

SUPPLIER IMPROVEMENT CASE STUDY

PRINTED CIRCUIT BOARD DESIGN & MANUFACTURER

This supplier specializes in the design and manufacturing of high technology, prototype, and quick turn printed circuit boards. At the time of this case study, the California-based supplier employed approximately 250 employees and occupied a 62,500 square foot facility.

The SEA Lean Enterprise System

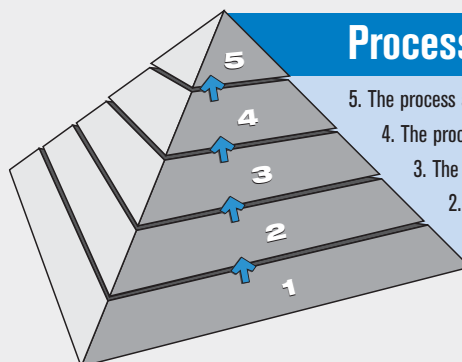
The SEA Lean Enterprise System captures the best practices for manufacturing enterprise improvement with a model with three key focus areas: leadership and culture, workforce development and operational excellence. The reason for these three areas is to emphasize the importance of a total organizational approach to managing the transformation. It also acknowledges that long-term sustainability of improvements relies on enterprise-wide solutions and well-managed change. Large-scale changes that do not address all three areas often fail.

Implementations of lean that do address all three take less effort and are more often successful.

The Process Maturity Model™ is the central element of the SEA Lean Enterprise System.

Process Maturity Model (PMM)

The PMM was developed as an aid for companies who wanted to self-assess and consistently manage their overall process improvement. Because the PMM serves as the backbone for all process improvement efforts whether lean, Six Sigma, or whatever comes next, it provides for long-term integration of all improvement approaches.



Process Maturity Levels

1. The process has been identified, defined, and has an owner
2. The process has been documented to the work instruction level
3. The process has certified trainers and is standardized
4. The process is under process control, is analyzed, and improved using data
5. The process shows continuous positive trends and benchmarks world class

Leadership and Culture

This supplier was already utilizing a continuous improvement program, and was preparing for an initial AS9100 certification. Yet, the supplier saw SEA LES as offering a structured methodical approach to enhance improvement efforts.

Comments by the Continuous Improvement

Coordinator: *“When I first looked at the program I was encouraged by the tools and the structured approach to problem solving and Lean implementation. I was confident that the SEA-LES would align with and compliment our existing efforts to create a culture for continuous improvement.”*

In April 2006 the Strategic Planning Workshop was conducted with the executive and middle management team. This workshop provided the necessary foundation for leadership to effectively implement a lean enterprise culture and, subsequently, the ability to sustain results generated through the workforce development and operational excellence activities. Key outcomes include an updated company mission statement, supporting values and assessment, identified five strategic goals, SWOT analysis, action plans, process owners, balanced scorecard metrics, communication system, and understanding of the process maturity model.

Comments by the VP of Operations. *“This was a different learning experience for us as the SEA-LES program not only teaches the tools but also requires that we apply them in the process. We all have more respect for what is involved in creating a vision statement, we’ve seen statements on walls with one or two sentences that seem simplistic until you actually try and create one for our own organization. This exercise made sure that all members of the leadership group were headed in the same direction.”*

Business processes (40) were identified, PMM baseline levels were established ranging from 0 to 3, and champions and process owners were assigned.

The five strategic goals:

- Improve gross margins
- Change culture to “shared leadership”
- Develop new technology
- Develop supply chain partnerships
- Develop the middle managers and process owners

In later April and early May 2006, this supplier launched their lean planning activity by completing the three-day Management Planning Workshop. Key outcomes included adopting the SEA Lean Enterprise System (LES) and the development of a master plan for Phase One implementation. The master plan enables leadership to have ownership and lead the significant changes that will be made. In addition, an initial stabilization audit was conducted, which will be a benchmark for subsequent audits assessing progress and value stream-maps were created on some critical processes.

Comments by Sr. Process Engineer: *“First program I know of that addresses training needs at the various organizational levels, from the top to the bottom. I liked the fact that employees from different cross-functional and operational levels were together in the same room discussing better ways to solve problems. Because of the overall commitment that this program requires, it forces upper management to participate and to fully support it.”*

The Kaizen events selected were:

- Quote, Order Entry/Planning
- Fabrication Set-Up Reduction
- TDR Test Rework Reduction
- Surface Finish Optimization

In May, the two-day Managing Process Improvement workshop was conducted with 12 Process Champions and Owners. The purpose of this workshop is to prepare process champions and process owners to fulfill their roles in the company’s Lean Enterprise System.



Workforce Development

In June, the leadership team also attended a half-day Job Skills Objectives Setting workshop. The team identified and prioritized training objectives linked to key company goals. A matrix was created and used to determine the participants, (Subject Matter Experts and Trainers) for the Master Trainer, Advanced Planning and Training Materials workshops.

By the end of August, the Master Trainers were certified, materials were developed and by the end of year, employees from various shifts were trained/certified in 21 process steps, while 19 processes were in progress and there were plans for 40+ more in 2007.

