Integrated LeanSigma: Ensuring you are tapping Full Potential

Presenter today

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Senior Advisor, TPG
Facilitator and Member, CISE
Operational Analytics Certification
Program Lead for IIESE

Special Thanks to our Sponsors:

The Poirier Group

ISE at Ohio State (all the great students that went through the ILSS Certification Program 2008-2020)

Chapter #1 IIESE

22 March 2022
PURPOSE:

To provide some case examples to help you benchmark to what Great Integrated LeanSigma DMAIC & DCDOV projects look like.

11:30  A very quick recap of Part I: What is Integrated LeanSigma?

Part II: some detailed examples of great ILSS projects (Case Studies)

Part III: Best in Class IISE Capstone Senior Design Case Studies

12:25  Close out and Adjourn
Knowledge and Experience Base for what I’m sharing today

- Built a BPI program, fueled with Integrated LeanSigma, from scratch.
- Trained and certified over 300 GB’s and BB’s from 2005-2007
- Worked closely with BMGi and Moresteam on curriculum, content, testing, etc.

2007-2020  Director of the ILSS Certification Program for ISE at OSU
- Deployed the course I developed at MDS (tailored format) as a three course sequence in ISE (Tech Elec) that integrated with capstone sr. design and led to dark green belt certification
- Trained over 750 ISE UG’s and G’s at ILSS BB level, certificates at end of 4 ch class
- Certified over 300 ISE UG’s and G’s at the ILSS dark GB level, certifications
- Certified 1 MBB and lectured to Moresteams MBB classes

2020-Present  Director of the Operational Analytics Certification program for IISE
Selected Case Examples

- 2008-2020, 3 course sequence to earn Black Belt Certificate and Dark Green Belt Certification.
- 700+ ISE’s earned their BB Certificates and 250+ earned their ‘dark’ GB Certifications, 3 also went on to earn the BB certifications, 1 to earn MBB.

- I’ve selected a small sampling of DMAIC projects that will illustrate how these projects work, specifically I’m sharing what we call the “Final Tollgate” presentations, essentially the final meetings with sponsors and defenses with review board for certification.
Case Examples we’ll cover

- an assembly plant (floor scales) ‘constraint’ mitigation process improvement project;

- a frozen food plant (Chinese food) with a bio-organic waste in effluent problem;

- A Printing Plant with a change-over, set-up time problem;

- A Medical Device (plastic extrusion and assembly process) defect and measurement system analysis problem;

- A Fire Truck Assembly Plant internal supply chain problem.
At least two ways to think about Integrated LeanSigma—we covered the left side in Part I.

The Operational Excellence, BPI/BPM Program View

• An Enterprise-wide (extended enterprise actually) approach to achieving and sustaining Full Potential Performance.

• Usually involves large-scale organizational change/transformation.

• Integrated LeanSigma is often the core ‘technology’ utilized to drive the process and performance improvement.

• Really is an Integrated Systems Engineering approach.

The Principles, Method, Tools View

• Lean & SixSigma and ISE integrated

• Systematic and disciplined approach at deploying Plan-Do-Study-Adjust using all the principles, methods, tools available to us in Lean, ISE, SixSigma, and related bodies of knowledge/skills.

• Key element is the creation of Process Improvement Specialists—‘Navy Seal’ types that can lead, drive, motivate, facilitate rapid and sustainable process/performance improvement and benefits realization.
Three fundamental ways to grow Enterprise Value

1. **POSITIONING STRATEGY**
   - Improve Positioning via:
     - Geographic Coverage / Offerings Provided / Served Segments / Branding/ Imaging, etc.

2. **VALUE EXCHANGE OPTIMIZATION**
   - Managing the Exchange of Value With Stakeholders:
     - Altering the Give/Get, Responding to unmet and unfulfilled needs, QFD, Innovation, Rebalancing Segment Investment

3. **OPERATIONAL EXCELLENCE**
   - Improve Quality, Efficiency, Productivity, Innovation, Engagement, Quality of Work life, Sustainability
     - Apply principles and methods of ISE and ILSS

**Graphical Representation**

- X-axis = # of customer relationships, Y-axis = Avg Value of those relationships, Z-axis = the ‘stickiness’ of those relationships
ISE + the ‘right’ performance improvement strategy and methods will push ‘levers’ in the EVM and then drive enterprise value growth (every project should map this out)
We’ll focus on the right side today in Part II

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- Key element is the creation of Process Improvement Specialists—’Navy Seal’ types that can lead, drive, motivate, facilitate rapid and sustainable process/performance improvement and benefits realization.
Fundamental Questions and Objectives

At perhaps the highest level the ‘roadmap’ for ILSS is this:

1. How does the system/process work?
2. How does it perform?
3. Why is it under-performing?
4. How do we close performance gaps?
5. How do we ensure our improvements worked, are working, and Enterprise Value is improved?
To do this it was determined that organizations needed Process Improvement Specialists—The New Industrial and Systems Engineering
All ILSS Training and Certification is going to consist of a blended training experience.
Greatness is a lot about disciplined people (thought, word, deed)

Disciplined about what?

Systems & Statistical Thinking
Personal Mastery
Mental Models
Creation Skillful
Team Learning

ISE & ILSS

Other Four Disciplines (04D)

Blending Peter Senge 5th Discipline with Jim Collins Built to Last and Good to Great: Foundational Model for the Program
We augment our training pretty heavily with additional resources and hence end up with “dark” green belts and black belts…. 
ILSS Overarching Principle: Value is Defined by the Customer

VALUE

TO THE

Customer
Is willing to pay for

Business
Requirements to Survive and Thrive

Employee
Attracts and Retains best of best

Shareholder
Requirements to attract investment for growth

THROUGH BUSINESS PROCESS ENGINEERING

Improving Standardization and Discipline and Control with day to day work practices

... with a focus on fixing the processes as a way to improve the System
Roadmaps for Lean, SixSigma and Integrated Lean Sigma as well as DCDOV are easy to find on the IoT.

**Six Sigma**

- **Define**
  - Define the problem

- **Measure**
  - Measure baseline performance

- **Analyse**
  - Analyse performance and identify root causes of problems

- **Improve**
  - Identify & implement methods to solve root cause problems

- **Control**
  - Ensure improvements become embedded

**Lean**

- **Value**
  - Specify value in the eyes of the customer

- **Map**
  - Map the value stream

- **Eliminate**
  - Eliminate waste and variation

- **Flow**
  - Make value flow at the pull of the customer

- **Iterate**
  - Continuously improve in pursuit of perfection
Need to develop agility and flexibility—right method for right situation—but DMAIC (or DCDOV) really still serves as the foundation roadmaps.
The Framework- Design for Lean Sigma (DfLS)

<table>
<thead>
<tr>
<th>Goals</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>D</strong> Define</td>
<td>Obtain customer needs and wants.</td>
</tr>
<tr>
<td><strong>C</strong> Concept Development</td>
<td>Develop Design Feature/functional requirements based on customer needs and wants.</td>
</tr>
<tr>
<td><strong>D</strong> Design Development</td>
<td>Identify engineering and process parameters based on the design features/functions requirements.</td>
</tr>
<tr>
<td><strong>O</strong> Optimize Design</td>
<td>Identify optimal settings for the engineering and process parameters based on data.</td>
</tr>
<tr>
<td><strong>V</strong> Verify Capability</td>
<td>Establish the designed process is capable of meeting the designed target and requirements.</td>
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</tbody>
</table>

"We cannot solve our problems with the same thinking we used when we created them."
Albert Einstein
DMAIC Roadmap Drives Creation of Value
Integrated Systems Engineering (ISE) + the ‘right’ performance improvement strategy and methods will push ‘levers’ in the EVM and then drive enterprise value growth (every project should map this out).

Enterprise Value Map
Practical paths to increase shareholder value
The IoT contains 100’s of good examples, like this,

<table>
<thead>
<tr>
<th>Define</th>
<th>Measure</th>
<th>Analyze</th>
<th>Improve</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Stream Mapping</td>
<td>Process Cycle</td>
<td>Process Constraint ID and Takt Time Analysis</td>
<td>Replenishment Pull/Kanban</td>
<td>Mistake-Proofing/Zero Defects</td>
</tr>
<tr>
<td>Identify Key Input, Process and Output Metrics</td>
<td>Operational Definitions</td>
<td>Cause &amp; Effect Analysis</td>
<td>Stocking Strategy</td>
<td>Standard Operating Procedures (SOP’s)</td>
</tr>
<tr>
<td>Develop Operational Definitions</td>
<td>Develop Data Collection Plan</td>
<td>FMEA</td>
<td>Process Flow Improvement</td>
<td>Visual Process Control Tools</td>
</tr>
<tr>
<td>Develop Measurement System</td>
<td>Collect Baseline Data</td>
<td>Hypothesis Tests/Conf. Intervals</td>
<td>Process Balancing</td>
<td>MGPP</td>
</tr>
<tr>
<td>Collect Baseline Data</td>
<td>Determine Process Capability</td>
<td>Simple &amp; Multiple Regression</td>
<td>Analytical Batch Sizing</td>
<td>Statistical Process Controls (SPC)</td>
</tr>
<tr>
<td>Determine Process Capability</td>
<td>Complete Measure Tollgate</td>
<td>ANOVA</td>
<td>Total Productive Maintenance</td>
<td>Solution Replication</td>
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<tr>
<td>Complete Measure Tollgate</td>
<td></td>
<td>Components of Variation</td>
<td>Design of Experiments (DOE)</td>
<td>Visual Workplace</td>
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<tr>
<td></td>
<td></td>
<td>Conquering Product and Process Complexity</td>
<td>Solution Selection Matrix</td>
<td>Metrics</td>
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<td>Queuing Theory</td>
<td>Piloting and Simulation</td>
<td>Project Transition Model</td>
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<td>Work Control System</td>
<td>Team Feedback Session</td>
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Kaizen Events Targeted in Measure to Accelerate Results

