Beyond the lean tool basics: Creating and sustaining a global lean culture

Matt Swain
Global Director, Enterprise Lean Six Sigma
Littelfuse, Inc.
Protect | Control | Sense — A Global Approach

- Founded in 1927
- Introduced many innovative, industry-first technologies
- Today
  - 10,000+ employees worldwide
  - $1.1 Billion in 2016 net sales
  - Publicly held: LFUS (NASDAQ)
  - More than 40 locations worldwide:
    - Americas
    - Europe
    - Asia

Protect
- Today’s sophisticated electronics require greater protection from ESD, power surges and other occurrences
- Handle more power in smaller products
- Innovative circuit protection solutions

Control
- Safely and efficiently control power in even the harshest environments
- Limit equipment damage and minimize electrical hazards
- Improve productivity and reduce costs

Sense
- Sensing technologies are increasingly used to support complex electronic systems
- Broad platform of technologies help improve product performance, comfort, convenience and safety

Lean starts here... 2011 in earnest...
Strategy and Enterprise Lean Six Sigma

2012 Revenue: $668 million

2016 Revenue: $1,056 million

2021 Target: Double Digit Annual Revenue Growth
Operational Excellence: A Foundational Element of Our Success; Recognized Externally

- Lean Six Sigma Culture
- Manufacturing Excellence
- Operating System
- New Product Introduction
- M&A Integration
- Supplier Excellence Award
- Supplier Quality Excellence Award
- Supplier Quality Award
- Best Delivery Supplier Award
- Quality Achievement Award
Lean Enterprise 2011 (start)

- 4 corporate associates dedicated to lean enterprise
- 35 additional semi-dedicated associates globally
Littelfuse Lean Enterprise – Doing Lean

- Value Stream Maps
- A3
- 6S
- LSGA
- Pull
- Flow
- VOC
- SIPOC
- Standard Work
- More...

Lean Manufacturing & Operations 2012
Littelfuse Lean Enterprise – Doing Lean

- OEE
- Autonomous Maintenance
- Preventive Maintenance
- Predictive Maintenance
- SMED
- More...

2013 Lean Manufacturing & Operations
Littelfuse Lean Enterprise – Doing Lean

- VA/VE
- 3P
- Lean NPD Events
- Risk Management
- Critical-to-Cost
- Critical-to-Quality
- More...

Lean Manufacturing & Operations
Lean New Product Development
Total Productive Maintenance

2014
Littelfuse Lean Enterprise – Doing Lean

- Lean Manufacturing & Operations
- Lean New Product Development
- Total Productive Maintenance
- Six Sigma

- DMAIC
- DOE
- Control Plans
- FMEA
- MSE
- Correlation
- More...

2015
2016
### Today’s Phases of Training

<table>
<thead>
<tr>
<th>At Start (2011)</th>
<th>Now</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week A</td>
<td>Phase 1: A3, Gemba Guide, Hoshin Kanri, LSW, Tiered Meetings</td>
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<tr>
<td>Week B</td>
<td>Phase 2: 6S, LSGA, TPM, SMED, OEE, Std Work, Poka Yoke, VOC</td>
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<tr>
<td>Week C</td>
<td>Phase 3: Coaching, Kaizen, Quality at the Source, SIPOC, TQM, VSM</td>
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<tr>
<td>Week D</td>
<td>Phase 4: 3P, Little’s Law, Supply Chain, TWI</td>
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<tr>
<td>Week E*</td>
<td>Phase 5: Heijunka, Muri, Project Management, Pull, Kanban, VA/VE</td>
</tr>
<tr>
<td>Week F*</td>
<td>Phase 6: Lean NPD</td>
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<td></td>
<td>Six Sigma</td>
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*Week E started in 2014, Week F started in 2013*
Littelfuse Lean Enterprise – Being Lean

- Lean Manufacturing & Operations
- Lean New Product Development
- Lean Enterprise Culture
- Total Productive Maintenance
- Six Sigma

Number of Dedicated Lean Leaders:

