Improvement of Management Assurance System Processes using Six Sigma Plus Methodologies

Jane Fitzpatrick
Director, Quality
Honeywell FM&T
November 4, 2009
Continuous Improvement

- Continuous improvement is a cultural element of work at FM&T and began formally in 1983.
- Use of Six Sigma Plus (Lean and Six Sigma) has been institutionalized since the 90’s.

**Six Sigma Plus***

_The way we all think, act, and execute …
our way of doing business_

[Figure P.2.c-3 FM&T’s Continuous Improvement Journey]
Process Management

- FM&T primarily designs, innovates, and implements its overall work systems and work processes utilizing the Six Sigma Plus Continuous Improvement Model (SSP CIM) and deploys them through a formal ISO 9001 Quality Management System in Command Media.

- The SSP CIM requires that FM&T systematically approach improvement projects with the logical DMAIC methodology.
  - **Define** the customer-critical parameters
  - **Measure** how the process performs
  - **Analyze** the causes of problems
  - **Improve** the process to reduce defects and variations
  - **Control** the process to ensure continued and improved performance.

SSP Continuous Improvement Model

- Apply Cycles of Learning
  - Collect Performance Feedback
  - Prioritize Opportunities
  - Launch Teams
  - Apply DMAIC Methodologies

FM&T Command Media System

1.0 Leadership
2.0 Strategic Planning
3.0 Customers and Markets
4.0 Measurement, Analysis & Knowledge Management
5.0 Human Resources
6.0 Process & Resource Management
7.0 Deliver Results

The Kansas City Plant is operated and managed by Honeywell Federal Manufacturing & Technologies, LLC, for the NNSA.
Internal Audit and Self Assessment

- Process Description 6.61 Internal Audit
- Primary method of Internal Audit and Self Assessment for MAS
  - Other methods include:
    - Management Operating System (MOS) activities
    - Scorecards
    - Application of Six Sigma methodologies
    - Internal peer reviews
- Operating Requirements: 10 CFR 830; ISO 9001:2000; ISO 14001:2004; QC-1, Revision 10; QA-5; DOE O 414.1C Attachment 2, Section 4“
Define – Problem Statement

- Maintain Audit coverage and performance with reduced staff (Functional Transformation Initiative, KCRIMS)
  - Stretch goal to achieve efficiency improvement equivalent to $100k (1 FTE)
- Maintain ISO 9001 and 14001 certifications
- Maintain audit quality (MAS support)
- Black Belt
  - Steve Mandl, Manager Quality Audits
High Level Project Map

- Identify Sources of Audit Delay
- Utilize tools to quantify impacts
- Study relationship between input and outputs
- Utilize performance data to study the process
- Measure performance
- Study failure modes and use tools to identify improvements
- Implement Improvements
- Use a control plan to follow-up and maintain improvements
Application of SSP Methodologies

- Thought process map
  - Identified process steps for further evaluation
  - Brainstormed a list of key obstacles to timely audit conclusion

- Process map
  - Identified key process inputs and outputs

- Cause/effect diagram
  - Identified key customer expectations
  - Identified key contributors to audit inefficiency and the relationship between them

- FMEA
  - Used the FMEA to identify key process steps to work

- Control Plan
  - To measure and sustain gains
Measure – Thought Map

Why do audits take so long?

What delays audit start?
* Resources not available
* Work not released to floor
* No active schedules

What delays audit performance?
* Resistance to audit by auditee
* People hide from auditor
* Complicated Research
* # of CAR’s / Findings
* Personnel needed to resolve issues not available
* Excessive interaction
* Too much time given to rectify deficiencies
* Waiting for C/A for incidental findings
* Allow extra time for issues to close
* Expected work doesn’t come in
* Follow-up to existing corrective actions

Preparation Phase

What impacts smooth audit flow?
* Coordination with audited activities
* Other competing assignments, i.e. metrics
* Auditors used as resources for other things
* External requests for activities other than audits / conflicting demands

