Sustaining a Lean Transformation in Complex Server Assembly and Test Organization

Nominee: Leadership Team, IBM Integrated Supply Chain Operations, Poughkeepsie, NY
Outline of Presentation

- Problem Statement
  - Burning Platform
  - Vision of Success

- Path Forward to Business Transformation Overview
  - Integrating Process Excellence and Cultural Transformation

- Lean Deployment Framework
  - Assessment and Hoshin Planning
  - SMART Lean Skills
  - 14 Lean principles and the Circumplex

- Lean Tools and Techniques employed

- Implementation and Results
  - Success Stories and Benefits of the Lean Deployment
Background of Domain

- High-end server assembly and manufacturing
  - Fabrication-fulfillment environment
    - Combines *build-to-plan* with *make-to-order* operations
  - Continuous quest for decreasing time to market and cycle time
  - Components extremely expensive, high inventory carrying costs
  - Extreme demand skews, constant engineering changes, long lead-times
  - Assembly/manufacturing process has high energy requirements
    - e.g.: Cooling water, thermal chambers requirements
  - *Short product life cycle – new product introduction challenge*
**Approach to a Successful Change Initiative**

**Compelling Reason for Change**  
(Why leave where we are?)

**Vision**  
(Where do we want to go?)

**Transformational Leadership**  
(Who will take us there?)

**Change Plan**  
(How will we get there?)

**Enable advocates for change**  
(How will we enroll others to go where we want them to go?)

*Reference: Adapted form Dr. Marvin Washington*
Problem Statement – Burning Platform

What is our burning platform – Why leave where we are?

- Highly competitive marketplace coupled with the economic downturn in 2008-09

- Multiple new products introduced; varying complexity of design
  Inefficient and non-adaptive processes for these products causes delays in prototyping and launch

- Increasing cost to maintain facilities and infrastructure, with the constant business pressure to reduce operational costs

- Customers expectations are increasing for more performance, cost and quality

- Problems observed during design and manufacturing were dealt with as they appeared (reactive) versus being proactive

- Employee morale and engagement declining
Vision of Success

- We are an organization of Self-Driven and Personally Motivated Employees deeply engaged and bought in to Key Lean Initiatives (5S, Kaizen, Gemba, etc) and local, everyday Lean Implementation which drives continuous improvement and achieves strong business results; which include:

  - Broad and Effective Training that reaches the entire Mfg Organization as well as extending into supplemental employees, sub-contractors, Engineering, and other Support Groups

  - Public, consistent, and timely recognition system that reinforces and rewards Lean progress and success

  - The plant is formally recognized as the most Lean/Cost effective site in the Supply Chain

  - Restructuring our internal management systems and Advanced Manufacturing Science tactics to proliferate LEAN at a working level and “lower the center of gravity” for core skills

  - A Common, Shared Alignment and Understanding of LEAN Goals and Cost Objectives across all Organizations

  - Improved Morale and Trust across the Organization
Defining the Change Plan
The Path Forward Approach to Business Transformation

Adaptive Culture

People

Success

Process Excellence

Process

Technology

Transformational Leadership

Path Forward Change Paradigm

Learning

Business Performance

Building Organizational Capabilities for Business Transformation

Innovation and continuous improvement enabled through process excellence and high performing organization culture
Aligning the Organization to Achieve the Vision

The Path Forward approach works with the senior leadership team to implement a ‘People-centric’ Balanced Scorecard.

“Teach your associates to teach themselves and in that way you will strengthen the entire organization”

Thomas J Watson (1947)
Organizational Culture Inventory® (OCI)
Circumplex with a Brief Description of the 12 Styles

**Self-Actualizing**
Members are expected to gain enjoyment from their work and produce high-quality products/services.

**Humanistic-encouraging**
Members are expected to be supportive, constructive, and open to influence in dealing with others.