- 2011: 30
- 2012: 50
- 2013: 70
- 2014: 80
- 2015: 90
- 2016: 100
- 2017: 120
Enterprise Lean Six Sigma Today

6 Corporate, 6 Regional and 82 ELSS Implementers & Leaders
Enterprise Lean Six Sigma Today

6 Corporate, 6 Regional and 82
ELSS Implementers & Leaders
ELSS = The Littelfuse CI Platform and Basis for LFOS

Lean

- Dongguan & Suzhou Receive 2017 AME Manufacturing Excellence Awards
- Certified Lean Contributors - 832
- Certified Lean Experts - 54
- Model Lines 12 of 17
- PFEF 14 of 17 sites participating
- TPM 12 of 17
- Lean Manager (Europe) Hired
ELSS = The Littelfuse CI Platform and Basis for LFOS

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Next

- ELSS Guide Revision 6
- Upgrades to Phase 1 – 6 Lean Training
- Finalize Corporate Hoshin Cadence
- Customer Interaction Training for Engineers
ELSS = The Littelfuse CI Platform and Basis for LFOS

- Yellow Belt Trained: 1619
- Green Belt Trained: 168
- Certifications in Process (77 have passed exam)
- Black Belt Training 1 Done in China
- Master Black Belt Projects in Process ($4.2 Million in Cost Impact)
ELSS = The Littelfuse CI Platform and Basis for LFOS

**Six Sigma**

- Yellow Belt Trained: 1619
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**Current**

**Next**

- Design for Six Sigma
- Limited Upgrade from Minitab to JMP
- Continue to Develop Regional Six Sigma Expertise
ELSS = The Littelfuse CI Platform and Basis for LFOS

- Lean Midyear Assessments
- Key LFOS Program Manager Role and Lean Leader Position Filled
ELSS = The Littelfuse CI Platform and Basis for LFOS

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Current

Next
**ELSS = The Littelfuse CI Platform and Basis for LFOS**

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<th><strong>Six Sigma</strong></th>
<th><strong>LFOS</strong></th>
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# Littelfuse Operating System

## OPERATIONAL EXCELLENCE: EVERYONE, EVERY DAY, EVERYWHERE

### STRATEGIC OBJECTIVES
- Customer Satisfaction
- Flawless Product Introduction
- Acquisition Integration
- Order to Cash Acceleration
- Sustainable Pipeline of Best Talent

### PRINCIPAL OPERATIONAL CAPABILITIES
- Talent Management
- 5-Phase Product Development
- Quality Management System
- Centers of Excellence
- Corporate Social Responsibility
- Enterprise Lean Six Sigma
- Category Management
- Integration Playbook
- Information Technology
- Sales & Operations Planning

### RESULTS
- Safety Incidents ↓
- Customer Complaints ↓
- On Time Delivery ↑
- Cash Conversion Cycle ↓
- Productivity ↑
- Employee Engagement ↑

### CORPORATE VALUES
Customer Focus, Results Driven, Teamwork, Integrity, Innovation.

### OPERATIONS VALUES
Data Driven, Engaged, Forward-looking.

### QUALITY VISION

### CONTINUOUS IMPROVEMENT CULTURE
Think Lean. Reduce Variation (6σ).
# Big-impact examples

## Lean VSM Round 1-6, EBU

<table>
<thead>
<tr>
<th>Measure</th>
<th>1st Round</th>
<th>6th round</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor Space (M²)</td>
<td></td>
<td></td>
<td>-13%</td>
</tr>
<tr>
<td>Capacity (5 days, 2 shifts)</td>
<td></td>
<td></td>
<td>23%</td>
</tr>
<tr>
<td>Margin</td>
<td></td>
<td></td>
<td>600%</td>
</tr>
<tr>
<td>Productivity (units/hour)</td>
<td></td>
<td></td>
<td>71%</td>
</tr>
<tr>
<td>OEE</td>
<td>65%</td>
<td>89%</td>
<td>37%</td>
</tr>
<tr>
<td>Cycle Time (seconds)</td>
<td></td>
<td></td>
<td>-32%</td>
</tr>
<tr>
<td>Number of Operators</td>
<td></td>
<td></td>
<td>-49%</td>
</tr>
</tbody>
</table>