Execution Phase

What slows audit performance?
* eIAMS data entry
* Excessive narrative
* eIAMS labor intensive
* Teaming with customer
* Scope too broad
* No defined audit timeframe or expectation
* Customer won’t use eIAMS

TOOLS

FMEA

Value Stream Map

Process Map

Cause & Effect Matrix
Measure – Process Map

Process Map

**Inputs**
- C/S-Review process documents
- C/S-Review standards
- C/S-Review product schedules
- C/S-Review previous audits

**Preparation**
- Inputs
  - C/S-Plan for collection of process evidence
  - C/S-Opening Meeting
  - S-Audit schedule set with department
  - S/N-Evaluate process performance
  - S/N-Collect data relative to process performance

**Execution**
- Inputs
  - S-Draft of the audit findings
  - S-Draft of audit observations
  - N-Initial concurrence with intended findings
  - S-Data to support audit conclusions
  - S/N-Closing Meeting

**Outputs**
- *Checklist prepared
- *Contacts made with department
- *Plan in place to perform audit

**Reporting**
- Inputs
  - *Data concerning status of conformance / nonconformance
  - *Preliminary concurrence for draft audit report
  - *Basic conclusions to take forward

**Outputs**
- *Formal Audit Report
- *CAPs for noncompliances

Legend
- C = Controllable
- S = Standard Operating Procedure
- N = Noise
## Analyze - FMEA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution</td>
<td>Other competing assignments of the auditor</td>
<td>Interrupts audit flow / adds additional time to complete the audit</td>
<td>9</td>
<td></td>
<td></td>
<td>Competing business needs / wants interfere with audit</td>
<td>7</td>
<td></td>
<td></td>
<td>Manager to run interference, auditor can manage to some degree</td>
<td>9</td>
<td></td>
<td></td>
<td>567</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>No defined audit timeframe or expectation</td>
<td>No driver to delineate what constitutes timely completion</td>
<td>7</td>
<td></td>
<td></td>
<td>Performance measured at aggregate not individual audit level</td>
<td>9</td>
<td></td>
<td></td>
<td>None at this level.</td>
<td>9</td>
<td></td>
<td></td>
<td>567</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Variety of department size affects audit time</td>
<td>Not clear what is the audit focus and extends/wastes audit time</td>
<td>7</td>
<td></td>
<td></td>
<td>Large departments, multiple processes, potential issues in associated areas</td>
<td>7</td>
<td></td>
<td></td>
<td>Auditor</td>
<td>9</td>
<td></td>
<td></td>
<td>441</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execution</td>
<td>Expected work doesn’t come in</td>
<td>Can slow or stop the performance of the audit</td>
<td>9</td>
<td></td>
<td></td>
<td>Forget to contact auditor, priorities, just don’t call auditor,</td>
<td>5</td>
<td></td>
<td></td>
<td>None</td>
<td>9</td>
<td></td>
<td></td>
<td>405</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Teaming with the customer</td>
<td>Adds audit time and lose control of audit timeliness</td>
<td>9</td>
<td></td>
<td></td>
<td>Differing expectations regarding expectations for timeliness - not leader</td>
<td>5</td>
<td></td>
<td></td>
<td>Auditor has limited control - attempt to set limits</td>
<td>9</td>
<td></td>
<td></td>
<td>405</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execution</td>
<td>Complicated topic - research</td>
<td>Slow research - lot of reading and investigation</td>
<td>7</td>
<td></td>
<td></td>
<td>Topic has numerous threads</td>
<td>7</td>
<td></td>
<td></td>
<td>None</td>
<td>5</td>
<td></td>
<td></td>
<td>245</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Kansas City Plant is operated and managed by Honeywell Federal Manufacturing & Technologies, LLC, for the NNSA.
Analyze

- Utilized
  - audit data (completion time frames) to establish current level of performance
  - Minitab to analyze data
  - Benchmark data to determine performance objectives

- Reviewed results from 134 audits over a three year window
  - Average audit duration is 22.08 days
  - Audit duration median is 20.5 days
  - Standard Deviation is 9.8 days
Analyze

