Lean Sigma Deployment at ADC Telecommunications

Shiv Venkataramani, Ph.D.
Global Lean Sigma Deployment Leader
What will we discuss today?

- Overview of ADC Telecommunications-Facts and Products
- Strategy Deployment Process (X-Matrix)
- Lean Sigma Transformation at ADC
- Lean Sigma Success Story
- Rewards and Recognition
- Video testimony by the ADC business leaders
- Lean Sigma Business Impact in FY 2009
ADC - Facts

- Leading Provider of Broadband network infrastructure products and services (Copper and Fiber connectivity, Network Solutions and Professional Services)
- 2009 FY Revenue $ 1 Billion (Nasdaq:ADCT)
- Employees ~ 10,000
- Headquarters : Eden Prairie, MN
- Global Manufacturing Facilities: Shakopee, MN; Sidney, NE; Santa Teresa, NM; Juarez, MX; Delicias, MX; Berlin; Brno (CZ); Bangalore (IN); Sydney (Aus); Shanghai
Who is ADC?

- Global Communications Network Infrastructure Provider for Over 75 Years Delivering a Broad Range of High Quality Products and Services That Enhance Communication Networks
- Headquartered in Eden Prairie, MN with International Facilities and Network of Distribution Partners in All Regions of the World (150 Countries Represented)
- Best in Class Manufacturing with Operations in the U.S., Mexico, Germany, Australia, China and India to Provide Unsurpassed Service to the Company’s Global Customer Base
- Customer Centric Focus and Application-Based Approach to Product Solutions, Services and Support to Meet Customers’ Distinct Network Needs and Business Issues
## ADC’s Global Connectivity Solutions (GCS)
### Market Leadership

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<thead>
<tr>
<th>COPPER</th>
<th>FIBER</th>
<th>FTTX</th>
<th>STRUCTURED CABLE</th>
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<tbody>
<tr>
<td>Central Office Connectivity Apparatus</td>
<td>Fiber Apparatus Central Office #1 in North America</td>
<td>Core FTTP Products #1 in North America</td>
<td>TrueNet® #1 or #2 in key countries #6 Worldwide</td>
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**SOURCE:** ADC Market Intelligence; annual reports based on latest reported fiscal year

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FTTP Network Architecture
ADC’s Complete End-to-End FTTP Solutions

[Diagram showing network architecture with labels for Central Office, Distribution, Single Family Units, Residential, Multiple Dwelling Units, High-Rise MDU, Medium-Rise MDU, Horizontal MDU, and Low-Rise/Garden MDU]
What I walked into at ADC....

- A business undergoing rapid change from Copper to fiber based networks and customers
- Telecommunication industry consolidation
- Low Inventory Turns and High Excess & Obsolete
- Long and complex supply chains
- A looming downturn in the economy!
- “Boil the Ocean” projects; lacking “critical few thinking”
- Very little alignment to strategy

But....

- Leadership committed to change (but not top down!)
- Smart and talented workforce hungry for change
- Customer is King attitude!
- Nothing but Opportunity!!!

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Strategy Deployment Process

What is it?

- A systematic approach to managing change in critical business processes leading to **sustainable breakthrough performance**.

- An effective leadership and management tool to maximize the best use of ADC’s **time, money and resources**.
Strategy Deployment Process

Why use it?

- To link ADC’s major direction setting with our execution systems to **convert strategy into reality** with sustainable breakthrough improvements

- To **clarify vision and align and focus resources** throughout the organization
SDP begins with understanding cascading value-drivers

Shareholder Value

Revenue Drivers

Growth/Volume Drivers

Share of Wallet

Customer Acquisition

Pricing Drivers

Market Pricing

Strategic Pricing

Portfolio/Mix Drivers

Product Quality

Delivery

Innovation

Cost Drivers

Cost Structure

GM

OPEX

Operations Costs

Supply Chain Costs

Product Costs

People Costs

Org Structure

Internal Processes

Cash Drivers

Capex

Inventory

A/P

A/R

Plant, Property, Equipment

Working Capital

Growth/Volume Drivers

Share of Wallet

Customer Acquisition

Pricing Drivers

Market Pricing

Strategic Pricing

Portfolio/Mix Drivers

Product Quality

Delivery

Innovation

Operations Costs

Supply Chain Costs

Product Costs

People Costs

Org Structure

Internal Processes

Nice Chart: If you’re in finance
During an SDP Workshop, we walk through all the parts of the X-Matrix.