## Six Sigma: Automotive Fuse

- High temperature application 160ºC vs. traditional 130ºC
- Increase safety margin for all automotive customers
- Prevent risks of terminal relaxation and melted fuses
- Design of Experiment applied to analyze effect of variables to gap and forces

**IMPACT:** Pleased Customer with the NPD process & develop an additional market opportunity with no competition!
## Big-impact examples

### Lean VSM Round 1-6, SBU

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<th>6th round</th>
<th>% Change</th>
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<tr>
<td>Floor Space (M²)</td>
<td></td>
<td></td>
<td>-11%</td>
</tr>
<tr>
<td>Capacity (K/day)</td>
<td></td>
<td></td>
<td>26%</td>
</tr>
<tr>
<td>Output (EA) per year</td>
<td></td>
<td></td>
<td>41%</td>
</tr>
<tr>
<td>Productivity (units/hour)</td>
<td></td>
<td></td>
<td>65%</td>
</tr>
<tr>
<td>Cycle Time (hours)</td>
<td></td>
<td></td>
<td>-8%</td>
</tr>
<tr>
<td>Number of Operators</td>
<td></td>
<td></td>
<td>-18%</td>
</tr>
<tr>
<td>OEE (CLIP 3S)</td>
<td>68%</td>
<td>93%</td>
<td>37%</td>
</tr>
</tbody>
</table>

### Six Sigma: Sensor Product

- 30% yield attempting to produce at rate; improved to 95%
- Applied several experiments to find root cause(s)

**Impact:** $3.7M / year
Lean 4.0 Assessments (TNM)

- **2016 Year End**
- **2017 Lean 4.0 Midyear**
- **2017 Lean 4.0 Goal**

<table>
<thead>
<tr>
<th>Location</th>
<th>2016 Year End</th>
<th>2017 Lean 4.0 Midyear</th>
<th>2017 Lean 4.0 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wuxi</td>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Dongguan</td>
<td>7</td>
<td>7</td>
<td>6</td>
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<tr>
<td>Suzhou</td>
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<td>Lipa City</td>
<td>7</td>
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<tr>
<td>Piedras IBU</td>
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<td>Tsukuba</td>
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<td>Piedras ABU</td>
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<td>Kaunas</td>
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<td>Matamoros</td>
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<td>Kunshan</td>
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<td>Legnago</td>
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<tr>
<td>Rapid City</td>
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<td>6</td>
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<tr>
<td>Saskatoon</td>
<td>7</td>
<td>7</td>
<td>6</td>
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</tbody>
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Successes

• Culture change (doing lean to being lean)
• Steering Committee: CEO, CLHRO, SVP Ops, VP Quality
• AME Awards
  2016: Wuxi, China
  2017: Dongguan, China
    Suzhou, China
• Nearing 900 lean certifications outside the 1%
Lessons Learned

• Get buy-in and develop pull
• Littelfuse “advanced” topics should be done in advance
• Lean is a culture with tools, not a tool set
• Pillage then burn (lean tools then Six Sigma)
• Focus on the willing, others will see the results creating pull
What is Next?

• Driving the existing facilities to assessment scores of 9+
• Starting from scratch with new acquisitions and accelerating their improvement
• Adding Marketing- and Sales-specific tools
• Adding DFSS and Master Blackbelt training and certification
Discussion Leads

3P
Matt Swain
Global Director ELSS

Six Sigma
Kevin Kent
Global ELSS Manager

Hoshin Kanri
Ellen Sieminski
Global ELSS Manager

Tiered Meetings
Noe Manriquez
North America ELSS Manager

Leader Standard Work
Scott Webber
China ELSS Manager
Thank You!

Your opinion is important to us!

Please take a moment to complete the survey using the conference mobile app.

Session No: ThS/53
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mswain@littelfuse.com