**Achievement**
Members are expected to set challenging but realistic goals and solve problems effectively.

**Affiliative**
Members are expected to be friendly, open, and sensitive to the satisfaction of the work group.

**Perfectionistic**
Members are expected to avoid making mistakes, work long hours, and keep “on top” of everything.

**Approval**
Members are expected to agree with, gain the approval of, and be liked by others.

**Competitive**
Members are expected to operate in a “win-lose” framework and work against their peers to be noticed.

**Conventional**
Members are expected to conform, follow the rules, and make a good impression.

**Power**
Members are expected to take charge and “control” others, and make decisions autocratically.

**Dependent**
Members are expected to do what they are told and clear all decisions with supervisors.

**Oppositional**
Members are expected to gain status and influence by being critical and constantly challenging one another.

**Avoidance**
Members are expected to shift responsibilities to others and avoid being blamed for mistakes.

**Styles of Behaviors Required to “Fit-in”**
Why Focus on Process? 14 Lean Principles* and the OCI Circumplex

- Base your management decisions on a long-term philosophy, even at expense of short-term financial goals.
- Develop exceptional people and teams who follow your company's philosophy.
- Standardized tasks and processes: continuous improvement and employee empowerment.
- Become a learning organization through relentless reflection and continuous improvement (kaizen).
- Build a culture of stopping to fix problems, to get quality right the first time.
- Grow leaders who thoroughly understand the work, live the philosophy, and teach others.
- Respect your extended network of partners and suppliers by challenging them and helping them improve.
- Use visual control so no problems are hidden.
- Use "pull" systems to avoid overproduction. Level out the workload (heijunka).
- Go and see for yourself to thoroughly understand the situation (Genchi Genbutsu).
- Create a continuous process flow to bring problems to the surface.

The need for empowering employees to affect their processes is key for a constructive culture.

Our Deployment Model: Engaging People to Transform Processes Critical to Business Transformation

- Focus on Continuous Improvement and Learning
- Engaged Employees & Suppliers, Generate Business Value
- Fundamental Lean Thinking – “Seeing & Eliminating Wastes”
- Starts with Transformational Leadership

Engaging employees directly contribute to improving constructive styles, reducing passive/aggressive styles → Transforming culture and generating business value
SMART Lean Assessment (SLA) was conducted in conjunction with the OCI to understand the organization’s process and technology maturity.
Deployment Strategy

**STAGE 1:**
Readiness for Change

- The “Burning Platform”
- Balanced Scorecard, Lean Assessment, & Global Competition

**STAGE 2:**
Skills Development

- Lean Transformation Plan
- Lean Transformation Skills Development and Deployment

**STAGE 3:**
Continuous Learning

- Bottoms-up Kaizens
- Continuous Employee Skills Development

**Organization Vision of Success**

**Leadership Commitment**

**Define Success, Success Measures, Barriers and Top Actions for Success**

**Transformational Leadership Development Roadmap**

**Preferred OCI**

**Gemba & Kaizens are the engine for continuous improvement**
**IBM Path Forward Business Transformation – Results**

ISC HE Server Manufacturing Operations, Poughkeepsie

<table>
<thead>
<tr>
<th>Cultural Performance Index - CPI</th>
<th>2004</th>
<th>2007</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Performance</td>
<td>Under Plan</td>
<td>Under Plan</td>
<td>Exceeded Plan</td>
</tr>
<tr>
<td>Inventory Management</td>
<td>Under Plan</td>
<td>Under Plan</td>
<td>Exceeded Plan</td>
</tr>
<tr>
<td>Quality Performance</td>
<td>Under Plan</td>
<td>Improving</td>
<td>Exceeded Plan</td>
</tr>
<tr>
<td>Lean Process Maturity</td>
<td>Score: 2/5</td>
<td>Score: 3.1/5</td>
<td>Score 3.9/5</td>
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<tr>
<td>Leadership CPI</td>
<td>245</td>
<td>358</td>
<td>728</td>
</tr>
<tr>
<td>Employee Satisfaction</td>
<td>3.62/5.00</td>
<td>3.68/5.00</td>
<td>3.71/5.00</td>
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<tr>
<td>Kaizens/# Ideas</td>
<td>0/20</td>
<td>0/80</td>
<td>46/300</td>
</tr>
<tr>
<td># Employees Trained</td>
<td>10 (&lt;3%)</td>
<td>30 (&lt;10%)</td>
<td>220 (55%)</td>
</tr>
</tbody>
</table>