Comments by the Continuous Improvement Program Administrator: *“The Workforce Development module has given our employees the opportunity to have a voice in creating their own work instructions and to strengthen the teamwork atmosphere. Employees have to consider what is involved in the processes before and after their own process, the visual work instructions transcend language barriers, making it easier for the employees to understand and follow.”*

Here is a list of the 21 processes completed: F.E cam, F.E Pre-Planning, DES Inner Layer, Mechanical Drilling, Electroless, A.O.I, Oxide, Final F/A, Fixture Testing, TDR Testing, Test Cam, Lam Bake, IPE Post Etch Punch, Routing, Fly Probe Test, Test Rework, Surface Finish, Sales Quotes, Sales Order Entry, SMV/Plating (Shipley), and Blueprint Reading.

Operational Excellence

Kaizen 1: Quote, Order Entry/Planning

This team, consisting of 9+ participants, conducted a 4-day Kaizen event in July that focused on lead-time reduction and first pass yield. The team was able to develop improved communications between Sales/Planning, develop a product release team for high technology jobs, and implement a material allocations program. Results showed lead-time going from 5.05 days to 2.75 days (46% improvement). First Pass Yield went from 87% to 95%.

Operational Excellence Cont.

Kaizen 2: Fabrication Set-Up Reduction

This four day Kaizen was conducted in August with 11 participants. This team utilized 6S to clean up and organize the area; they automated the First Article program using CAD reference, and upgraded the Fabrication equipment to standardize capabilities.

| KEY METRICS FOR THIS PRODUCT LINE | | | |
|-----------------------------------|----------|-------------|----------------------------|
| Metric | Baseline | Post-Kaizen | % Change/ Dollars Saved |
| Set-Ups Per Shift | 13 | 20 | 35% |
| Throughput (panels) | 77 a day | 108 a day | 29% |

Kaizen 3: TDR Test Rework Reduction

This October event, consisting of 9 team members, created the following improvement activities:

- Optimized the coupon design and lay-out
- Developed charts and reports
- Expanded design concept to other products

| KEY METRICS FOR THIS PRODUCT LINE | | | |
|-----------------------------------|----------|-------------|-------------------------------|
| Metric | Baseline | Post-Kaizen | % Change/ Dollars Saved |
| Scrap at TDR | 2.3% | 1.7% | \$110K savings per quarter |
| Rework at TDR | 45% est. | 14.5% | 68%, \$169K/per year |

Kaizen 4: Surface Finish Optimization

This final Kaizen was completed in January 07. The team was able to evaluate surface finish processes to look for lean opportunities, and validated that the surface finish process was not the significant factor as previously perceived (no smoking gun found), and there was an improved defect tracking methods at Inspection. The end result showed rework going from 17% to 10%.



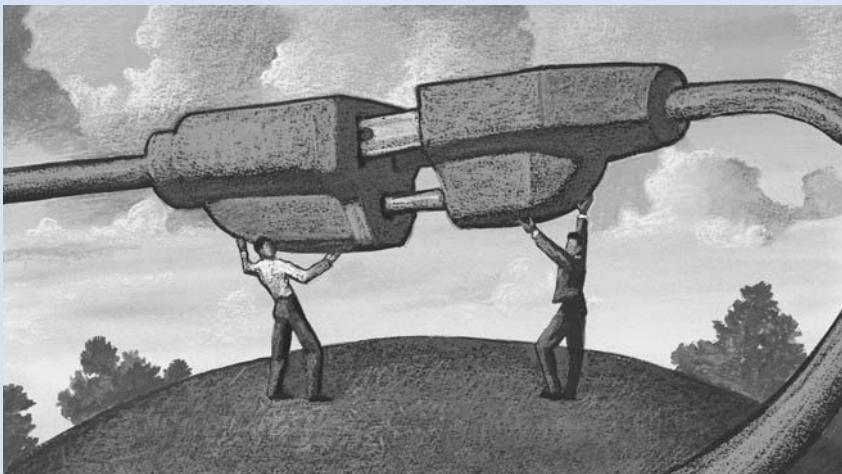
Operational Excellence Cont.

Summary of Results:

| METRIC | BENEFITS |
|--|------------------|
| On-Time Delivery | 8% Improvement |
| Process Yield | 15% Improvement |
| Productivity (Units/Month) | 47% Improvement |
| Cost Reduction (Labor Dollars/Units) | 23.5% Reduction |
| Efficiency (Revenue Dollars/Labor Dollars) | 17.4 Improvement |

Conclusion:

The SEA LES first engagement was a success: Many processes achieved level 3 process maturity, utilized many tools and methods for continuous improvement, enhanced employee morale and ownership, promoted teamwork, and improved company performance metrics. In addition, this supplier became AS9100 certified at the conclusion of this engagement.



Members

- | | |
|---------------------|---------------------|
| BAE Systems | The Boeing Company |
| Bombardier | Cessna |
| Dresser-Rand | Firth Rixson |
| Hamilton Sundstrand | Honeywell Aerospace |
| Lockheed Martin | Northrop Grumman |
| Parker Aerospace | Pratt & Whitney |
| Rockwell Collins | Sikorsky |
| Smiths Aerospace | Space Systems Loral |
| Textron | TW Metals |
| Tyco Electronics | United Technologies |

SEA is an alliance of leading aerospace, defense and space prime and subcontractors whose purpose is to accelerate the development of supply chain capabilities in order to ensure American competitiveness

Goals

Create a unified vision and a collaborative industry-wide approach to supply chain development that eliminates duplication and aligns existing resources

Lead the deployment of SEA Lean Enterprise System throughout our supply chains

Mission

Accelerate Supply Chain Performance

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- The Boeing Company - Robert Gower
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- Firth Rixson - Michael Carr
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