- Near-term stretch
- 12°
- 9°
- 3°
- 6°
- 5°

“how we are going to get there”
“who we are going to be”

Defining success

Top Level Improvement Priorities
Targets To Improve

2010

Process Improvement Priorities

Initiatives and Metrics

1-Yr Asset Turns Stretch
1-Yr Revenue Stretch
1-Yr Oil Stretch

5-Yr Asset Turns
5-Yr Revenue
5-Yr Oil
Vision Narrative

“who we are going to be”

“how we are going to get there”

Near-term stretch
Strategy Deployment Process
Alignment to Lean Sigma

- 5-Year Breakthrough Objectives
- Strategy Deployment Process
- 2009 Annual Objectives
- Improvement Priorities
- Strategic Targets to Improve (TTIs)
- SDP Action Plans
- Process Excellence
- Lean Sigma Training and Deployment

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Managing Strategy Execution

1. SDP Workshop
   Prioritization of Projects

2. Project Planning and Project Management
   DMAIC

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Project</th>
<th>Leader</th>
<th>Champion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Mgt Systems</td>
<td>Production Ace Implementation</td>
<td>Marlon H</td>
<td>Jerry Cash</td>
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<td>SPC</td>
<td>Gary Amandela</td>
<td></td>
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<tr>
<td>Data Mgt Systems</td>
<td>Traceability</td>
<td>Marco Duarte</td>
<td></td>
</tr>
<tr>
<td>Data Mgt Systems</td>
<td>Virtec</td>
<td>John Ihrlke</td>
<td></td>
</tr>
<tr>
<td>Fiber Center of Excellence</td>
<td>MTP process improvement</td>
<td>Will Pomeroy</td>
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<tr>
<td>Fiber Center of Excellence</td>
<td>Revive Global Connectivity Best Practices Committee</td>
<td>Will Pomeroy</td>
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<td>Fiber Center of Excellence</td>
<td>Improve Fiber Polishing Process (UPC)</td>
<td>Greg Moser</td>
<td>Will Pomeroy</td>
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<td>Fiber Center of Excellence</td>
<td>Automate Cleaving Process (UPC)</td>
<td>Paul Perkovich</td>
<td>Will Pomeroy</td>
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<td>Fiber Center of Excellence</td>
<td>Improve Potting Process (UPC/APC)</td>
<td>Ken Perkin</td>
<td>Will Pomeroy</td>
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<tr>
<td>Fiber Center of Excellence</td>
<td>Standardized Documentation for Transfers</td>
<td>TBD</td>
<td>Tom Tinucci</td>
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<tr>
<td>Fiber Center of Excellence</td>
<td>Work Instruction Content and Control Process</td>
<td>TBD</td>
<td>Tom Tinucci</td>
</tr>
<tr>
<td>Fiber Capacity Shakopee Pilot</td>
<td>Financial Modeling pre-Transfer</td>
<td>Brian Iacono</td>
<td>Jerry Cash</td>
</tr>
<tr>
<td>Fiber Capacity Shakopee Pilot</td>
<td>Implement Pilot Line for optimizing fiber (UPC, APC) on SC/LC</td>
<td>Ray Wells</td>
<td>Mark Anderson</td>
</tr>
<tr>
<td>Fiber Capacity Shakopee Pilot</td>
<td>Optimize line design for mass production during pilot stage (Shakopee to Global)</td>
<td>Tom Tinucci</td>
<td>Joel Halls</td>
</tr>
</tbody>
</table>

3. Monthly Reviews
   Bowling Charts

4. Counter-Measures
   Using Lean-Sigma Tools

5. Adjust the project plan Resource-wise, etc.,

6. Execute

7. CHECK

8. Counter-Measures
   Using Lean-Sigma Tools
KPI’s vs. TTI’s

**KPI**
- Key Performance Indicators (KPI’s) are measured against the core business
  - On-time delivery
  - Revenue, bookings
  - Etc.,
- In a non-SDP world, top-leaders spend 80% of their time managing KPI’s.