- Analyzed data to study variation
- Captured delays and causes of variation
- Validated the top issues on the FMEA
- Used “Voice of the Customer” data to seek improvement opportunities from the customer perspective
- Worked the FMEA RPNs to improve the process
- Used existing data to measure process performance (days in departments and overall time from start to report publish)
Improve

Improvements:
• Used data to measure performance and projected goals
• Team utilized known benchmarks to derive goals (i.e. field quality supplier surveys, Olathe process)
• Used VOC data to alter reporting methods to shorten reports and reduce eIAMS entry time
• Worked on “Service Agreement” with ISC, Engineering, and QTMs to enable shorter audit times with full access to work in process
• Worked a plan to implement desired changes to drive improvements
• Developed a control plan to monitor, maintain, and identify potential future improvements
Service Agreement Proposal

Service Agreement Meeting Topics
March 3, 2008
Mandl/Stubenhofer/Spangler/Madrid

Main Point: Intent is to perform conformance audits quicker.
- Blackbelt Project
- Current average is 22 calendar days
- Voice of the Customer asks for quicker audits
- Voice of the Customer asks for shorter reports

Our Goal to Deliver:
- Opening meeting that seeks a mutual agreement / Plan for action to complete audit
- Spend <= 5 days in the departments. Not to exceed 7 days. (excludes FU issues)
- Quicker reviews
- Shorter reports

What we need to enable this performance:
- Mutual agreement / Plan for action to complete the audit (similar to vendor)
- List of work that will happen during the audit: FIDs, Shop Order #s (prep items)
- List of people that work in the department with support personnel shown
- Overall view of what will be happening in the department over the next 5-7 days
- People available to audit. (Extremely helpful to have 4 hours notice of work so audit can be prepped and ready to observe.) Not disappearing.
- Staff and appropriate back-ups to resolve issues – available and responsive
- Audit contact to take an active role in resolution of issues

Benefits to D/431:
- Provide more coverage of plant departments to permit reduced oversight by NNSA
- Free up auditor time for other assignments in the non-weapons areas to provide better coverage of these areas

Benefits to Operating Departments:
- Quicker audits – less time and distraction to the departments operations
- Shorter reports – easier to read and interpret
- Fewer CARs – quick resolution of issues that can reduce the need for CARs
- Better partnering so that audits can be more effective at reviewing things that really matter versus administrative items of lesser importance
Improve

• Piloted Process
  – Piloted the revised process for three audits
  – Three completed audits average 13.33 days / reduction of audit time of 39%
  – Auditor feedback has been mostly favorable

• Savings
  – Averaged 44.6 Conformance Audits per year
  – Reduced time to perform audits by 39.6%
  – Added potential to perform 17.7 additional audits
  – Goals per auditor is 15 audits per year
  – Benefit is approximately 1.13 FTE
  – Evaluation Specialist Senior cost is $97000/year
  – Savings = 1.13 X 97000 = $109,610 per year
Interesting Learnings

• Teaming with customer does not affect audit duration
• Departmental size does not have an obvious effect on duration
• There is significant variation between auditors time to complete audits
Control Plan

• Identified key process metrics to measure and collect
  – Included on Quality Balanced Scorecard
• Introduced individual accountability for performance to the new goal
  – Honeywell Performance and Development Goals
CY 2009 Performance
(through 10/27)

• Dramatic shift moving the bulk of audit timeliness from between 18-30 days to 14 with only 4 points above 14 with none higher than 19.

• Audit quality has not been negatively affected with this improvement.
Results – Continued CY2009

- Mean shifted from over 22 to 13.36, a 39.3% reduction
- Worst case times fell from over 60 days to 19.
Process Quality Not Impacted

** Significant Findings **

We are identifying and fixing our significant issues before external sources identify them.

** ISO9001 Minor Findings **

The Kansas City Plant is operated and managed by Honeywell Federal Manufacturing & Technologies, LLC, for the NNSA.
Questions?