

Exit Rate = \( \frac{\text{Work-in-Process}}{\text{Process Lead Time}} \) = Little’s Law

Takt Time = \( \frac{\text{Net Available Time}}{\text{Customer Demand}} \)

Takt Rate = \( \frac{\text{Customer Demand}}{\text{Net Available Time}} \)

Labor = Takt Rate \times \text{Cycle Time}
The Basics

Takt Rate = 10 units/Hr

Takt Rate = 0.167 units/min

SOS A
4 min

SOS B
5 min

SOS C
3 min

SOS D
8 min

Takt Time = 6 min

Labor = Takt Rate x Cycle Time

units/min  min/cycle

Labor (A) = 0.167 x 4 = 0.667
Labor (B) = 0.167 x 5 = 0.833
Labor (C) = 0.167 x 3 = 0.500
Labor (D) = 0.167 x 8 = 1.333

Total Labor = 3.3 Operators
Takt Time vs. Cycle Time: Example

(Resource Requirement)

<table>
<thead>
<tr>
<th>Customer Demand</th>
<th>Takt Times</th>
<th>Independent Processes</th>
<th>Cycle Time</th>
<th>Labor #</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>0.2 hr 12 min</td>
<td>A</td>
<td>30 min</td>
<td>2.5</td>
</tr>
<tr>
<td>8</td>
<td>1 hr 60 min</td>
<td>B</td>
<td>30 min</td>
<td>0.5</td>
</tr>
<tr>
<td>160</td>
<td>0.05 hr 3 min</td>
<td>C</td>
<td>15 min</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>0.4 hr 24 min</td>
<td>D</td>
<td>90 min</td>
<td>3.8</td>
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</table>

Dependent Processes

8 hrs.
Available Working Time
480 min

Theoretical Actual
12.94 14
Standard Work & Takt: Case Study

Standard Operation Sheet

Tax Return Review Process

Unit of Measure: Seconds

Process Cycle Time: 498

Takt Time: 25

Standard WIP Symbol: 1

Critical Operation: 1

Quality Check: 1

Safety Element: 1

Work Steps: 6

User Defined: 1

Storage Location:

Date: [Blank]

Department: [Blank]

Posting Location: [Blank]

Process Name: Tax Return Review Process

Process Owner: [Blank]

Approvals:

Shift: [Blank]

Supervisor: [Blank]

Manager: [Blank]

Start:

1st

2nd

3rd

End:

1

2

3

Step No.

Element of Operation (brief description)

Manual Work

Mech Time

Walk Time

TT = Cycle Time

IR = Cycle Time

Resources Required: 3.46

Equipment and Tools Required: [Blank]

Cycle Time: 8.3 min

80%

4 Resources

Total Process Cycle Time: 498 0.0

Seconds 0.0
Reference Material
<table>
<thead>
<tr>
<th>Time</th>
<th>Session 1</th>
<th>Time</th>
<th>Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>H.E.L.P. Overview (Purpose &amp; Objective)</td>
<td>8:30</td>
<td>Brain Teasers / The True Meaning of Kai Zen (video clip)</td>
</tr>
<tr>
<td>8:45</td>
<td>Roundtable Introductions. (What do you expect to gain from workshop?)</td>
<td>8:45</td>
<td>Review any 5S or Standard Work Q&amp;A</td>
</tr>
<tr>
<td>9:00</td>
<td>5S Module (with Letter's Group Exercise)</td>
<td>9:00</td>
<td>SOS Exercise (Cycle Time at the Gemba, Time Observation Form)</td>
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<td>9:15</td>
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<td>9:45</td>
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<tr>
<td>10:00</td>
<td></td>
<td>10:00</td>
<td>Create / Document the SOS</td>
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<tr>
<td>10:15</td>
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<td>10:30</td>
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<tr>
<td>10:45</td>
<td>5S Audit &amp; Tracking toolkit. (allow for discussion)</td>
<td>10:45</td>
<td>Review SOS results</td>
</tr>
<tr>
<td>11:00</td>
<td>View Boeing 5S video (25min)</td>
<td>11:00</td>
<td>Leader Standard Work</td>
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<td>11:30</td>
<td>Create personal LSW</td>
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<td>LUNCH</td>
<td>12:00</td>
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<td>13:00</td>
<td>Lean Standard Work Module (with Lean House Exercise)</td>
<td>13:00</td>
<td>Takt Module / “I Love Lucy” - Chocolate Factory (video clip)</td>
</tr>
<tr>
<td>13:15</td>
<td>SOS, Time Observation Form, Audit</td>
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<td>13:45</td>
<td>Floor Tour (focus on 5S, Standard Work, Takt, Visual Mgmt at the Gemba)</td>
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<tr>
<td>15:00</td>
<td>Batch vs One Piece Flow video</td>
<td>15:00</td>
<td>Takt Time Challenge</td>
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<tr>
<td>15:15</td>
<td>Stop Watch use</td>
<td>15:15</td>
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<tr>
<td>15:30</td>
<td>Cycle Time Exercise (with Stop Watch)</td>
<td>15:30</td>
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<td>15:45</td>
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<tr>
<td>16:00</td>
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<td>16:00</td>
<td>Takt Time Case Study Exercises</td>
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<tr>
<td>16:15</td>
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<td>16:15</td>
<td>H.E.L.P. Workshop Q&amp;A (SharePoint site)</td>
</tr>
<tr>
<td>16:30</td>
<td>Review Day 2 objectives</td>
<td>16:30</td>
<td>Wrap-up</td>
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TOPIC SUMMARY

**Topic:** Hands-on Execution of Lean Principles (H.E.L.P.)

**Presenter:** Luis Loya, Master Black Belt, Cardinal Health

**Level:** Beginner

Many corporate Lean Six Sigma training programs do an excellent job with teaching six sigma methodologies and tools but sometimes fall short of providing an in-depth fundamental understanding of practical lean concepts and principles. At Cardinal Health, a supplemental workshop style training has been developed for the purpose of closing this gap and to expand lean skills in 5S, Standard Work and Takt in a hands-on environment. This session will examine the strategy, content, tools and the exercises from this two day workshop style training. Attendees will also have an opportunity to participate and experience an abbreviated version of the interactive hands-on exercise for 5S.