Applying Six Sigma at 3M

David Osten

3M Company Vision & Values

To be the most innovative enterprise and the preferred supplier.

Values

• Satisfy customers with superior quality, value and service.

• Provide investors an attractive return through sustained, quality growth.

• Respect our social and physical environment

• Be a company employees are proud to be part of.
What is Six Sigma?

- A proactive means of achieving excellence in all business processes
- A measurement of performance or improvement in economic profit
- A data- and fact-driven approach versus a predominantly intuitive approach
- A methodology to promote continuous improvement, correct and prevent defects
- Goal: Growth, increased productivity, higher earnings

What Does Six Sigma Mean In Your Daily Life?

<table>
<thead>
<tr>
<th>Service</th>
<th>Sigma Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Advice</td>
<td>3</td>
</tr>
<tr>
<td>Restaurant Bills</td>
<td>2</td>
</tr>
<tr>
<td>Payroll Processing</td>
<td>2</td>
</tr>
<tr>
<td>Baggage Handling</td>
<td>1</td>
</tr>
<tr>
<td>Airline Safety Rate</td>
<td>1</td>
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</tbody>
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PPM

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Six Sigma Is ...

**Initiative**
- Improvement
- Breakthrough
- A Systematic, focused approach
- Right projects
  - Linked to business goals
- Right people
  - Selected and trained
- Project management
  - Management reviews
- Sustaining gains
- Right results
  - Process and financial ($$)

**Methods and Tools**
- Process thinking
- Process variation
- Facts, figures, data
- Define, Measure, Analyze, Improve, Control (DMAIC)
- Statistical tools
- Critical few variables

Six Sigma Definition....

Six Sigma is a *methodology* for pursuing *continuous* quality *improvement* and reducing inherent *variability*. It requires a thorough *process and product understanding* and is clearly focused on *customer driven* expectations.
Why Did 3M Embrace Six Sigma?

- Right Process for Business Decisions within 3M
- Provides Common Approach to Problem Solving
- Common Goals
- Institutes a common language throughout the corporation, with suppliers, and customers
- Develops transferable skills to all levels
- Provides Leadership Development throughout all disciplines within the corporation
- Most effective way to increase and accelerate our business performance and customer quality

Six Sigma: Supporting 3M Company Goals

<table>
<thead>
<tr>
<th>Customers</th>
<th>Employees</th>
<th>Shareholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better Products</td>
<td>Development of Talent</td>
<td>• Growth</td>
</tr>
<tr>
<td>Meet Needs</td>
<td>Energizing Organization</td>
<td>• Productivity</td>
</tr>
<tr>
<td>Responsiveness</td>
<td></td>
<td>• Cash</td>
</tr>
</tbody>
</table>

Driving 3Six Sigma to the Bottom Line
A Simple Approach...

Process Input:
Strategic and Annual Business Objectives and Targets

Select the Right Projects → Select and Train the Right People → Develop and Implement Improvement Plans → Manage for Excellence in Operations → Sustain the Gains

Process Output:
Make the Numbers

Our Six Sigma Areas Of Focus

Growth
- Commercialization Cycle Times
- Sales & Marketing Effectiveness
- Customer

Cost (Operating Margin)
- Manufacturing
- Supplier

Cash
- Receivables
- Inventory
Goal Tree Alignment & Project Selection

Goals
- Operating Margin Growth
- Working Capital
- Customer Sat.

How

Metrics
- BETTER Yield
- FASTER Rate
- CHEAPER Waste

Projects
- More Valued Features
- Increase Performance
- Fewer Defects
- Improve Yield
- Reduce Cycle Time
- Redesign Process Flow
- Reduce Waste
- Lower Inventory
- Reduce Rework
- First Time Acceptance
- Reduce Scrap
- Improve Quality of RMs

Links Individual Efforts to the Strategic Plan & Value Creation

Why

50 Years of Advancing Pressure Sensitive Tapes

Pursuing Entitlement....

Performance

Six Sigma Difference
Baseline
Traditional Goal Setting
Closing the Gap
Entitlement

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The Funneling Effect.....

Y’s = Key Process Output Variables

X’s = Key Process Input Variables

Tools

 DEFINE

 MEASURE

 ANALYZE

 IMPROVE

 CONTROL

 Process Map  MSA
 C&E Matrix  Gage R&R
 FMEA  Initial Capability
 Multi-Vari  Process simulation
 DOE  Control Plan

Optimized Process

Y = f(X)

• Yield
• Rate
• Waste
• Effectiveness
• Efficiency

Reduced X’s
Few Key X’s
2-3 Critical X’s

Tools

Gage R&R
MSA
Initial Capability

Multi-Vari
Process simulation

The Roadmap...

Y = f(x_1, x_2, x_3, x_4, \ldots x_n)

Process Map

Prioritization Matrix

Risk assessment

Key inputs

Multi-Vari identifies Noise variables and reduces the inputs for Real Experiments

The Roadmap Reduces the inputs from the trivial many to a “vital few”

FMEA reduces variation and effects for “inputs gone wrong”

Experiments identify the Critical x’s and their relationship to the Y

Controls in place for Critical inputs

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What Does this Mean to 3M?...

- A roadmap to **breakthrough performance**...
  - Entitlement thinking and goal setting
  - A disciplined methodology to drive **value creation**
  - Links the strategic plan to business critical Y's

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**Six Sigma**
and
Leadership at 3M
LEADERSHIP IS THE KEY TO SIX SIGMA.....

Leaders Must:
  . Understand It
  . Use It
  . Demand It
  . Resource It
  . Spend Time on It
  . Measure It
  . Reward It
  . Teach It

A Simple Approach....

Process Input:
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Select and Train the Right People
Develop and Implement Improvement Plans
Manage for Excellence in Operations
Sustain the Gains

Process Output:
Make the Numbers

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Six Sigma Accountability

CEO

Six Sigma Integrated Into Operations

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3M’s Six Sigma Journey and Goals...

- Initial Launch – Feb. 2001 with 3M senior leadership
- Build on 3M’s history of improvement
- Training is focused on results/projects
- 4,000 people were trained by year end 2001, over 10,000 in 2002.
- Goals in place to have all global salaried personnel “belt” trained by year end 2004.

The State of Six Sigma at 3M

- Strong support!
  - 2001 – a year of launching, training
  - 2002 – a year of results
  - 2003 – becoming part of the 3M culture
- Over 3,000 projects underway globally
  - Essential to meeting improvement goals ($$)
- The top priority at 3M
  - A tool to help everyone perform better
- DFSS deployment underway
Lessons Learned....... 

- Projects must be aligned with business goals
- Full time Black Belts and Master Black Belts are required
- Six Sigma is the way we work at 3M – Value of a common language
- Train the organization, share best practices
- Scoping of projects is absolutely critical
- Involve key operators, customers, suppliers, etc.
- Controller involvement to validate financials

THOUGHTS TO TAKE-AWAY .......

- Entitlement Thinking is KEY
- Follow the Priorities - Goal Trees
- Process Owners
- Management Ownership
- Communicate! Communicate!
3M Road To Six Sigma ...

2001
LEARN & BUILD CRITICAL MASS

2002
ACCELERATE IMPACT

2003
SIX SIGMA DNA

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