**TTI**
- Targets to Improve are measurements for SDP projects
- In a business run by SDP, top-leaders spend only 20% of their time managing KPI’s and 80% of their time managing TTI’s.
- Why? Leaders should delegate daily work and KPI’s and empower their subordinates.

Where leaders spend their time can be a massive culture change.
How Breakthrough Becomes Daily Work

- Using DMAIC, each project upon completion goes to a CONTROL PLAN
- At this stage, initiative leader hands off project to the process owner
- Target-to-Improve becomes KPI
- SDP project taken off list
- KPI then undergoes kaizen (continuous improvement)

Bottom Line: Scope SDP for successful project completion
## Strategy Deployment Process Example

### D&I Global Fiber Center of Excellence (COE)

- D&I using lean-sigma pull replenishment competency
- D&I using lean-sigma fiber capacity competency
- Refine and execute global quality program

### Key Performance Indicators

- 7 Inventory Turns
- $966M Revenue
- 6.4% Operating Income

### 2010 Annual Objectives to Improve

- Achieve Verizon TPR audit “no major” in all facilities by Mar 31, 2010
- Improve fiber connectorization capacity from <100 (avg) to 150 (Juarez)
- Improve Fiber Cpk from 0.7 to 1.0
- Convert 20 value-streams by Sep 30, 2010

### 2013 Breakthrough Objectives

- 25% Operating Income
- $1.7B
- 12 Turns

### Designated by Facility

- Mario Dena
- Shiv Venkataramani
- Tom Huegerich

### Primary Responsibility

- Primary Responsibility

### Secondary Responsibility

- Secondary Responsibility
ADC Lean Sigma Deployment - Beginnings

- Pragmatek Consulting Ltd was selected as Deployment Partner (Aug 2008)
- “Train-the-Trainer” Program with Pragmatek complete and all training is done in-house. (Dec 2008)
- Global Licenses for Champion, Green Belt and Lean Simulation Training purchased and available. (Dec 2008)
- Sharepoint site established for Training materials, project documentation, tools and templates. (Aug 2008)
- Global Lean Sigma Council established with representation from regions, plants, functions.
  - Share best practices in tool applications
  - Dashboards and cost savings
  - Replication opportunities
Lean Sigma Deployment Plan Roadmap (Aug 2008)

- **PRTM Benchmarking Data (2008)**
  - Projects selected for Wave 1 Convergence Training
    - Supply Chain/SCOR
    - Lean Enterprise
    - Six Sigma
    - Project Management
    - Change Leadership
  - Key Stakeholders assigned to selected projects
    - Exec Sponsor
    - Champion
    - Process Owner
    - Project Leader
  - Scope projects create action plans
    - Project Charter
    - Core Team
    - Business Case

- **Strategy Deployment Process**
  - Wave 2 and beyond By ADC Trainers
    - Global Rollout
    - Process Excellence group
    - Functional area Black Belts
    - Black Belts from Wave 1
    - Champion (2 days)
    - Green Belts (2 weeks)
  - Belt Certification for Project Leaders (GB/BB)
    - Completion of GB Training
    - Progress through DMAIC phases
    - Proficiency in applying SCOR, Six Sigma and Lean Tools
    - Statistically significant shift in chosen metrics over 3-6 months
    - Hard $ benefits
    - Project Closure
    - GB Certification
  - Wave 1 Training By Pragmatek
    - Champion (2 days)
    - Green Belt (2 weeks)
    - Formal project reviews
    - Tool application and feedback
    - Monitor performance metrics
    - Best Practice Sharing
    - Corrective adjustments
Lean Sigma Approach at ADC

SCOR, Six Sigma and Lean all aim to improve the business by optimizing system performance, reducing variation, and eliminating wasteful activities.