International Standards for Lean Six Sigma (ISLSS)
Check Lists for you to help you prepare for Stage and Gate Meetings (you are only limited by how intentional you are as a learner today)

https://www.dmaictools.com/dmaic-define
Fundamental Questions answered, Analytics, Deliverables Created, etc…….
Fundamental Questions answered, Analytics, Deliverables Created, etc……

- mess
- pain
- needs
- low productivity
- waste
- mis-alignment
- ambiguity
- VoC not clear
- VoP not understood
- weak, poor, no data/facts
- confusion
- data/facts, measurement system is not rationalized, not well designed from PDSA perspective
- culture often doesn’t support “B”

- Stakeholders identified, roles and accountabilities clear, and plan to manage communication and coordination defined
- Purpose and Objectives crystallized and agreed to, DONE defined very explicitly in terms of Key Metrics of Success
- SIPOC and other high level visualizations of the system and processes created and reviewed
  - Failure Modes, Wastes, Variation, Pain points, etc. overlayed
- Current state process capability, key metrics as much as they exist summarized
- Demand on the System understood and characterized (past, present, future)
- Product Families (different workflows or value streams) identified
- Business Case, v1.0 developed (Level 1)
- IMP and strategy to get to DONE created
- Measurement Plan, v1.0 completed and data warehouse started

- alignment
- focus
- clarity
- Primary Y clear and agreed to
- High level understanding of system and processes
- Failure modes, pain points initially highlighted
- DONE defined and agreed to
- strategy to get to done (IMP) agreed to
- initial business case complete
- Stakeholders identified, relationship management plan clear

Start w/

End w/
DEFINE Fundamental Questions and Deliverables

1. What’s the ‘it’? Meaning what’s the problem or opportunity?
2. Why is this important? Voices before and after.
3. What is DONE?
4. Who’s on the team to help me get this to DONE?
5. How do I plan to crack the code on this, get to DONE?
6. When will we be DONE?
7. Stage Gates along the way?

1. System and Process views of how it works, where the waste is, where it breaks down, etc.
2. the impact to the business and customers of closing the performance gap, initial Business Case
3. your Promise, objectives and outcomes
4. Stakeholder Map with RRA
5. IMP along with ‘technologies’ to employ
6. IMS
7. IMS major milestones
8. detailed plan through to next Stage and Gate
Start w/:
- DEFINE stage and gate complete (all the deliverables and outcomes satisfied)
- Voice of Process (VoP) not clear, not complete, not understood
- Measurement System inadequate
- Voice of Customer (who is the customer?) not clear and push or provider view drives things
- no Visible Measurement Systems

End w/:
- VoP complete
- Y = f(x) completed
- measurement and analysis plan finalized through to C stage
- Current State Process Capability thoroughly defined and specified
- Ready to answer questions surrounding what is causing the gap or error in performance

 Fundamental Questions answered, Analytics, Deliverables Created, etc…….

- Measurement Plan refined, Data and Facts (Data Elements) gathered and organized (Y, X and other variables and factors included)
- See next slide
- Value Stream Mapping and other workflow, process maps are completed (how the workflow and processes are accomplished) are completed
- Data boxes, key metrics, KPI’s for the VS’s, processes are defined, specified
- Derivative metrics are created
- Sustainability of measurement issues addressed
- Trilogy analysis completed
- Specification Limits defined and agreed to
- Voice of Process Completed
- Through to the ANALYZE Stage Gate detailed plan created and agreed to
Principles, Roadmaps, Methods, Tools...

The Secret to Success with DMAIC is to not lose sight of DONE (the end game) and the fundamental questions and OKR’s (Objectives and Key Results) for each stage of the roadmap.

Learning the Roadmap is easy.

Getting skillful at picking the right ‘tools’, applying them correctly, sequencing things in the right causal and logical fashion is mostly what certification training is about.

After 750+ projects (coaching and doing), my go to tools are on the next slide:
• Swim Lane (Functional) Flow Maps
• High Level Value Stream Mapping
• Layering (with Visio for example) pain points, failure modes, wastes, control points, critical alignment points on top of Swim Lane Flow Maps
• Management System Modeling
• Exploratory/Graphical Data Analysis (Individual Value Plots, Dot Plots, time series analysis, looking for rational subgroups, etc.)
• Interviewing key stakeholders in the system/process and blending the points of view together to understand current and future states
• SPC in general but Staged Control Charts are very useful
• Simulation when appropriate (Moresteams Process Playground is a neat tool to start with)
• Design of Experiments when appropriate but ANOVA in general, Factor Analysis more broadly
• Creation Skill approach, From-To Charting, Future State focus

People/Students, Young Professionals underestimate the Practice to Play ratio to get from Understanding to Analyzing or Evaluating....
Case Examples we’ll cover

- an assembly plant (floor scales) ‘constraint’ mitigation process improvement project;

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- A Medical Device (plastic extrusion and assembly process) defect and measurement system analysis problem;

- A Fire Truck Assembly Plant internal supply chain problem.
I’m going to take a ‘deconstructed’ approach to sharing tips, learnings, ideas with you...

Key Points—fundamental as Apple Pie, with ice crème of course.

- Picking the ‘right’ projects
- Mapping the Value Stream AND the focal Process and understanding ‘control points’
- Utilizing the power of failure mode identification and analysis
- Sticking to the sequence of fundamental questions
- Creative use of visuals, learning to create AHA moments
- Apply Creation Skillful Methods before you apply Creative Problem Solving Methods
- Map and Analyze the flow of value, focus on optimizing flow
- Learn how to manage ‘resistance’ creatively (Baesman)
- Adopt the Measure What Matters, OKR approach espoused by John Doerr—agile, sprints through stages to Tollgates
  - Utilize discipline Integrated Master Planning, stay focused on DONE DONE.
Best in class Program and Project Management—Agile, fixation on rapid benefits realization

Program Initialization

Engage the ‘Right’ People

Pick the Right Projects

Best in Class Training

Discipline around Methodology

Celebrate Successes to get the ‘fly wheel’ spinning

Develop Habits of Achieving “DONE”

Path between improvement projects and strategic objectives

Capabilities
A set of project deliverables enabling an organization to deliver a desired outcome. They can be a service, function or operation that enables the organization to exploit opportunities. Capabilities exist prior to transition.

Examples: R2A2 clearer due to improved Process Transparency, PML 3-4 is better understood and practiced.

Benefits
Measurable improvements providing a business advantage. Benefits can be both tangible or intangible, are often interconnected and stakeholder specific.

Examples: communication and coordination is improved, R2A2 clarity is better, we are a better process oriented organization, Higher PML's

Examples: Process steps have lower CT/LT's, improved quality, less waste,

End Benefits

Intermediate Benefits

Outcomes
A new operational state achieved after transition of capabilities into five operations. Normally affecting real world behavior or circumstances, they are the manifestations of the future state implemented.

Examples: Key business processes and L3 processes are executed more consistently, less variation, improved quality, less time....

Strategic Objectives

- Profitable Growth
- Maturity of Op Ex

- Cust Experience/Sat
- Employee Experience

Organizational Adoption & Alignment to Solution(s)
Non Value Added Time in Pick, Pack, and Ship

Final Tollgate
April 22, 2014

Eleanor Cooper
GB Candidate
Pick, pack and ship operations begin at the end of assembly, and build the order to completion with picking and packing of kits, then send to the shipping area.
**Problem Statement**
The Pick, Pack and Ship (PPS) operations of the Floor Scale and Vehicle Scale system do not have standard processes for scheduling and communication (information flow) which contributes to wait times, lack of standard workflow, time pressure at the end of the process, and errors in customer orders.

**Opportunity**
From stakeholder interviews and visual observation of the work cell, opportunities include:
- Linking information flow and customer orders to production schedules
- Eliminating wait time and idle time due to communication deficits
- Eliminating the self-directed nature of the workflow in PPS

**In-scope:**
- Information flow in the processes

**Out-of-scope (Identified but not to fix):**
- SAP Issues
- BOM mistakes

**Primary Y:**
Non-value-added time

**Secondary Y:**
Order errors

**Objectives**
- Decreased non-value-added time in the process
- Decrease in errors sent to customers
- Improved information flow and communication standards
- Organized and directed workflow
Pain points from all perspectives

Voice of External Customers
- On-time delivery
- Order accuracy
- Responsiveness

Voice of Internal Customers (Production)
- Defined Schedules
- Clarity of Responsibilities
- Communication
- Business flexibility
- Customer service level

Voice of Business (MTMS)
- Operating Costs
- Efficiency
- Consistency

These will become the CTPCs - Critical To Performance Characteristics

These are the pain points currently being experienced

- PPS operations must work efficiently to deliver orders at specified times
- Orders delivered are not correct to customer specifications
- Changed orders/dates cause rushed and chaotic operations
- Customer orders and production schedules are not closely linked
- Processes and responsibilities are shifted depending on orders and time available
- Correct information is not transferred at correct time
- Lack of ability to adjust quickly with changing orders
- Must be able to satisfy customers through order accuracy and on-time delivery
- Costs are increased with error correction efforts
- Non-value-added time is present in operations
- There is not consistent workflow and communication
Business Case – Why this project?

