Implementing Lean on a Global Scale

Succeeding through Diversity of Products, Processes and People

Berlin, Germany - November 28, 2017
Luvata Special Products

Five Business Units

<table>
<thead>
<tr>
<th>Business Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formed Products</td>
<td>Leader supplier of <strong>welding electrodes</strong> to the <strong>automotive industry</strong> with a footprint on four continents.</td>
</tr>
<tr>
<td>Superconductors</td>
<td>Global leader of high value-add <strong>superconducting wire</strong> to high-growth <strong>MRI</strong> market.</td>
</tr>
<tr>
<td>Electrical Power Americas</td>
<td>World’s leading fully-integrated producer of <strong>copper alloy wire</strong>, and supplier of choice for <strong>demanding applications</strong> such as alkaline batteries, ordnance and photovoltaic.</td>
</tr>
<tr>
<td>Pori Special Products</td>
<td>High-quality integrated producer of products and solutions for the <strong>metals and electrical industries</strong>.</td>
</tr>
<tr>
<td>Electrical Power Asia</td>
<td>Leading supplier in <strong>South East Asia</strong> of busbars and anodes as well as photovoltaic ribbons.</td>
</tr>
</tbody>
</table>

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Our Global Footprint

1300 employees  12 locations  7 countries
Vision
We will use our unique technology know-how to influence the development of a sustainable modern world.

KEY GROWTH STRATEGY ELEMENTS

Build on distinct strengths
Focus on technically demanding products

Grow in adjacent markets
Geographical, complementary products and similar technologies

Partnerships beyond metals
Joint development teams, extend non-production offering

CORE COMPETENCIES

Innovation
Structured road map to new product and process development

Procurement
Customer driven, agile sourcing

Production
Lean methodology
Luvata Production System (LPS)

Sales
Structured sales process
Application engineer mentality

Open mindset
Passion for results
Delivering on our promises

People
Global LPS Team

Richard Hainrihar
Americas

Alejandro Tassara
Europe

Vincent Li
Asia

Tara

Christina

Nelly

Markku

Nicola

Bob

Roberto

Steve

Jari

Ariff

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Our LPS Journey

The journey of a thousand miles begins with a single step.

*Chinese Proverb*

2007
Developed a Lean Production System for our business

2008
Conduct Lean Transformations at each location on selected value streams

2010
Companywide learning, communication, benchmarking, and shared experiences

2012
LPS Audit Program developed and administered globally

2016
Focus up and down the supply chain, working with suppliers and customers
2007: LPS Vision, Principles, and Objectives

Our Vision

Empower capable people to operate high performing businesses by continually reducing waste.

Why we exist

Our Principles

What guides us

Our Objectives

What success looks like
LPS applies 4 critical components

- **People**
  - *Influence* mindsets and behaviors and build skills to develop **capable people** who believe in the improved way of working

- **Process Excellence**
  - *Manage* our assets to improve **overall equipment effectiveness** and built-in quality

- **Performance Management**
  - *Align* our organization to support the new operating system so that systems are in place to **manage performance** and drive the improvements

- **Flow**
  - *Configure* our assets so material and information can **flow** through our operations
Luvata Production System Plant Guide

People
- Continuous Improvement
- Skill Building
- Culture
- Safety
- Review Practice
- Solving Problems
- Raising Problems
- Target Setting
- Visual Control
- Responsibility and...

Performance Management
- Standard Operations
- Workplace/5S

Flow
- Plant Design
- Flow Philosophy
- Interval Planning
- Sequence
- Inventory Mgmt
- Pull
- Customer Orientation
- Process Philosophy
- Built-in-quality
- TPM
- OEE
- Labour Productivity
- Continuous Improvement
- Work/5S
- Standard Operations

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2008: LPS Transformation Approach

LPS waves

- Flow
  - Select focus area

- Performance Management
  - Train management

- Process Excellence
  - Initiate data collection

- People Development
  - Run introductory workshops

Prepare LPS Transformation (3-6 months)

16 weeks

- Diagnose (2 weeks)
- Design (2 weeks)
- Implement (10 weeks)
- Refine (2 weeks)
The plant prepares for its pilot transformation through five steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Timeframe</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Send navigator ahead</td>
<td>6 months in advance</td>
<td>Navigator must gain sufficient experience of critical success factors for a lean implementation in order to become plant’s leading lean representative and spokesperson.</td>
</tr>
<tr>
<td>2. Select pilot area</td>
<td>3 months</td>
<td>Area must be selected before appropriate change team is recruited and local management informed.</td>
</tr>
<tr>
<td>3. Select LPS team</td>
<td>2 months</td>
<td>Lean team members must hand over previous responsibilities (and pilot’s chain of command should also free-up time where appropriate).</td>
</tr>
<tr>
<td>4. Train personnel</td>
<td>2 months</td>
<td>Lean team should have initial training before facilitating data collection.</td>
</tr>
<tr>
<td>5. Measure performance data</td>
<td>1 month</td>
<td>Sufficient performance data must be captured before pilot starts.</td>
</tr>
</tbody>
</table>
LPS and Local Management:

**LPS Team**
- LPS Director
- Guest Navigator
- Local Navigator
- Change Agent 1
- Change Agent 2

**Local Mgmt**
- GM/Plant Manager
- Operations Manager
- HR Manager
- Supervisor
- Planner
- Engineers

**Typical Profile for Navigator**
- Highly Respected
- Highly capable (Rising star within plant mgmt)
- Excellent analytical and problem-solving skills
- Able to drive a team through uncharted territory

**Typical Profile for Change Agent**
- Highly respected
- Good knowledge of processes
- Good interpersonal skills
- Self-starter with positive *can-do* attitude

**Important!**
The LPS Team has no decision-making authority; this stays with the local chain of command. It may therefore be necessary to free up some time for the chain of command (especially production and planning roles).
LPS Transformation Approach

**LPS waves**

- **Prepare LPS Transformation**
  - (16 weeks)

- **Diagnose**
  - (2 weeks)
  - • Select focus area
  - • Map product flows

- **Design**
  - (2 weeks)
  - • Dedicate product flows
  - • Establish KPI's
  - • Introduce performance boards

- **Implement**
  - (10 weeks)
  - • Rearrange inventory path
  - • Flush out excess inventory
  - • Introduce daily meetings on the shop floor

- **Refine**
  - (2 weeks)
  - • Develop flow update procedures
  - • Develop system reviews
  - • Institute focused problem solving
  - • On-the-job training

**Process Excellence**

- • Initiate data collection
- • Identify bottlenecks and quality issues
- • Calculate improvement potential with new product flows
- • Institute focused problem solving
- • Plan further roll-out of OEE or 6-sigma events

**Performance Management**

- • Train management
- • Understand current measurements/performance processes
- • Establish KPI's
- • Introduce performance boards
- • Introduce daily meetings on the shop floor
- • Develop system reviews

**People Development**

- • Run introductory workshops
- • Map skill levels and required improvement areas
- • Tailor training programs
- • On-the-job training
- • Evaluate skill levels and define future development programs

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Luvata Special Products
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2010: Share the knowledge and experiences

- Leadership and coordination
  - President
  - Director Americas
  - Director Europe
  - Director Asia

- Annual conference

- SharePoint site

- Benchmarking
2012: LPS Audit Program

Why?
- Encourage and invigorate LPS efforts across all Business Units
- Evaluate facilities against a common ‘lean’ standard
- Outline steps in order to reach this standard

When?
- Every 12-24 months

Where?
- On-site at each Luvata location that has completed their LPS pilot transformation

How?
- Conducted by LPS Office
- 1 to 3 days visit per plant
- Interviews, observations and assessment based on LPS Plant Guide
Key Contributor to Success
A Robust Performance Management Program
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- KPI's to Individuals
- Target Setting

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- KPI's to Individuals
- Target Setting
- Raising Problems

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- KPI's to Individuals
- Target Setting
- Solving Problems
- Raising Problems

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Key Contributor to Success
A Robust Performance Management Program

- Structured approach
- All elements engaged simultaneously

• Reviews
• KPIs for Individuals
• Visual Management
• Target Setting
• Solving Problems
• Raising Problems
Main contributors to success:

Correlation Study: Overall Score vs. each LPS Plant Guide Element

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>90%</td>
<td>-</td>
</tr>
<tr>
<td>88%</td>
<td>-</td>
</tr>
<tr>
<td>86%</td>
<td>-</td>
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<tr>
<td>84%</td>
<td>-</td>
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<tr>
<td>82%</td>
<td>-</td>
</tr>
<tr>
<td>80%</td>
<td>-</td>
</tr>
<tr>
<td>78%</td>
<td>-</td>
</tr>
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Main contributors to success:

Correlation Study: Overall Score vs. each LPS Plant Guide Element

- Raising Problems: 78%
- OEE: 82%
- Workplace 5S: 86%
- SOP/WI's: 88%
Main contributors to success:

Correlation Study: Overall Score vs. each LPS Plant Guide Element

- Raising Problems: 78%
- OEE: 80%
- Workplace 5S: 82%
- SOP/WI's: 84%
- Culture: 86%
- Overall Score: 88%
- Expected Score: 90%
Culture is the difference between good and *great*!

- Everyone has a voice
- Everyone is welcome
- Mgmt support of new ideas
- Accountability
- We are ‘FAMILY’
- Celebrating Together
## Achievements to date

<table>
<thead>
<tr>
<th>Category</th>
<th>Achievement</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>Safer work environments through pro-active ‘near-miss’ corrections</td>
<td>45% reduction in accidents</td>
</tr>
<tr>
<td>Quality</td>
<td>Reduced costs, through reliability and repeatability</td>
<td>67% reduction in defects</td>
</tr>
<tr>
<td>Customer Service</td>
<td>Meet the needs of the market through improved operational effectiveness</td>
<td>50% improvement in OTIF and Lead Time</td>
</tr>
<tr>
<td>Capacity</td>
<td>Opportunity to liberate capacity to drive sales</td>
<td>52% improvement in OEE</td>
</tr>
<tr>
<td>Release tied up capital</td>
<td>Ability to operate reliably with less inventory</td>
<td>55% reduction in inventory</td>
</tr>
<tr>
<td>Penetration</td>
<td>Deep implementation of LPS, lasting change</td>
<td>85% of our business</td>
</tr>
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Thank you