**SCOR**
- Top-Down Analysis
- End-to-End View
- Optimizing supply-chains as a whole

**Lean**
- Speed in the value chain
- Waste elimination
- Value system redesign

**Six Sigma**
- Variation reduction
- Problem solving methodology
- Stability and accuracy
# Lean and Six Sigma DMAIC Tools

<table>
<thead>
<tr>
<th>Define</th>
<th>Measure</th>
<th>Analyze</th>
<th>Improve</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Project Selection Tools</td>
<td>• Operational Definitions</td>
<td>• Pareto Charts</td>
<td>• Brainstorming</td>
<td>• Control Charts</td>
</tr>
<tr>
<td>• PIP Management Process</td>
<td>• Data Collection Plan</td>
<td>• C&amp;E Matrix</td>
<td>• Benchmarking</td>
<td>• Standard Operating Procedures (SOPs)</td>
</tr>
<tr>
<td>• Value Stream Map</td>
<td>• Pareto Chart</td>
<td>• Fishbone Diagrams</td>
<td>• TPM</td>
<td>• Training Plan</td>
</tr>
<tr>
<td>• Financial Analysis</td>
<td>• Histogram</td>
<td>• Brainstorming</td>
<td>• 5S</td>
<td>• Communication Plan</td>
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<tr>
<td>• Project Charter</td>
<td>• Box Plot</td>
<td>• Detailed “As-Is” Process Maps</td>
<td>• Line Balancing</td>
<td>• Implementation Plan</td>
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<td>• Multi-Generational Plan</td>
<td>• Statistical Sampling</td>
<td>• Basic Statistical Tools</td>
<td>• Process Flow Improvement</td>
<td>• Visual Process Control</td>
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<td>• Stakeholder Analysis</td>
<td>• Measurement System Analysis</td>
<td>• Constraint Identification</td>
<td>• Replenishment Pull</td>
<td>• Mistake-Proofing</td>
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<tr>
<td>• Communication Plan</td>
<td>• Control Charts</td>
<td>• Time Trap Analysis</td>
<td>• S&amp;OP</td>
<td>• Process Control Plans</td>
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<td>• SIPOC Map</td>
<td>• Process Cycle Efficiency</td>
<td>• Non-Value-Added Analysis</td>
<td>• Setup Reduction</td>
<td>• Project</td>
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<td>• High-Level Process Map</td>
<td>• Process Sizing</td>
<td>• Hypothesis Testing</td>
<td>• Generic Pull</td>
<td>Commissioning</td>
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<td>• Non-Value-Added Analysis</td>
<td>• Process Capability C&amp;C</td>
<td>• Confidence Intervals</td>
<td>• Kaizen</td>
<td>• Project Replication</td>
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<td>• VOC and Kano Analysis</td>
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<td>• FMEA</td>
<td>• Poka-Yoke</td>
<td>• Plan-Do-Check-Act Cycle</td>
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<td>• QFD</td>
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<td>• Simple &amp; Multiple Regression</td>
<td>• FMEA</td>
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<td>• RACI and Quad Charts</td>
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<td>• “To-Be” Process Maps</td>
<td>• Hypothesis Testing</td>
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<td>• ANOVA</td>
<td>• Solution Selection Matrix</td>
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<td>• Plan-Do-Check-Act Cycle</td>
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**Operational Definitions**
- Control Chart
- Histogram
- Box Plot
- Statistical Sampling
- Measurement System Analysis
- Control Charts
- Process Cycle Efficiency
- Process Sizing
- Process Capability C&C

**Pareto Charts**
- C&E Matrix
- Fishbone Diagrams
- Brainstorming
- Detailed “As-Is” Process Maps
- Basic Statistical Tools
- Constraint Identification
- Time Trap Analysis
- Non-Value-Added Analysis
- Hypothesis Testing
- Confidence Intervals
- FMEA
- Simple & Multiple Regression
- ANOVA

**Brainstorming**
- Benchmarking
- TPM
- 5S
- Line Balancing
- Process Flow Improvement
- Replenishment Pull
- S&OP
- Setup Reduction
- Generic Pull
- Kaizen
- Poka-Yoke
- FMEA
- Hypothesis Testing
- Solution Selection Matrix
- “To-Be” Process Maps
- Piloting and Simulation

**Control Charts**
- Standard Operating Procedures (SOPs)
- Training Plan
- Communication Plan
- Implementation Plan
- Visual Process Control
- Mistake-Proofing
- Process Control Plans
- Project Commissioning
- Project Replication
- Plan-Do-Check-Act Cycle
Lean Sigma Focus Areas