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An adaptive culture + process excellence consistently produce superior business results
Patents and Publications

- 22 Publications at IIE Annual Conferences (2007-10)
  - One publication won the best of the simulation track

- 10 Publications at the American Society of Engineering Management Conference (2008-10)

- 1 Publication at the IEEE Winter Simulation Conference

- 5 Patents (filed, pending)

Recent Recognition

- Assembly Magazine – Assembly Plant of the Year 2008

- Progressive Manufacturing 100 – 2011
Backup
Poughkeepsie LEAN Journey
Story of “Driving Continuous Improvement”

2004
Part-Time Team

2005
Part-Time Team

2006
Dedicated Lean Team

2007
Dedicated Lean Team

2008
Dedicated Lean Team

2009
Dedicated Lean Team

2010

- Lean Projects Delivered
- Productivity Gains
- Cultural Transformation
- Strategic Innovation

2004
- Part-Time Team
- Scheduling Oppty Analysis

2005
- Part-Time Team
- Oppty Analysis

2006
- Dedicated Lean Team
- $3 Million Cost Savings - Oppty Analysis
- Client Focus Tour Strategy
- 5S Plan “The Goal”

2007
- Dedicated Lean Team
- $7 Million (Tot) Cost Savings - Oppty Analysis
- 5S Deployment
- Green Supply Chain Team

2008
- Dedicated Lean Team
- $10 Million (Tot) Cost Savings - Oppty Analysis
- Organization Kaizen Plan and Kickoff

2009
- Dedicated Lean Team
- Lean Certification Programs (GS/B)

2010
- $11.5 Million (Tot) Cost Savings
- Oppty Analysis

Emphasis on:
- Strategic PLAN for NPI
- OCI Measurement
- Planning and Layout of new bldg
- Supplier Relations
- WW Smart Lean
- POKE YOKE Organization
- MGR LSI EXEC LIs
- New Bldg OPENING
- Standard Work
- GEMBA Deployment
- Innovation Hub
- OCI Measurement
Foundational Competencies: Lean Certification Levels

**GOLD LEVEL**

1. Pass the Gold Level Certification Examination
2. Lead or Actively Participate in 5 Lean TACTICAL* Projects
3. Coach and Mentor; Conduct Workshops or Kaizen Events using 8 Step
4. Lead or Actively Participate in 3 STRATEGIC# Projects

Gold practitioners help to lead the Lean deployment across an organization

**SILVER LEVEL**

1. Pass the Sliver Level Certification Examination
2. Lead or Actively Participate in 3 Lean TACTICAL* Projects
3. Coach and Mentor; Conduct Workshops or Kaizen Events using 8 Step

Silver practitioners Lead Lean Improvement Project teams

**BRONZE LEVEL**

1. Complete Class and Pass the Bronze Level Certification Examination
2. Lead or Actively Participate in 1 Lean TACTICAL* Project
3. Knowledge of 8 Step Structured Problem Solving

Bronze practitioners lead lean quick win opportunities and Kaizens

* - Deployment and application of lean principles, concepts and methods within a work cell, work group or value stream

# - Projects that demonstrate the transformation of a business or organization

Adapted from SME Lean Certification BOK
House of Lean - Concepts and Knowledge Elements

- **Lean Vision of Success**
- **Continuous Learning Organization**

### Capabilities & Skills
- **Strategic Planning**
  - Deployment Leadership & VSM Management
- **Information & Support Systems**
  - Decision Support Systems
  - QFD
  - Visual Control Board
  - Simulation Modeling
- **Pull Value & Streamline E2E Flow**
  - Pull Systems, Kanban
  - POUS
  - Single Unit Flow
  - Process vs. Functional Layout
- **Structured Problem Solving Plan-Do-Check-Act**
  - 8D Problem Solving & A3 Process Improvement
  - DMAIC & DFSS
  - FMEA
- **Basic Stability**
  - 5S, Visual Management
  - Standard Work Process Map, Value Add Analysis
  - Kaizen Events
- **Basic Knowledge (Getting Started)**
  - Lean 101 Core Team Training
  - Science of Mfg. Web Lectures
  - Leadership Book Clubs & Workshops