MTMS Shareholder Value

Revenue Growth
- Retain and Grow Current Customers
- Improve responsiveness to customer requests and inquiries
- Improve tracking of customer interactions
- Improve Quality Assurance Programs

Operating Margin
- Improve Customer Interaction Efficiency
- Improve emphasis on design for packing/shipping efficiency
- Improve pick, pack, and ship processes
- Provide staff with better customer and order information
- Improve order management methods and tools

Asset Efficiency
- Improve Development and Production Efficiency
- Improve Production Scheduling & Staging Process
- Improve Capacity Planning Processes, skills, and tools
- Improve manufacturing and quality control processes

Expectations
- Improve PPE Efficiency
- Reconfigure facilities/increase utilization of facilities
- Increase utilization of IT systems

Improve Execution Abilities
- Establish a culture centered on operational excellence
- Increase emphasis on quality management and benchmarking
- Improve sharing of knowledge across organizational boundaries

Improving pick, pack and ship processes directly relates to the operating margin of the business

Business Case is comprised of two parts:
1. Non Value Added Time savings of $75/hour x #hours
2. Error Correction/Investigation Savings—Over $38,000 annually (slide 11)
## Define Stage Recap

### Problem Statement
The Pick, Pack andShip (PPS) operations of the Floor Scale and Vehicle Scale system do not have standard processes for scheduling and communication (information flow) which contributes to wait times, lack of standard workflow, time pressure at the end of the process, and errors in customer orders.

### Metrics:
<table>
<thead>
<tr>
<th>Primary Y:</th>
<th>Secondary Y:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-value-added time</td>
<td>Order errors</td>
</tr>
</tbody>
</table>

*For all others that were tracked, see measurement plan.*

### In-scope:
- Information flow in the processes, scheduling, workflow
- SAP integration/use/practices

### Out-of-scope (Identified but not to fix):
- SAP system issues, BOM mistakes

### What does "done" look like?
- Reduced NVA time in the PPS process
- Improved and standardized communication and information flow in PPS
- Standard scheduling practices
- Reduced order errors, error proofing practices in process

### Business Case

**How much is spent on non-value-add work?**
(assume average of 3 hrs/day)

\[
\text{3 hrs/day} \times \text{240 days} \times \text{4 workers in PPS} \times 75/\text{hr} = \$216,000 \text{ for NVA work annually}
\]

**What kind of errors does this chaotic process translate to?**

\[
\text{\$989 total per error} \times 3.2 \text{ errors per month} \times 12 \text{ months} \approx \$38,571 \text{ for known order correction costs annually.}
\]

**Additional Hard Costs:**
- Packaging costs (varies between errors)
- Inventory costs (varies between errors)

**Additional Intangible Costs:**
- Customer dissatisfaction
- Cost of disruption
What do we want to see in April?

<table>
<thead>
<tr>
<th>Element to be Tracked</th>
<th>Current Value</th>
<th>Future Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling release accuracy</td>
<td>31.2% released on time</td>
<td>↑</td>
</tr>
<tr>
<td>Computer and Paperwork in Kit Packing</td>
<td>23% of time</td>
<td>↓</td>
</tr>
<tr>
<td>Average time of orders sitting without pick lists?</td>
<td>43 minutes</td>
<td>↓</td>
</tr>
<tr>
<td>Scheduling time (Mostly Tom)</td>
<td>~.5 hours a day</td>
<td>↓</td>
</tr>
<tr>
<td>Order Errors</td>
<td>~4 per month</td>
<td>↓</td>
</tr>
</tbody>
</table>
Recap of Quick-Wins

Done

- **Shipping Form Completion**
  - Meeting: Jon Berger, Carolyn Pulley, Kathy Westervelt
  - Just a miscommunication—they did not know it was needed

- **Elimination of old kits**
  - Need to form a standard of when to check for old kits

- **Wire/Storage and Organization**
  - The storage will be eliminated
  - Tom kits the wires right when needed for Steve
  - Track double handling

- **Classification of Materials By Usage**
  - Won't look at layout/restructuring
  - Kit studies will confirm efficiency

In Process

- **Creation of Kits for Shipping**
  - Curtis will manipulate SAP so that Brent may give Steve the production order BOM without releasing the order to the floor.
  - Will track the frequency of doing this to see if in the long term a restructuring of the BOM is necessary
Key Areas for Measurements

First part of Assembly will not be involved in measurement plan

**Assembly**
- Receive Production Order (Quintin/Zack)
  - Chose correct frame/skid
  - Assemble Scale
  - Confirm Production Order complete
  - Send unpacked, possibly incomplete scale to shipping

**Picking/Packing**
- Receive Production Order (Tommy)
  - Assemble Kit
  - Check VA03 to ensure complete
  - Inspect and Stage
  - Wait for order to move to shipping
  - Move to shipping area when needed
  - Pack skid with all necessary parts/kits
  - Move to shipping area

- Receive Production Order (Stacie)
  - Assemble Kit
  - Check VA03 to ensure complete
  - Inspect and Stage
  - Pick list generated
  - Move to shipping area

**Shipping**
- Receive Production Order (Steve)
  - Kit received (from Tommy)
  - Check VA03 Production order
  - Add items specified to kits from Tommy
  - Confirm order in SAP
  - Wait for necessary paperwork (mostly exports)
  - Order loaded
  - Staged for truck
  - Ship products

**Q:** Queue Time
**S/O:** Scheduling/Organization time
**Tr:** Transportation
**Arr:** Arrival time at shipping
**Pr:** Process time
**Err:** Order Errors

Staging/Loading not in scope, no measure after paperwork complete
What the process is currently doing to the lead time...

Breakdown of lead time for random 10% of the 360 studied

If released as SAP schedules, orders would be kitted the day before use, a max. time of 48 hours.

Lead Time Break Down

How do we achieve this?
...and what we will see in March 2015

The successful completion of the following projects:
- Capacity Planning and Load Leveling
- Floor Scale Work Redesign
- Scheduling Optimization
- Pick/Pack Redesign
- SAP Integration

What the kit lead time can look like with pull:

What steps are being taken to get to DONE in March 2015?

NVA ~ 20%
Recap of Concepts for the Future State

Moving From:

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
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<tbody>
<tr>
<td>72hr</td>
<td>3 days</td>
</tr>
<tr>
<td>144hr</td>
<td>6 days</td>
</tr>
<tr>
<td>178hr</td>
<td></td>
</tr>
<tr>
<td>220hr</td>
<td></td>
</tr>
<tr>
<td>270hr</td>
<td></td>
</tr>
<tr>
<td>216hr</td>
<td>9 days</td>
</tr>
<tr>
<td>288hr</td>
<td>12 days</td>
</tr>
</tbody>
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Moving To:

What are we addressing to close the gap?

- Order release
- Order scheduling
- Production order process times
- Pick list distribution in shipping
- Floor scale workflow adjustment
- Truck scale order staging

We reviewed these elements in our last meeting:

...and where they occurred in the process:

Now what?

1. FS shipper will have orders to process immediately upon arrival
2. Pick list will be received a designated time before order leaves (1-8)
3. Order will be done and staged a designated time before (1-4)
4. Time buffer for complications

...and detailed how the process will work at each step.
Floor Scale Process—where do the projects that are planned come in the process?

**Blue: Tools being created**

**Orange: Longer-term projects**

**Green: Other lean elements**

*Note: shading shows progress*

Gantt Chart will lay out future projects to aid in the transition

**Process/Workflow Redesign** to enable completed scales to be sent to shipper and eliminate rework/idle time of unfinished goods

**Defect Prevention** by eliminating a step that allows miscommunication

**SAP Integration** will take place to make order release/BOM changes

**Lead time expectations**

**Inventory buildup is unavoidable** here due to the nature of the delivery schedule.

**Capacity planning and demand analysis** could lead to realization that this employee can be a floater/better utilized

**Scheduling and order release improvements** will enable more visibility of work content and better utilization

**Visual processes** can be bettered with more devoted use to hour by hour board

**Core pull by day** is attainable with tool in assembly—only producing what will ship that day, controls the lead time.

**Changeover/Setup Reduction** by doing scales in predetermined optimal sequence

Floor scale capacity and scheduling tool

Assembly receives schedule → Assembly completes scales → Assembly transports scales to shipping area → Semi Finished Goods → Shipper adds necessary items → Shipper completes paperwork → Order ready on dock → Finished Goods → Customer Demand

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**Core pull by day** is attainable with tool in assembly—only producing what will ship that day, controls the lead time.
Truck Scale Process—projects and elements to be addressed

**Blue:** Tools being created  
**Orange:** Longer-term projects  
**Green:** Other lean elements  
*Note: shading shows progress*

- **Pick/Pack Initiative (led by Aaron)** will lead to standard kits that can be stocked
- **Scheduling and order release improvements** will enable more visibility of work content and better utilization
- **Visual processes** can be bettered kanbans and color coded standard kits and HxH boards
- **Strategic buffer/kanban** will come into affect after pick/pack project to stock these standard kits.
- **Order confirmed and verified by shippers**
- **Order staged for truck loaders**
- **Order loaded on truck**
- **Truck departs**
- **Customer Demand**
- **Gantt Chart** will lay out future projects to aid in the transition
- **Lead time expectations**
- **SAP Integration** will take place to make order release/BOM changes
- **Core pull by order** will be attainable after completion of projects.
- **Truck Scale Planning Tool** will dictate release until SAP/scheduling is fully adjusted

- **Core pull by order** will be attainable after completion of projects.