- Manufacturing Operations (All Global Manufacturing Sites)
- Global Inventory Turns Management
- Product Quality
- Customer Service and Sales Operations
- IT, Financial and HR Shared Services
- Supplier Quality and Contract Manufacturing
- Joint Projects with customers and suppliers.
LEAN Sigma Success Story!
Rapid Fiber Collector Production
Project Charter

• **Problem Statement:**
  - Assembly and test performed across 3 different production lines
  - No communication between assembly and test operators
  - No visual way of tracking weekly throughput
  - 43 units/week average average output

• **Green Belt:** Dailyn Gunderson

• **Team Members:** Cindy Olson, Ed West, Dawn Senghsourinhet, Christina Ta, Chris Jelinek, Ryan Koller, Jaime Gonzalez

• **Champions:** Cindy Olson, Mark Anderson

• **Process Owner:** Ed West

• **Master Black Belt and Coach:** Shiv Venkataramani
Kaizen Team and Mission

- Mission: Increase Rapid Fiber Throughput in Shakopee
- Team Members: Ray Wells, Dailyn Gunderson, Bicky Luong, Ed Loper, Ed West
- Takt Time = 27 min/unit
- Total Production Lead Time
  - 3411 min/Unit
- Value Added Time = 100 min/unit
- Feb 23-26 Kaizen event
- Eleven operations
- Five opportunities
Fishbone Diagram
(To understand opportunities for improvement)
Improvement Opportunities-Kaizen Bursts

1. New U-Shaped Cell layout for better material flow
2. Kanban bins for balancing flow and visual control
3. Operator Balancing to eliminate duplicate efforts
4. Visual boards for targets, current run-rate and recognition
5. Decrease setup time for optical testing
6. Streamline software functionality for ease-of-use by operator.
7. 5S Activity: Have materials and tools available at the work stations (visual pull).
8. Establish visual communication between assembly, testers, inspectors and technicians

All Improvement Opportunities Implemented!
Future State Value Stream Map

- Nine operations
- One opportunity

Analyze

Cycle Time: 8.0
Change Over Time: 0.0
FPY: 100%
# Operators: 1.0
# Machines: 0.0

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Process Improvement #1 and #2: New Floor Layout – Flow and Kanban
Process Improvement #3: (Operator Balancing)

Operator usage current to future state comparison

- Quality Inspector supports other areas so their time was minimized

![Bar chart showing current and future operator usage](chart.png)
The increase in production output was achieved **without** additional equipment or headcount!
• Documentation was created (MAP 1353) to clearly state the Control Plan procedure:
  – Operators will fill form by shift to record quantity collectors tested
  – Forms will be handed in at end of shift to the Line Lead
  – Line Lead inputs data into X Bar chart

• When the values are outside the control limits response is needed by the process owner

• Control limits (UCL and LCL) will be re-calculated after 20 data points

Support Personnel is called when a point is outside of the control limits
Key Learning Points

- Capital Investments (more equipment) are not always the answer

- How powerful Lean tools can be:
  - Value Stream Map – Reveals hidden waste in the process
  - Visual Boards to track throughput numbers – Better communication between operators and support personnel
  - 5S Tool Boards at workstations – Increase productivity

- Operator involvement is key to project success

- Share with other ADC plants (Juarez and China) lessons learned
Green Belt Certification Competency Elements

1. Technical Knowledge

2. Project Execution

3. Organizational Endorsement

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Green Belt Certification Process Checklist and Timeline

Complete Training

- Completed assigned pre-work
- Attended classes
- Actively participated in class
- Completed all in-class exercises and activities

Execute 1 - 2 Projects

- Project benefits achieved (per Project Charters)
- Received endorsements from Project Champions
- Received endorsements from project mentors (MBB or BB)
- Received endorsements from team members (optional)

Receive Deployment Champion Endorsement

- All previous endorsements validated (i.e. team members, mentors and Project Sponsors)
- All previous certification requirements validated
- All requirements completed within 1 year

Certification Board consists of Project Champion, Process Owner, Black Belt Coach and Lean Sigma Deployment Leader (Chair)
Dailyn Gunderson has demonstrated in-depth knowledge and proficiency in the ADC LEAN SIGMA methodology and has successfully applied the appropriate tools and techniques to her Green Belt project on:

**Rapid Fiber — Collectors Output Improvement**

Rapid Fiber Collectors production output improved by 95% and work-in-process inventory reduced by 50%. The output far exceeded customer expectations in delivery quantities and capabilities.