### House of Lean Building Blocks
- **Process Excellence**
- **Employee Empowerment**

- High Performing and Adaptive Culture
- Transformational Leadership

- Results Feed the Organization’s Balanced Score Card

- **Value**
  - Stream
  - Mapping
# Foundational Competencies: Kaizen Training

**Lean Best Practice Award**

**ISC Poughkeepsie, Manufacturing Operations**

**Published in 2010 IIE Annual Conference and Exposition, Cancun, MX**

*"The Role of Kaizen Events in Sustaining a Lean Transformation"*

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**A3 Flow down:** Aligning Kaizen Improvement Activities with Organizational Vision and Mission

Top Level Mission Flows Down to Lower Level Activities

- **Senior Leadership Team**
  - Mission/Vision ➔ Goals ➔ Initiatives

- **Functional Management**
  - Mission/Vision ➔ Goals ➔ Initiatives

- **Line Management**
  - Mission/Vision ➔ Goals ➔ Initiatives

- **Self-directed work teams (Kaizen Teams)**
  - Mission/Vision ➔ Goals ➔ Initiatives

### EIM

<table>
<thead>
<tr>
<th>Event</th>
<th>No. of Ideas Generated</th>
<th>No. of Ideas Implemented</th>
<th>No. of Ideas Sustained</th>
<th>Impact (Impact/Range)</th>
<th>EIM</th>
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<tbody>
<tr>
<td>Kaizen Event 1</td>
<td>23</td>
<td>19</td>
<td>14</td>
<td>0.8</td>
<td>0.37 *</td>
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<td>40</td>
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<td>41</td>
<td>38</td>
<td>0.5</td>
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<td>26</td>
<td>25</td>
<td>22</td>
<td>0.6</td>
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<td>28</td>
<td>21</td>
<td>19</td>
<td>0.6</td>
<td>0.55</td>
</tr>
<tr>
<td>Kaizen Event 6</td>
<td>46</td>
<td>42</td>
<td>37</td>
<td>0.7</td>
<td>0.56</td>
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*Conduct lessons learned and address low sustainability. Another Kaizen event is scheduled upon defining the scope.

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**GSI**

<table>
<thead>
<tr>
<th>Event</th>
<th>CPI Baseline</th>
<th>CPI After Kaizen</th>
<th>Improvement from Baseline (%)</th>
<th>CPI Sustain</th>
<th>Improvement from Baseline (%)</th>
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</thead>
<tbody>
<tr>
<td>Kaizen Event 1</td>
<td>238</td>
<td>452</td>
<td>52.06%</td>
<td>594</td>
<td>89.13%</td>
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<tr>
<td>Kaizen Event 2</td>
<td>321</td>
<td>399</td>
<td>24.36%</td>
<td>420</td>
<td>38.64%</td>
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<tr>
<td>Kaizen Event 3</td>
<td>245</td>
<td>362</td>
<td>45.92%</td>
<td>537</td>
<td>57.86%</td>
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<tr>
<td>Kaizen Event 4</td>
<td>311</td>
<td>489</td>
<td>60.46%</td>
<td>510</td>
<td>63.98%</td>
</tr>
<tr>
<td>Kaizen Event 5</td>
<td>328</td>
<td>308</td>
<td>20.36%</td>
<td>522</td>
<td>58.86%</td>
</tr>
<tr>
<td>Kaizen Event 6</td>
<td>281</td>
<td>478</td>
<td>70.11%</td>
<td>543</td>
<td>93.24%</td>
</tr>
</tbody>
</table>

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**Increased Team Based Decision Making**

"Safe" Environment for Employees for Idea Generation

High % of Solutions Implemented

**Employee Empowerment, Build on Ideas of Team**

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**Published in 2010 IIE Annual Conference and Exposition, Cancun, MX**

"The Role of Kaizen Events in Sustaining a Lean Transformation"
Foundational Competencies: 5S

- **Mission:** To utilize Poughkeepsie team ingenuity along with Japanese 5s concepts to implement organization, orderliness, and cleanliness for establishing a highly functional, visual, state-of-the-art manufacturing facility.