- **Capacity planning and demand analysis** could lead to realization some tasks should be redistributed

*Note: shading shows progress*
**How will the process work at each step?**

1. **Orders are released ON release date**
2. **Released orders and pick lists are generated into schedule at the beginning of the day**
3. **Production orders and pick lists have estimated process times that allow schedule generation**
4. **Production orders will have an approximate due time**

---

**Sales**

- **Start**

  - Orders are entered in by sales function who gets the customer order

**SAP (IT)**

- **Order becomes planned order in SAP**

  - Production order stay as planned order until SAP release date (usually day before Goods Issue Date—or day it leaves)

**Production Scheduler**

- **Production order released on release date**

  - Released orders and pick lists are generated into a schedule at the beginning of the day/day before

**Schedule Optimizer**

- **Production orders have a general process time associated with them**

  - Pick lists have a time estimate depending on what items/how many items need to be picked
How will the process work at each step?

1. Pick lists that are ready are completed first
2. Production orders completed next
3. If production order generates a pick list (if for that day) generate to worker's computer
4. Production orders for next day delivery will be placed in designated area with date

### Element to be Tracked

<table>
<thead>
<tr>
<th>Element to be Tracked</th>
<th>Impact Desired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling release accuracy</td>
<td>Inc.</td>
</tr>
<tr>
<td>Computer and Paperwork in Kit Packing</td>
<td>Dec.</td>
</tr>
<tr>
<td>Average time of orders sitting without pick lists?</td>
<td>Dec. 3</td>
</tr>
<tr>
<td>Scheduling time</td>
<td>Dec. 1</td>
</tr>
<tr>
<td>Order Errors</td>
<td>Dec. 4</td>
</tr>
</tbody>
</table>

### Overall Process

- **Orders entered into system**
- **Orders and pick lists released to production**
- **Packer receives production order and assembles kit**
- **Kit set aside or put on shelf**
- **Pick list generated for shippers, gather remainder of order**
- **Paperwork/confirmation and verified by shippers**
- **Order staged for truck**
- **Truck loading/Order loading**
- **Truck leaves facility**

### SAP (IT)

- **Orders entered into system**
- **Orders and pick lists released to production**
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- **Paperwork/confirmation and verified by shippers**
- **Order staged for truck**
- **Truck loading/Order loading**
- **Truck leaves facility**

### Worker 1

- **Receive schedule from production scheduler**
- **Complete pick lists that were generated first**
- **Complete production orders by time specified**
- **Place production order (kits) in designated WIP area with date packed**
- **Move to shipping area**
- **End**

### Worker 2

- **Receive schedule from production scheduler**
- **Complete pick lists by end of shift/time specified if applicable**
- **Complete production orders by time specified**
- **Place production order (kits) in designated WIP area with date packed**
- **Move to shipping area**
- **End**

### FS Shipper

- **Completed items put in designated area**
- **Complete paperwork**
- **Ready for pick up by carrier**
- **End**
How will the process work at each step?

**Overall Process**

- Orders entered into system
- Orders and pick lists released to production
- Packer receives production order and assembles kit
- Kit set aside or put on shelf
- Pick list generated for shippers, gather remainder of order
- Paperwork/confimation and verified by shippers
- Order staged for truck
- Truck loading/Order loading
- Truck leaves facility

**FS Shipper**

1. Completed items put in designated area
2. Complete paperwork
3. Place in designated area
4. Ready for pick up by carrier
5. Carrier arrives, loaded
6. Orders leave facility

**TS Shipper**

1. Receive kits from worker
2. Receive pick list for TS delivery (designate a time beforehand)
3. Complete pick list (designate a time beforehand)
4. Place order in labeled area of workcell
5. Staged, complete order
6. Complete any necessary action items

**Element to be Tracked**

<table>
<thead>
<tr>
<th>Element to Be Tracked</th>
<th>Impact Desired</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Inc.</td>
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<tr>
<td>Computer and Paperwork in Kit Packing</td>
<td>Dec. 3</td>
</tr>
<tr>
<td>Average time of orders sitting without pick lists?</td>
<td>Dec. 2</td>
</tr>
<tr>
<td>Scheduling time</td>
<td>Dec. 1</td>
</tr>
<tr>
<td>Order Errors</td>
<td>Dec. 2 3 4</td>
</tr>
</tbody>
</table>

**Impact**

1. FS shipper will have orders to process immediately upon arrival
2. Pick list will be received a designated time before order leaves (t-8)
3. Order will be done and staged a designated time before (t-4)
4. Time buffer for complications
### Through to DONE—Now to March 2015

#### APRIL 2014
- Determine where load leveling occurs presently
- Determine problems and failure modes for current state load leveling
- Observe and describe miscommunications in FS that add rework
- Define the errors/miscommunications and develop a data sheet to collect info (4/22)
- Roll out data sheet (4/22)

#### MARCH 2015
- No days over capacity
- Workers are not given too much/too little work
- Clearly defined daily schedules for workers, outline of work to be done and when
- All ramps and frames added at assembly
- Standard kits incorporated into Kanban system
- All process times and new standard kits incorporated
- Necessary changes made for FS project

### Floor Scale Redesign
- Pull all production data
- Analyze top percent of demand
- Get time estimates from workers for top demanded material numbers
- Sum all demand and time by worker to compare
- Determine where load leveling occurs presently
- Determine problems and failure modes for current state load leveling

### Scheduling Optimization
- Observe and describe miscommunications in FS that add rework
- Define the errors/miscommunications and develop a data sheet to collect info (4/22)
- Roll out data sheet (4/22)

### Pick/Pack Initiative
- No days over capacity
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- Clearly defined daily schedules for workers, outline of work to be done and when
- All ramps and frames added at assembly
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- Necessary changes made for FS project

### SAP Integration
- No days over capacity
- Workers are not given too much/too little work
- Clearly defined daily schedules for workers, outline of work to be done and when
- All ramps and frames added at assembly
- Standard kits incorporated into Kanban system
- All process times and new standard kits incorporated
- Necessary changes made for FS project

---

**Lead time (order release to shipping) from study of a Install KOP for Vehicle Scales:**

- 0hr: 52hr
- 72hr: 1 hr
- 144hr: 178hr
- 216hr: 228hr
- 288hr: 270hr

**Sample Kit Lead Time Sample:**

- 00hr: NVA ~ 20%
Objective of This Project

The objective of this project is to analyze the current state of work allocation and demand. This project will help determine if roles and responsibilities are properly divided amongst workers to handle the demand. This project will also take action to prevent having days that are over capacity, i.e., not enough workers to satisfy all orders. This will help reduce the chances that orders are released early to smooth demand, thus reducing lead times of those orders. A new process for analyzing capacity before the orders get to production will be an outcome.

Timeline of Migration Tasks

In a work session held to discuss the migration to pull and the completion of this project, key tasks for this project were mapped to a timeline. The summary of these key tasks should be completed is detailed below:

By April 2014
- Determine where load leveling occurs presently
- Determine problems and failure modes for current state load leveling

By June 2014 (Q2)
- Determine current average daily demand and capacity by worker
- Analyze/compare daily demand by worker and total available time

Let's review the projects, their objectives, and what has been accomplished to this point.
Significant Accomplishments and Next Steps

**Significant Accomplishments:**

- Time studies completed on kit packing showed that the kitting process itself is efficient
- Collected data on lead time of kits
  - Brought to light the variability and large range of times that kits are in the system
  - Caused shift in project direction to creation of a future state pull system
- Key areas identified for changes that will enable pull to take place
- Lean elements were identified and tied to the process
- Two Excel tools were created that will facilitate the shift as well as encourage pull
- Migration strategy was drafted as a team to prioritize and determine ownership
- Transition/Hand-off Meetings were completed to transfer ownership

**Next Steps:**

**For Me:**

- Update project plan on drive
- Complete FS tasks today
- Will ensure hand-off documents contain any extra files that have been completed in the last week
- Will email the hand-off documents

**For the Team:**

- Review the hand-off document (will be updated by tomorrow)
- Ask any questions you have (by April 28th!)
- Stay committed to the objectives of each project
Looking ahead to Verify—a Project Plan

- Just a snapshot of Gantt chart is shown below—don’t worry about details yet!
- Future plans to add: **Will have** Leads for **Finalize**

<table>
<thead>
<tr>
<th>Item Number</th>
<th>WBS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Load Leveling and Capacity Planning in Order Entry</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Current state analysis</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Determine where load leveling occurs presently</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Determine problems with current levels of load leveling</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Determine current state capacity by worker</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Determine average daily demand by workstation</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Compare demand to available working time</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Analyze capabilities of SAP in relation to load leveling</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>Analyze potential adjustments to labor distribution</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>Present potential adjustments to stakeholders/management</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Implement adjustment if decided upon</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>Retrain based on new roles</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Create new SOPs and workflow for new roles</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>Requirements gathering</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>Work/Process Adjustment and Reallocation for Floor Scale</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>Updated current state analysis</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>Review Joey’s project Value Stream Map</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>Ensure all process times are consistent with his time studies</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>Data collection and analysis of errors</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Observation and analysis of inefficiencies</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>Create data collection method for assembly/shipping</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>Define and track miscommunication frequency</td>
</tr>
</tbody>
</table>

This document will help pass the baton!
Key Points from Mettler Toledo, highlighted

- Picking the ‘right’ projects
- Mapping the Value Stream AND the focal Process and understanding ‘control points’
- Utilizing the power of failure mode identification and analysis
- Sticking to the sequence of fundamental questions
- Creative use of visuals, learning to create AHA moments
- Apply Creation Skillful Methods before you apply Creative Problem Solving Methods
- Map and Analyze the flow of value, focus on optimizing flow
- learn how to manage ‘resistance’ creatively
- Adopt the Measure What Matters, OKR approach espoused by John Doerr—agile, sprints through stages to Tollgates
  - Utilize discipline Integrated Master Planning, stay focused on DONE DONE DONE.
- Disciplined Project Transition Action Plan (PTAP)
Case Examples we’ll cover

- an assembly plant (floor scales) ‘constraint’ mitigation process improvement project;
- a frozen food plant (Chinese food) with a bio-organic waste in effluent problem;
- A Printing Plant with a change-over, set-up time problem;
- A Medical Device (plastic extrusion and assembly process) defect and measurement system analysis problem;
- A Fire Truck Assembly Plant internal supply chain problem.
The Kahiki Performance System
BOD Waste Reduction

Final Tollgate

March 16th, 2010

Belt Candidate: Jared Frederici
MBB Coach: Scott Sink
Project Champion: Mark Novak
The BOD issue...