In recognition of this important contribution, Dailyn Gunderson is awarded the ADC Certification as Green Belt in LEAN SIGMA this 16th day of July, 2009.
Lean Sigma Transformation: Moving to a Continuous Improvement Mindset

- Lean Six Sigma becoming a core competency at ADC with a full complement of Master Black Belts, Black Belts and Green Belts
- Black Belts hired from other companies with proven Lean Sigma track record (GE, Seagate, 3M, Honeywell, United Health Group, Best Buy, Lear Corporation)
- 125 Champions trained ADC Wide (2 day Lean Sigma Champion Training)
- 70+ Lean Sigma Green Belts trained (9 day Lean Sigma Green Belt Training)
- 60+ Lean Sigma projects underway Globally
Lean Sigma Deployment – Program Highlights of FY 2009

- Certification guidelines established for Green Belts and Black Belts

- Increased Global Inventory Turns from 4.5 to 5.6 through application of Lean tools and concepts ($ reduction: 34MM YTD)

- Lean Sigma site “live” on Broadway Intranet Site (Training documents, project documents, references, contacts).

- Lean Sigma Rapid Fiber Success featured on ADC LeaderConnect (July 2009)

- ADC Lean Sigma Deployment selected as finalist for “best Emerging Business Improvement” by the Global Six Sigma Awards Committee (TGSSA Conference, Oct 2009).

- Developed plans for deploying Design For Six Sigma (DFSS) in FY 2010
Lean Sigma Deployment – Financial Highlights of FY 2009

• Improved Global Inventory Turns from 4.5 to 5.6, resulting in Working Capital reduction of ~ $40 Million

• Achieved $4 Million savings through focused Lean Sigma Green Belt Projects and Kaizen events.

• Reduced Operating Expenses by 30% as a result of Lean Sigma transformation efforts

• Despite difficult business environment, the Americas business recorded ~ 19% improvement in Operating Income in spite of ~ 25% less revenue.

• Total Cost of Lean Sigma deployment was $150K expenses + Salaries of 1 MBB and 4 full-time BBs

• ROI for Lean Sigma deployment >400% (in cost savings alone)
For continued Lean Sigma success in 2010

- Continue to use of Lean Sigma Methodology as the management way of thinking via formal training and mentoring/coaching! Customer Focused!

- Continue Monthly/Quarterly Tollgate reviews in Americas and EMEA to monitor project progress and readouts. Execution, Execution, Execution!

- Continue Monthly Lean Sigma Steering Committee meetings to share best practices and project replication strategies.

- Design and Implement Supply Chain Pull Replenishment Processes Globally

- Improve Fiber Capacity and Fiber Quality across all global manufacturing sites

- Implement Design For Six Sigma (DFSS) Methodology globally.
What Worked well for us

- Have a Robust Strategy Deployment Process
- Wean off of external consultants within 4 months.
- Develop In-house training
- Blend of hiring BBs from outside and develop internal BBs
- Start Small, Show Success and Replicate
- Big events for recognizing our Green Belts’ achievements.
- Involve Senior Management in Toll Gate reviews, Kaizen events and Gemba walks
- Involve our workforce globally in Kaizens and ideas for improvement
Acknowledgments

- Pat O’ Brien – President, Global Connectivity
- Jaxon Lang- Vice-President, Americas Connectivity
- Bill Schroer – Vice President, Global Operations
- Chris Jurasek – CIO and President, APS BU
- Justin Revak – Lean Sigma Black Belt, Americas
- Hugo Luna – Lean Sigma Black Belt, Mexico
- Jason Alvig – Lean Sigma Black Belt, Customer Service
- Pavel Riman – Lean Sigma Black Belt, EMEA
- Gary Jing – Design For Six Sigma MBB