- **What are the goals and expectations?**
  - We will succeed in building a world class visual factory and “set the bar” for the future.
  - We will all buy-in to sustaining PACC and take personal responsibility for our work areas.
  - We will revitalize our factory in for our new product base.
Lean Best Practice Award

Pull and Streamline E2E Flow: Factory Layout

- Flow Matrix: A “one-stop-shop” matrix to re-layout a floor, using key factors, such as distances, frequency, transportation costs, resource utilization

**Flow Matrix**

<table>
<thead>
<tr>
<th>Shared Resource Symbol (SRS)</th>
<th>Opportunity Analysis Table (OAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contains Area-to-Area Proximity Indices</td>
<td>Proximity Index (PI)</td>
</tr>
</tbody>
</table>

**Process Interrelationship Matrix (PIM)**

**Resource Utilization Factors (RUF)**

**By-Area Cost Evaluator (BACE)**

**Transportation Mode Indicator (TMI)**

**Flow Matrix**

<table>
<thead>
<tr>
<th>Station 1</th>
<th>1A</th>
<th>1C</th>
<th>1B</th>
<th>1C</th>
<th>1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>1A</td>
<td>1C</td>
<td>1B</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>1C</td>
<td>1C</td>
<td>1C</td>
<td>1B</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>1B</td>
<td>1B</td>
<td>1B</td>
<td>1C</td>
<td>1C</td>
<td>1C</td>
</tr>
</tbody>
</table>

**OPPORTUNITIES**

Ease of movement

Ease should be 1A/B, 2C, 3C

For proximity 1 should be 3C

**AS-IS**

Opportunities in the Server Assembly Area, 67 Relationships Identified

TO-BE

Identified and Implemented 16 Proximity Improvements

Space Savings: **18.3K sqft**, Transportation Cost Savings: **$120K/yr**

IT Simplification/Reduction, Cycle Time Savings, WIP Reductions

Published in 2008 IIE Annual Conference and Exposition, Vancouver, BC

Strategic Planning: 3P and Simulation Modeling

- Integrated Design of Experiments (DoE) – Simulation modeling approach for making strategic decisions
  - DoE identifies the key factors that impact decisions
  - Simulation modeling can represent the randomness and uncertainty

Over $50 mil. worth business decisions have been made using modeling

Publications:
- 2008 IIE Annual Conference: Using Simulation Modeling to Establish Kanban Levels in a Server Manufacturing Environment (Won Best Paper in Lean Systems Track)
- 2008 IIE Annual Conference: Using Design of Experiments and Simulation Modeling to Study the Facility Layout for a Server Assembly Process
- 2008 Winter Simulation Conference: Using Design for Six Sigma and Simulation in a Server Manufacturing Process
- 2010 International Conference on ISO 9000 and TQM – ICIT

Note: In the 2011 IIE Annual Conference, a member of the team will be hosting the “Modeling to Support Lean Transformation” Session
Strategic Planning: Information Systems and Decision Support Systems
Using Lean and Agile Techniques to Eliminate *Muda*

**Demand/Constraint Supply Reports**
- Forecasts any demand and supply constraints to prevent production stoppage

**Value Stream Mapping**
- Identifies waste and optimizes processes

**Data Gathering**
- collects and analyzes information

**Eliminate Waste, Process Redesign**
- Improves efficiency and reduces waste

**Enable Cross-functional Teams, Voice of the Customer**
- Enhances collaboration and customer satisfaction

**Training Within Industry**
- (On-demand Training System)
- A one-stop-shop for employee skill development (online training/certification system)