What is BOD?

<table>
<thead>
<tr>
<th>Summary</th>
<th>What This Means to Us</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD</td>
<td>Biologically Active Organic Matter</td>
</tr>
</tbody>
</table>

Problem Statement: Current operations produce BOD waste levels averaging 3864 mg/L – 1546% higher than the upper spec limit from Columbus City Utilities.

Goal Statement: At least 50% reduction in BOD by 3/15/10 and the creation of a sustainable system capable of reaching a long term target of 95% reduction.

VOC Customer Spec Limits:

- BOD: <= 250 mg/L
- TSS: <= 300 mg/L
- TKN: <= 40 mg/L

Kahiki Average 2008/2009:

- BOD: 3864 mg/L
- TSS: 1995 mg/L
- TKN: 89 mg/L

Primary Y
Drain Utilization “Hot Spot” Chart
Where do we attack Waste Generation?

Legend

- 0-4 lbs Daily
- 0.750 – 1.5 lbs Daily
- 1.5 lbs + Daily

- 70% of Waste Collected from:
- 25% of Waste Collected from:
- 5% of Waste Collected from:

- 5 Worst Drains: 37, 9, 20, 21, 2

- 3 “Areas” to Target: Raw Process, Bagger Area, Dishwash

Data Collection Defense
BOD Status --- Real Results
Where we’ve been, what we’ve done and where we’re going
December – January

**Awareness on Sweeping Solids into Drains**
Have seen improvement (still much left to do)

Combining left over batter with fry and other crumbs --
- solidifying liquids to throw away with solids

**Better Batter Practices**
Mix solids and liquids and throw away. NOT letting excess batter go down drains
December – January

Methycellulose Pilot ran, 2\textsuperscript{nd} Pilot TBD for an entire shift. Delayed Implementation April/May

Pilot Test ran organized for February Launch

December – January BOD Average = 2295 mg/L

40.4\% Reduction From 09 Average

$91,155 Savings at This Level
BOD Status --- Real Results
Where we’ve been, what we’ve done and where we’re going

BOD Real and Forecasted Results

Date

mg/L

08/09 Average

Tier 1

Pilot Tier 1

Forecasted Tier 1,2

Forecasted Tier 1,2,3

Forecasted Tier 1,2,3

X=350

X=3864

X=1375

X=1333

X=2294

1-23-2008

5-9-2008

2-13-2009

8-19-2009

12-15-2009

1-23-2009

3-17-2010

5-16-2010

7-15-2010

8-18-2010

12-17-2010
February 2\textsuperscript{nd} - 5\textsuperscript{th}

Separator Pilot Test ran February 2\textsuperscript{nd}-5\textsuperscript{th}
Install Successful – issues with Spillover
Shipped Back February 17\textsuperscript{th}

February 2\textsuperscript{nd} – 5\textsuperscript{th} Pilot Results = 1375 mg/L

65.1\% Reduction From 09 Average

$151,106 Savings at This Level

Unit Purchased 2/19/10
Drawings to Arrive 3/8/10
Arrival of Unit Expected 5/21/10

$ Information
BOD Status --- Real Results
Where we’ve been, what we’ve done and where we’re going

BOD Real and Forecasted Results

08/09 Average

Tier 1

Pilot Tier 1

Forecasted Tier 1,2

Forecasted Tier 1,2,3

mg/L


Date

Forecasted Tier 1,2,3

X=350

1 1

X=1333

X=1375

X=2294

X=3864
Employee Training – 3 Phases:
(1) – All Employee Training 2/30th Tuesday Meeting
(2) – Small Group Based Lessons
(3) – Individual 1 on 1 Training and Refinement

Initial Formation of Best Practice Documentation:
- Batter Practices (100%)
  - Sauce Practices (95%)
  - Fry Oil Practices (75%)

Formation of WAP Committee (Best in Class Do This)
- 7-10 Employees Representing 1-2nd Shift Dishwash, Raw Process, Fry, Packaging and Sanitation
  “Waste Awareness Program”
February 17th - Current

Drain Close Off --- Removing Opportunities for a “Defect” to Occur. Provides Visual ID
Material Ordered 2/25 to fit
Full order week of 2/29

Drain Basket Optimization

Grease Interceptor Upkeep “One Point Lesson”
-SOP’s established to determine frequency of Pumping. Proper upkeep is critical!

February - May BOD Average Forecasted = 1335 mg/L
Separator Install 5/21
≈70% Reduction From 09 Average

$155,000 Savings at This Level
BOD Status --- Real Results
Where we’ve been, what we’ve done and where we’re going

BOD Real and Forecasted Results

08/09 Average

Tier 1

Pilot Tier 1

Forecasted Tier 1,2

Forecasted Tier 1,2,3

Date

mg/L

May – December 2010 and on

Root Cause Attack – Waste Creation
Waste is created which causes the need to deal with – how do we not create waste?
1. Increase Throughput Yield (Methyl-cell)
2. Better Forecasting (reducing overproduction)
3. Equipment Modifications (rice depositor, etc)
To Be tackled and sustained by: Brad, John G, WAP, Focused Improvement Pillar

PM Program for Plant Equipment
Leaks in equip/machines will drip on floor – need to be reduced
1. Development of All Monitor Points
2. Development of Auditing Frequency
3. Execution/Enforcement
To be led by Brad with Danny

Continued Best Practice Development
Establishing better methods, documenting these methods, making visuals SOP’s and enforcing
To be led by WAP
May – December 2010 and on

New Lyco Separator May 21st, 2010
Will help gap between refined SOP’s T3 Soln’s
Will need to develop revamped cleaning methods
and fine tune traveling spray, turn on switches, etc.
To be led by Brad

More Efficient and “Green” Waste Removal
More dry cleanup – More waste to remove
Griffin Industries: Collects and Recycles:
Meat/Poultry By Products
Grease
Waste from Baking
POC – Mark (Also ORS info)

Continued Employee Training
New Hire training program
Best Practices Training Updates
Led by WAP, Todd, Diana, Kurt

May – December BOD Average Forecasted = Converge to 350 mg/L
Separator Install 5/21
95% Reduction From 09 Average
$195,000 Savings at This Level
## Formal Business Case 3/12
### Real and Forecasted $ Savings and Ancillary Benefits

### Last Year

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 1st Quarter Cost (BOD)</td>
<td>$21,408.60</td>
</tr>
<tr>
<td>Total 1st Quarter Cost (TSS)</td>
<td>$8,047.38</td>
</tr>
<tr>
<td>Total 1st Quarter Cost (TKN)</td>
<td>$273.57</td>
</tr>
<tr>
<td><strong>1st Quarter Total (12/08/08-2/15/09)</strong></td>
<td><strong>$29,729.55</strong></td>
</tr>
<tr>
<td>Total 2nd Quarter Cost (BOD)</td>
<td>$44,990.75</td>
</tr>
<tr>
<td>Total 2nd Quarter Cost (TSS)</td>
<td>$14,124.22</td>
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<tr>
<td>Total 2nd Quarter Cost (TKN)</td>
<td>$520.03</td>
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<tr>
<td><strong>2nd Quarter Total (2/15/09 - 5/15/09)</strong></td>
<td><strong>$59,635.00</strong></td>
</tr>
<tr>
<td>Total 3rd Quarter Cost (BOD)</td>
<td>$46,567.79</td>
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<tr>
<td>Total 3rd Quarter Cost (TSS)</td>
<td>$13,145.26</td>
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<tr>
<td>Total 3rd Quarter Cost (TKN)</td>
<td>$715.26</td>
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<tr>
<td><strong>3rd Quarter Total (5/15/09 - 8/12/09)</strong></td>
<td><strong>$60,428.32</strong></td>
</tr>
<tr>
<td>Total 4th Quarter Cost (BOD)</td>
<td>$41,319.85</td>
</tr>
<tr>
<td>Total 4th Quarter Cost (TSS)</td>
<td>$11,591.10</td>
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<tr>
<td>Total 4th Quarter Cost (TKN)</td>
<td>$285.98</td>
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<tr>
<td><strong>4th Quarter Total (Projected) (8/12/09 - 12/8/09)</strong></td>
<td><strong>$53,196.93</strong></td>
</tr>
<tr>
<td><strong>Total Annual Extra Strength Cost (FY 2009)</strong></td>
<td><strong>$203,989.80</strong></td>
</tr>
</tbody>
</table>