**Innovation Hub**
- System for employees to submit ideas and collaborate on improvements

**Workflow and Information Flow Redesign**

**Standardization/Learning Tools**
- Enables continuous learning and improvement

**Enable IT Improvements**
- Adapts technology to resources

**Adapt Technology to Resources**
- Flexibility and adaptability to changes

**SMART Warehouse Management System**
- Resource Deployment Matrix
  - Flexible workforce

**Used Parts Inventory System**
- (Reverse Logistics)
  - Identifies the optimal part allocation policy for maximizing part life cycle (Greener products through reverse logistics)

**Resource Deployment Matrix**
- Identifies the most appropriate resource for a task based on skill, quality and complexity

**SMART Warehouse Management System**
- Defines a new real-time slotting principle for warehouses (IIE 2008, Patent Pending)
Continuous Improvement: GEMBA

- **Objective:** To Improve business efficiency by transforming the factory from current management process to *lean visual management process*
  - Using communication gemba boards and implementing shift to shift crossover and management gemba walk discipline

**Highlights:**

- Implemented in 2010 after 6S is in Sustain
- Reduced number of status meetings (impact of ~$0.5M a year in lost productivity)
- Reduced time from problem identification to problem resolution
- Employee empowerment: Eliminates time where employees are waiting for direction
- Integrated with 5S and TAKT Management System
Continuous Improvement: 8 Step Structured Problem Solving

- **8 Step Structured Problem Solving Methodology**
  - Uses qualitative process analysis tools, along with the seven quality tools

- **Focus on Quick Wins** to address problems and opportunities
  - 1-2 month projects

- **Empowers employees** to identify problems and implement containment actions and countermeasures

- **Increased collaboration** between teams as a result of team based problem solving

- **Improves constructive styles of behavior and reduces passive/aggressive styles**

- **Available learning resources**: Path Forward
  - 2 day workshop (face-to-face) or virtual delivery
  - Web lectures available for reference

- **Used organization wide** for quick major wins
  - Key enabler to GEMBA process
Balanced Scorecard of Poughkeepsie ISC Server Organization (2007-10)

<table>
<thead>
<tr>
<th>Process Excellence</th>
<th>Client Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Dedicated Process Improvement Team</td>
<td>▪ Flagship Site – Launching three new products</td>
</tr>
<tr>
<td>▪ Self Directed Work Teams (2010 strategy)</td>
<td>▪ Successful ‘Zero Pends’ Initiatives</td>
</tr>
<tr>
<td>▪ Kaizen Events, PACC and Strategic Initiatives</td>
<td>▪ Frequent Customer tours</td>
</tr>
<tr>
<td>▪ SMART Lean – WW Collaboration</td>
<td>▪ Green initiatives</td>
</tr>
<tr>
<td>▪ Standard Work on all Processes</td>
<td>▪ Assembly Plant of the Year Award (2008) and other recognitions (IP and Publications)</td>
</tr>
<tr>
<td>▪ Modeling and Simulation Competency</td>
<td></td>
</tr>
<tr>
<td>▪ Data Analysis and Reporting Competency</td>
<td></td>
</tr>
<tr>
<td>▪ Over $11.5 mil cost savings through Process Improvements (over $10 mil savings in 2004-05)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People Growth</th>
<th>Financial Excellence</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ People-centric initiatives – GEMBA, 5S/PACC</td>
<td>▪ Over $11.5 mil cost savings through Process Improvements</td>
</tr>
<tr>
<td>– Lowering “Center of Gravity” for Decision Making</td>
<td>– 2005 “Shoot for the Stars Award” ($1m cost savings)</td>
</tr>
<tr>
<td>▪ Lean Certifications for Manufacturing</td>
<td>▪ Successful building bring up (cost and competitive advantages): The new product family bring-up and product performance has been the faster than the predecessor</td>
</tr>
<tr>
<td>– 10 Silver Trained (generated ~ $500k in savings)</td>
<td></td>
</tr>
<tr>
<td>– 50+ Bronze Trained (projects under progress)</td>
<td></td>
</tr>
<tr>
<td>▪ Lean for Services – for support functions</td>
<td></td>
</tr>
<tr>
<td>▪ Innovation through Think-Place Ideas</td>
<td></td>
</tr>
<tr>
<td>▪ Kaizen Events empowering teams to implement new ideas (&gt;100 employees, &gt;300 ideas)</td>
<td></td>
</tr>
<tr>
<td>▪ Leading Lean for Managers (LSI’s and LI’s)</td>
<td></td>
</tr>
</tbody>
</table>
Current Culture – 2004 to 2010