### Projected 2010

#### Realized

<table>
<thead>
<tr>
<th>Month</th>
<th>Monthly Surcharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>$6,422.29</td>
</tr>
<tr>
<td>February</td>
<td>$3,743.13</td>
</tr>
<tr>
<td>March</td>
<td>$3,554.23</td>
</tr>
<tr>
<td>April</td>
<td>$3,459.75</td>
</tr>
<tr>
<td>May</td>
<td>$3,252.67</td>
</tr>
<tr>
<td>June</td>
<td>$1,288.54</td>
</tr>
<tr>
<td>July</td>
<td>$1,211.76</td>
</tr>
<tr>
<td>August</td>
<td>$756.65</td>
</tr>
<tr>
<td>September</td>
<td>$655.87</td>
</tr>
<tr>
<td>October</td>
<td>$554.48</td>
</tr>
<tr>
<td>November</td>
<td>$452.37</td>
</tr>
<tr>
<td>December</td>
<td>&lt;$300</td>
</tr>
</tbody>
</table>

**2010 Total Est. Charges:** **$25,624.45**

#### Forecasted

- **2009 vs. 2010 Forecasted Savings:** **$178,365.35**
- **2010 Estimated Project Costs ≈ $51,550**
- **2010 Estimated Project Profitability ≈ $126,515**

### Other Benefits
- Green Initiative supporting Ocean Conservancy
- Future Implementation will increase Throughput
- Separator may warrant less sump pumping $$$
- Cost reduction may reallocate budgeted funds to other opportunities

### Other Benefits (Continued)
- Methylcellulose and other similar projects could create better taste profiles and reduce sodium content
- Created waste system properties allows for expansion
- Water usage reduction
Past State:

- BOD/TSS levels cut 70%
- BOD -- 1375 mg/L
- TSS -- 790 mg/L
- System incapable of meeting customer spec
- $204,000 in extra strength surcharges FY 2009
- No current measurement system for solid waste measurement
- Ineffective solid separator
- No formal SOP's regarding the handling of waste

Now:

- BOD/TSS levels cut 70%
- BOD -- 1375 mg/L
- TSS -- 790 mg/L
- System capable of reaching long term targets
- $151K savings at current levels
- Measurement system generated
- Lyco solid separator purchased
- Initial employee training and best practice ID w/ one point lessons and correct/incorrect documentation in works

Future (12/15/10):

- BOD/TSS levels cut 95%
- BOD -- 350 mg/L
- TSS -- 290 mg/L
- Specs capable and close to being completely in spec
- $195K savings at current levels
- Lyco solid separator fully functioning
- Employees trained in 3 phases, WAP Committee developing better practices, visual SOP’s in place, results sustained

March 19th, 2009

September 23rd, 2009
Key Learning's and Takeaway’s

• ≈70% Reduction in BOD from 2008/2009 Average realized

• Bulk of improvements started on the plant floor and realized from more dry cleanups...

• Separator gets us roughly 30% more of the solution – Fiscally responsible “band-aid” on the system --- root causes addressed w/ long term strategy attacking waste creation

• Sustainability hinges on active employee involvement in solutions (WAP) and training

• Don’t reinvent the wheel – this problem has been solved before, however using DMAIC tools created a Custom solution to Kahiki’s needs, implementing solutions at “hot spots” to get the big fish

• More dry cleanups = more solid waste in landfill – project team investigating companies that recycle and re-use waste for animal feed and/or fuels.

• Estimated $178,XXX in savings – direct bottom line results and also the right thing to do as a Green organization. The system is bigger than any one food manufacturer.
Key Points from Kahiki, highlighted

- Picking the ‘right’ projects
- Mapping the Value Stream AND the focal Process and understanding ‘control points’
- Utilizing the power of failure mode identification and analysis
- Sticking to the sequence of fundamental questions
- Creative use of visuals, learning to create AHA moments
  - Great use of Staged Control Charts
  - Great ppt skills, animation
- Apply Creation Skillful Methods before you apply Creative Problem Solving Methods
- Map and Analyze the flow of value, focus on optimizing flow
- Learn how to manage ‘resistance’ creatively
- Adopt the Measure What Matters, OKR approach espoused by John Doerr—agile, sprints through stages to Tollgates
  - Utilize discipline Integrated Master Planning, stay focused on DONE DONE.
Case Examples we’ll cover

- an assembly plant (floor scales) ‘constraint’ mitigation process improvement project;

- a frozen food plant (Chinese food) with a bio-organic waste in effluent problem;

- A Printing Plant with a change-over, set-up time problem;

- A Medical Device (plastic extrusion and assembly process) defect and measurement system analysis problem;

- A Fire Truck Assembly Plant internal supply chain problem.
Printing Press Make Ready
Standardization and Time Reduction

Baesman Printing

August Secue
A better representation of the Make Ready: 4C-7C Process Control and Capability

- Remove 1C-3C jobs for a better representation of the process
- Data is skewed right and fits a gamma distribution
- Highest p-value with Johnson Transformation
- Pp = 0.13, Ppk = -0.16
- Process is in control but not capable

- 4C-7C in control
  - Mean = 16.02
  - SD = 10.01

- 4C-7C jobs account for over 70% of all work
Discovery and realization of root causes

**Prioritized List of Root Causes**

1. Lack of standardization in how to perform the process between crews
2. Waiting waste – parts of process than can be done during run (internal activities) are being done after the run is completed.
3. Pre-press Errors (eg paper missing or incorrect, job bags are confusing
4. Old press rollers and dryers causing printing errors
5. Lack of color curve standard on new inks resulting in long impression make readies
6. Materials scattered and distance from the work areas

---

**Why are these Root Causes?**

- Interviewing, suggestions, and knowledge from experience through pressmen, David Kirkman, Dave Moore, Mark Acree, and Dr. Sink
- Analysis of Make Ready data to weed out sources of variance
- Inspection of the process
- Research
    - Case Study of DMAIC project done in the Pharma industry on changeover reduction with several similar root causes
Developing and prioritizing of solution elements

Prioritized List of Solution Elements

1. Standardization of the process
2. Machine Maintenance
3. Implementing SMED on the process
4. Material Staging and 5S
5. Establishing Color Curve Standards

Why are these Solution Elements?

- Interviewing, suggestions, and knowledge from experience through pressmen, David Kirkman, Dave Moore, Mark Acree, and Dr. Sink
- Inspection of process and studying of standardization and SMED
- Research
  - [http://www.cma4results.com/AREnmag809.pdf](http://www.cma4results.com/AREnmag809.pdf)
    - The benefits and uses of standardized work
    - Case study where standardization, 5S and SMED are uses
How Developed Solution Elements will Address our Root Causes

Prioritized List of Solution Elements

1. Standardization of the process
2. Machine Maintenance
3. Implementing SMED on the process
4. Material Staging and 5S
5. Establishing Color Curve Standards

Prioritized List of Root Causes

1. Lack of standardization in how to perform the process between crews
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4. Old press rollers and dryers causing printing errors
5. Lack of color curve standard on new inks resulting in long impression make readies
6. Materials scattered and distance from the work areas
So far we have seen a reduction in:
- Average by 3 minutes
- Deviation by 4.5 minutes

Current State

Future State (Forecasted)

Improvement Implementation Plan

$X = 16.03\text{ min/unit}$

$X = 7.62\text{ min/unit}$

Click event on timeline for in-depth explanation
Meeting with David and all pressmen to edit first copy of SMED method

Meeting with David Kirkman to form Final SMED Method

SMED Implemented 2/15/10
Project Plan and Next Steps

Recently Completed (Actual Completion Date)
- Maintenance and Staging Improvements Test Completed and Measured (2/12/10)
- SMED Method Established and Implemented (2/15/10)
- Control Plan and PTP Developed (2/20/10)
- Improve/Control Tollgate (2/24/10)

In Progress (Target Completion Date)
- SMED Test Run (2/26/10)

Upcoming Events (Start Date – Finish Date)
- Measure SMED Method Improvement (2/27/10 – 2/30/10)
- Audit Time Recordings (3/1/10 – 3/12/10)
- Hand Off Control Plan (2/26/10)
- Project Realization and Completion (3/1/10 – 3/12/10)
Opportunity and Current to Future State

Receive order/supplies → Planning/Printing → Binding/Cutting/Folding → Assembly → Shipping

Planning/Printing → Scheduling → Staging/PrePress → Set-up → Make Ready → Run → Wash

Current State

<table>
<thead>
<tr>
<th>All Colors</th>
<th>10/14/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make Readies take 23.5 minutes/unit on average</td>
<td></td>
</tr>
<tr>
<td>Lack of standardization in process</td>
<td></td>
</tr>
<tr>
<td>Ink standards not established</td>
<td></td>
</tr>
</tbody>
</table>

Current State (4C-7C)

<table>
<thead>
<tr>
<th>11/25/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make Readies take 15.8 minutes/unit on average</td>
</tr>
<tr>
<td>Lack of standardization in process</td>
</tr>
<tr>
<td>Ink standards not established</td>
</tr>
</tbody>
</table>

- 1C 3C jobs are rarer and not truly representative of the process

Future State

<table>
<thead>
<tr>
<th>3/12/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make readies take 7.5 minutes/unit on average</td>
</tr>
<tr>
<td>Standardization in process between all shifts</td>
</tr>
<tr>
<td>Color Curve Established</td>
</tr>
<tr>
<td>SMED methods implemented</td>
</tr>
</tbody>
</table>

Baeseman:
Key Points from Baesman, highlighted

- Picking the ‘right’ projects
- Mapping the Value Stream AND the focal Process and understanding ‘control points’
- Utilizing the power of failure mode identification and analysis
- **Sticking to the sequence of fundamental questions**
  - Great RCA to ECR transition
- **Creative use of visuals, learning to create AHA moments**
  - Another great example of Staged Control Charts

- Apply Creation Skillful Methods before you apply Creative Problem Solving Methods
- Map and Analyze the flow of value, focus on optimizing flow
- **learn how to manage ‘resistance’ creatively (Baesman)**
- Adopt the Measure What Matters, OKR approach espoused by John Doerr—agile, sprints through stages to Tollgates
  - Utilize discipline Integrated Master Planning, stay focused on DONE DONE.

**Key Points**—fundamental as Apple Pie, with ice crème of course.
Case Examples we’ll cover

- an assembly plant (floor scales) ‘constraint’ mitigation process improvement project;

- a frozen food plant (Chinese food) with a bio-organic waste in effluent problem;

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- A Fire Truck Assembly Plant internal supply chain problem.
Reduction of Flash in Fluid Path

Stopcock A934LG2 and A921G2
Plug 400-060

Cody Havaich
Analyze/Improve Tollgate
Date 2/17/2010
Project Description - Stopcocks

**Opportunity Statement:** Flash is the main reason molded stopcock parts are rejected, detailed or reworked. In fiscal 2009, 20% of the sites rejected product was for flash. The documented cost of scraped product for flash was $257,709. This problem has been an issue for over 20 years.

**Business Case:** Flash in the fluid path is a critical defect with the potential to cause great harm to a patient. This project addresses financial savings for Smiths Medical and more importantly patient safety by reducing the probability of flash occurring.

**Goal Statement:** This project will improve 1st pass yield for high flow stopcocks by 50% by February 19, 2010.

**Primary Metric:** First Pass Yield.

**Project Constraints:** Current materials will be used.

**Project Scope:** The 2 stopcocks A9341LG2 and A921G2 utilizing body 350-168 and plug 400-060.
Plug and Body diameter and roundness are measured to 30 thousandths of an inch above and below fluid path.

This is the area measured ABOVE the fluid path. The inner wall is measured.

This is the area measured BELOW the fluid path. The inner wall is measured.

This is the area measured ABOVE the fluid path. The outer diameter is measured.

This is the area measured BELOW the fluid path. The outer diameter is measured.

Circularity is measured by comparing 4 distances across the diameter.

EXAMPLE:

D1 = .0010, D2 = .0009, D3 = .0008, D4 = .0007
D1 – D4 = .0003 = D_{delta max}
The largest delta is used for the circularity measurement.
Measurement System Analysis – Gage R&R

Experiment Parameters

• Attribute Agreement Analysis

• 16 Samples

• 9 Appraisers & 1 Expert

• 2 Trials under same conditions

• Each appraiser performs experiment in their normal environment under normal conditions

• Accept/Reject based on FFP Only

• Analyze Results
On average, the appraisers agree with themselves 77% of the time across the 2 trials.

On average, an appraiser agrees with the Expert 32% of the time!!!

<table>
<thead>
<tr>
<th>Appraiser</th>
<th>Agree w/ Self</th>
<th>Agree w/ Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>62.5%</td>
<td>18.75%</td>
</tr>
<tr>
<td>2</td>
<td>81.25%</td>
<td>31.25%</td>
</tr>
<tr>
<td>3</td>
<td>81.25%</td>
<td>43.75%</td>
</tr>
<tr>
<td>4</td>
<td>68.75%</td>
<td>25%</td>
</tr>
<tr>
<td>5</td>
<td>93.75%</td>
<td>37.5%</td>
</tr>
<tr>
<td>6</td>
<td>75%</td>
<td>12.5%</td>
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<tr>
<td>7</td>
<td>87.5%</td>
<td>18.75%</td>
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<tr>
<td>8</td>
<td>50%</td>
<td>37.5%</td>
</tr>
<tr>
<td>9</td>
<td>93.75%</td>
<td>68.75%</td>
</tr>
</tbody>
</table>
## Measurement System Analysis – Gage R&R

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Expert</th>
<th>% Agreement</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Accept</td>
<td>50%</td>
</tr>
<tr>
<td>2</td>
<td>Reject</td>
<td>28%</td>
</tr>
<tr>
<td>3</td>
<td>Accept</td>
<td>22%</td>
</tr>
<tr>
<td>4</td>
<td>Accept</td>
<td>33%</td>
</tr>
<tr>
<td>5</td>
<td>Accept</td>
<td>44%</td>
</tr>
<tr>
<td>6</td>
<td>Reject</td>
<td>33%</td>
</tr>
<tr>
<td>7</td>
<td>Reject</td>
<td>50%</td>
</tr>
<tr>
<td>8</td>
<td>Accept</td>
<td>56%</td>
</tr>
<tr>
<td>9</td>
<td>Accept</td>
<td>78%</td>
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<td>10</td>
<td>Accept</td>
<td>67%</td>
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<tr>
<td>11</td>
<td>Accept</td>
<td>83%</td>
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<tr>
<td>12</td>
<td>Accept</td>
<td>39%</td>
</tr>
<tr>
<td>13</td>
<td>Accept</td>
<td>44%</td>
</tr>
<tr>
<td>14</td>
<td>Accept</td>
<td>22%</td>
</tr>
<tr>
<td>15</td>
<td>Reject</td>
<td>22%</td>
</tr>
<tr>
<td>16</td>
<td>Accept</td>
<td>33%</td>
</tr>
</tbody>
</table>

44% agreement between appraisers and expert from part to part!
Measurement System Plan

**Key Takeaways from Gage Analysis**

- Measurement System is unreliable
- Past collected data/Current Process Capability is unreliable
- Several good parts were being Rejected consistently between all appraisers
- Some defective parts containing FPP were being Accepted
- Appraisers were 77% consistent between trials, but it is clear that everyone has a different idea of what a defect actually is

**How will we develop The new Measurement System?**

**Analyze**
- Look at method linked to most consistent appraisers & use those methods in a 2nd Gage R&R

**Improve**
- Update/Develop Operational Definitions and Inspection Manual
- Coordinate training for standardized method of sorting confirmed in Gage Study
Transition from M→A

Moving Forward

• Main focus on DOE
  • Gather factors and levels
  • Figure out how to plan it and break into the production schedule
• Work on the Inspection System (MSA)
• With a 6-month project timeline, it was not an option to stop in our tracks and fix the Measurement System, and then move to Analyze…So it had to be done simultaneously

Key Learnings

• The Measurement System, or in this case the visual inspection system, is crucial to any project and cannot be overlooked
• Without a valid Measurement System, it is difficult to rely on existing data
• A simple find like this could lead to surprising results in the end
Current State Update/Report

Current State
September 2009

• 20% of all defects in 2008 due to FFP
• Varying visual inspection methods
• At any given time there are 5 – 12 orders delayed because of 100% sorting.
• $300,000 lost annually due to waste
• Defects can potentially be lethal

Potential Future State
March 2010

• <10% of all defects annually due to FFP
• Standardized and effective visual inspection system
• Reduce delayed orders by 50%
• Reduce scrap produced by 50% to save $150,000
• Create a safe product and take customer satisfaction to the max
Screening DOE Setup

**Molding**
- Run DOE on the plug in Molding

**Inspection**
- Inspect parts for any signs of FFP
- Perform secondary measurements

**Auto Assembly**
- The plug is assembled to a designated lot of good bodies in Auto Assembly

**Inspection**
- Inspect completed stopcocks for FFP and trace back findings to the settings for that run
- Also check for any cavity to cavity variance that may exist

**Analysis**

Look at differences from run to run, cavity to cavity, setting to setting, etc.
Screening DOE – Measurable Outputs

**PRIMARY**

- FFP following assembly and oven aging
  - Inspected by Auto Assembly for FFP Only!
  - Oven aging takes place before inspection
  - Defects are counted for each run

**SECONDARY**

- Weight of the plug after molding, before assembly
  - 3 samples from each cavity for each run were weighed following the DOE in molding
  - Results

- Visual inspection for FFP following molding, before assembly
  - Random samples from each cavity from each run visually inspected for flash

- Destructive Testing
  - Used to measure wall thickness to see if it correlates to FFP once assembled

- CMM
  - Used to measure Diameter and Circularity and see if it correlates to FFP once assembled
Screening DOE – Plug Analysis

- **Only 2 defects found** out of all 12 runs (~1100 Assembled Stopcocks)
- Pareto Chart of Standardized Effects shows that none of the factors significantly effect FFP in the assembled stopcocks

With a new tool, it is nearly impossible to produce FFP!!!
Where is the flash coming from?

It was impossible to find an unacceptable molding process

Tooling?