- **Key Improvement Areas (from 2004 – 2010):**
  - Significant Improvement in Constructive Styles of Behavior
  - Substantial Reduction in Aggressive Styles of Behavior
  - Significant Reduction in Passive Styles of Behavior
  - **More than Doubled** the Culture Performance Index from 2004 and **18% increase** from 2007
Impact of Process Excellence on Improving Culture

- Successful Product Launches
- Setting the Lean Vision of Success

- Kaizen Events
- AMS Core Team
- Modeling and Simulation
- Data Analysis Team
- Strategic Initiatives

- SMART Lean WW Collaboration
- Innovation Council
- Think Place Ideas

- 6S, Gemba
- Kaizen Events
- AMS Core Team
- Poka-yoke Organization

- Cultural Transformation Program
- Strategic Initiatives
- SMART Lean

- Lean Certifications – Bronze, Silver, Gold
- 1st Line Manager “Leading Lean”
- Action Planning for Lean

- Over $11.5 mil. Cost Savings in Opportunity Analysis
- Self Directed Work Teams
- Process-related Patents and External Publications

- Leading Lean for Managers
- Self Directed Work Teams
  - Standard Work
  - Kaizen Events
  - Gemba, 6S

- Gemba, 6S
- Innovation Council and ThinkPlace
  - Kaizen Events

- Gemba, 6S
- LSI/LSI for Managers
- Innovation Council
- ThinkPlace, Kaizen Events

- Successful Product Launches
- Setting the Lean Vision of Success
Sustaining the Gains from Lean Deployment
How Do We Sustain Our Success?
Employee Engagement and Innovation Framework

Organizations provide a vehicle that allows employees to overcome business challenges.

- **Kaizen Events**
- **Scrum Meetings**
- **Innovation Council**
- **5S Teams**
- **Green Teams**
- **Self-directed Improvement Teams**

**Strategic Initiatives**

- **Innovation Council**
- **Kaizen Events**
- **Scrum Meetings**
- **5S Teams**
- **Green Teams**
- **Self-directed Improvement Teams**

**Idea Database**

- 300+ Ideas in DB Over $1M Savings

**Innovation**

**Recognition**

Employee Develops New Skills and Competencies
Lean Best Practice Award

Publications

- "A Simulation Approach to Determine Inventory Release Times for a Pull System", 2010 Industrial Engineering Research Conference, IIE
- "Using Lean and Optimization Techniques to Determine Line-Side Stock Kanban Limits", 2010 Industrial Engineering Research Conference, IIE
- "A Fuzzy Optimization Approach for Product Configuration in Reverse Logistics", 2010 Industrial Engineering Research Conference, IIE
- "A Used Parts Inventory Monitoring System for Server Reverse Logistics", 2010 Industrial Engineering Research Conference, IIE
- “A Simulation-based Framework to Study the Impact of Lean Techniques on Green Supply Chain”, 2009 American Society for Engineering Management (ASEM) Conference
- “Integrating a Structured Problem-Solving Process in a Lean Project – Challenges and Opportunities”, 2009 American Society for Engineering Management (ASEM) Conference
- “A Hybrid Approach of Data Mining and Simulation Modeling for Production Planning in a Server Manufacturing Environment”, The 14th Annual International Conference on Industrial Engineering Theory, Applications & Practice
- “A Novel Methodology to Allocate Commodities and Re-Layout a Warehouse”, 2009 Industrial Engineering Research Conference, IIE
- “Using Simulation and Design for Six Sigma to Study the Server Assembly Process”, 2008 IEEE Winter Simulation Conference
- “Maintaining an Efficient Workforce Through Innovative Resource Deployment Methodologies”
Questions?