• The 4031 tool was used for the DOE
• This tool was just rebuilt and not validated
• Is it Tooling and not the molding process???
Let’s focus on tooling

4031
• Used for DOE
• Rebuilt 12/7/2009

4030
• Rebuilt 7/17/2009
• Used in production for the past 6 months

4019
• Rebuilt on 5/5/2009
• Been used in production for 8.5 months

4018
• Rebuilt – Used old cavities from other tools at different times

Rebuild Date Unknown
Testing the different tools

Molded plugs from each tool
- Tools 4030, 4019, and 4018
- Collect 12 shots from each tool (6 shots after washed/dried & 6 shots before washed/dried)

Quick Visual Inspection for Flash
- Check for flash around and in the fluid path
  - Pre dryer
  - Post dryer

Assemble the plugs to bodies
- Pre dryer
- Post dryer
- Oven Aging

Final Inspection
- Visually inspect all parts for FFP and other defects

Analysis
Compare age of the tool since rebuild to flash in the fluid path results
Improvement #2 – Tooling PM

Validated

• Rebuilt tooling clearly produces better quality parts that lead to little-to-none FPP downstream in Auto Assembly

• With time, tools begin to produce flash around the edges of the fluid path holes which leads to far more flash once assembled

Sustain

• Develop an optimized PM schedule

• Develop standardized requirements for when a part should go through the rebuilding process. For example, if a certain amount of parts show flashing around the edges of the fluid path holes, it needs to be rebuilt.

• Develop audit system to evaluate tool performance

• Standardized Rebuilding Process
Through → DONE Plan

<table>
<thead>
<tr>
<th>This week</th>
<th>Next Week</th>
<th>April - May</th>
<th>June 1st</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROCESS APPROVAL</strong></td>
<td><strong>IMPLEMENTATION</strong></td>
<td><strong>REALIZE &amp; CONTROL</strong></td>
<td><strong>COMPLETION</strong></td>
</tr>
<tr>
<td>• Continue to push for the approval of the new IP document</td>
<td>• Carry out implementation of a new measurement system (visual inspection system)</td>
<td>• Gather data on # of NCRs being filed daily and plot the # of defects in May/June versus previous months to show improvements</td>
<td>• Final TG to present up-to-date realized benefits and close out the project</td>
</tr>
<tr>
<td>• Plan out implementation and training process for the following week</td>
<td>• Work with the core team to handover all of the tooling data and help with the start of that whole new project</td>
<td></td>
<td>• Hold Control TG to introduce these plans for data collection</td>
</tr>
</tbody>
</table>
Highlights from the Smiths Medical Project

Key Points—fundamental as Apple Pie, with ice crème of course.

- Picking the ‘right’ projects
- Mapping the Value Stream AND the focal Process and understanding ‘control points’
- Utilizing the power of failure mode identification and analysis
- Sticking to the sequence of fundamental questions
- Creative use of visuals, learning to create AHA moments
- Apply Creation Skillful Methods before you apply Creative Problem Solving Methods
- Map and Analyze the flow of value, focus on optimizing flow
- Learn how to manage ‘resistance’ creatively
- Adopt the Measure What Matters, OKR approach espoused by John Doerr—agile, sprints through stages to Tollgates
  - Utilize discipline Integrated Master Planning, stay focused on DONE DONE.
- A great example of Measurement Systems Analysis
- Very good example of Creative Root Cause Analysis, would have been easy to miss the ‘rebuild’ data element on this project.
- Great use of ILSS tools, DOE, MSA....
Case Examples we’ll cover

- an assembly plant (floor scales) ‘constraint’ mitigation process improvement project;

- a frozen food plant (Chinese food) with a bio-organic waste in effluent problem;

- A Printing Plant with a change-over, set-up time problem;

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- A Fire Truck Assembly Plant internal supply chain problem.
About Sutphen

- 131-Year-old custom fire truck manufacturer
- Largest private, vertically integrated fire truck manufacturer (6th generation family)
- Over 150M yearly sales
- Known as the “Cadillac of fire trucks”
- Growing, taking market share due to ‘Sutphen Experience – family feel’, quality of product and range of customization allowed
  - Just purchased 53 acres of green space for a new Chassis facility
- Extremely high mix-low volume
- Very low process maturity when I started, most processes ad-hoc with some repeatability
- Very old school culture conditioned to resist change, ‘This is how we’ve always done it mentality’
- Teamsters union for production
System History

Pre-2013
- Ad hoc inventory management & ordering
- Order Forms used for ordering stock parts
- Which items are HS determined
- Little data collected

2013 - 2014
- Jared Walter
- Centralized warehouse and Kanban system
- Cards moved manually
- Yellow belt project determined which parts were Kanban
- Kits created

2014 - 2015
- Jordan Casteel
- Eliminated phantom locations for HS parts (HS0101 → *Z Locations)
- Default locations set in AX
- HS moved to warehouse except for Aerial Finish, Plumbing, and Body Build

2015 - 2016
- Joseph Francis
- Physical card movement constrained to within a department
- Consolidated data storage to AX
- Began to collect good KPI data
- Increased transparency between system users

2017 - 2018
- Hannah Miller
- Reworked OQ and ROP updating system
- Set standard card and bin colors for added visibility
- Built decision support system (Business Intelligence tool)
- Proved usefulness of collected data

2019 +
- Better match parts with Inventory Delivery Methods
- Increase system transparency
- Implement “quick wins” to increase capability and keep employees and customers happy

Sutphen Transformation Overview Notes

Transformation Alignment Cycle

Where are we?

Create/ Augment Transformation Program

Where are we going?

How does Lean Transformation help enable that

<table>
<thead>
<tr>
<th>Stage</th>
<th>Themes</th>
<th>Initiatives Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start (2013)</td>
<td>• What can we do now to make an impact?</td>
<td>• CAR Team</td>
</tr>
<tr>
<td></td>
<td>• Iterative ‘First who, then what’</td>
<td>• Materials Replenishment Kanban System</td>
</tr>
<tr>
<td></td>
<td>• LEARN – Seek first to understand, then to be understood</td>
<td>• Transformation roadmap development sessions</td>
</tr>
<tr>
<td></td>
<td>• Model the organization and transformation</td>
<td></td>
</tr>
<tr>
<td>Keep it rolling (2015-2019)</td>
<td>• Confront the brutal facts but never lose faith</td>
<td>• Gated quality system</td>
</tr>
<tr>
<td></td>
<td>• Try a lot and keep what works</td>
<td>• Continued materials system development</td>
</tr>
<tr>
<td></td>
<td>• Understand the mental models that influence the culture</td>
<td>• Iterative data analysis tool creation</td>
</tr>
<tr>
<td></td>
<td>• LeanSigma Projects – large and small</td>
<td>• Value stream process development</td>
</tr>
<tr>
<td></td>
<td>• Sustainability very difficult</td>
<td></td>
</tr>
<tr>
<td>Initial Breakthroughs</td>
<td>• Level 5 leadership emerges</td>
<td>• Initiatives around how we communicate - feedback loops and closed-loop communication, handoffs and reviews, daily walks and touchpoints</td>
</tr>
<tr>
<td></td>
<td>• Continued iterations begin to bear fruit</td>
<td>• Breakthroughs on BI data tools and Kanban system</td>
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<td>• Culture of discipline begins to develop</td>
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<td>• Re-structuring of value stream teams and production flow redesigns allow for fresh concepts to take root</td>
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<td>• Make use of data that’s taken years to get useable</td>
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2013-2015 – Start journey, lots of energy and ambition, little top-down support, building everything from ground up, small program successes, many failures, often not sure where to go

2015-2019 – Lots of ‘First Who’ changes top and middle of org, product and sales challenges, some organizational process development, continued iterations through programs to gain value and sustainability, beating up against a change management wall often, lots of “Confronting the Brutal Facts”

2019 – 2021 – Major ‘First Who’ and leadership changes, gain in top down support, restructuring of org, some programs starting to bloom, large scale transformations taking place
Iterative Stock Item Kanban Ordering System Development

**June 2013 State**

- 6000 Locations all being ordered with handwritten and filled out order forms
- Ad hoc process to reorder items dependent on the orderer knowledge
- All transactions need to be manually entered into ERP (PO’s, transfers)
- Items with multiple locations had multiple orders
- Items with single locations plant wide used in multiple departments movement cause waste
- Data not being collected and aggregated for KPI based decision making

**November 2021 State**

- ~4000 locations being ordered via Kanban either direct to purchasing or replenishment transfer from central warehouse
- 97% all replenishment orders from warehouse filled within a day
- PO’s and Transfers and Production orders auto generated from scans in ERP
- App driven scanning (any smart device can be used)
- Defined Order Quantity and Reorder point visible for anyone to see
- Items stocked in all departments needed
- Data collected and aggregated to make data driven decisions around ordering

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**Transformation Timeline**

- **Establish Warehouse, Kanban, and Kitting System**
  - Determine what items to initially stock on Kanban / to Kit from WH
  - 2014

- **Stabilize and expand system, perform minor Kaizens around process failure modes**
  - 2015-2016

- **Migrate Physical movement of Kanban to scanning to enable better data collection, visibility, and eliminate plant wide card movement**
  - 2017

- **Establish an optimization program for adjusting order quantities, ROP’s etc., migrate over to PowerBI with D365 integration**
  - 2018-2021

- **Fully integrate Kanban scanning and processing into D365 ERP with app for scanning and out of the box expansion to other facilities**
  - 2021
Iterative BI Tool Development

2014 – Process for extracting raw hours data

2015 - 2020 – PowerPivot based tools on hours analysis

2021 – PowerBI Launch with Hours and Schedule linked for more intelligent outputs
Key Lessons Learned

Do not depend on the hope of results. You may have to face the fact that your work will be apparently worthless and even achieve no result at all, if not perhaps results opposite to what you expect. As you get used to this idea, you start more and more to concentrate not on the results, but on the value, the rightness, the truth of the work itself. You gradually struggle less and less for an idea and more and more for specific people. In the end, it is the reality of personal relationship that saves everything.

- Thomas Merton

Organizational transformations, like personal ones, are cyclical and not straightforward – you will often take 1 step forward and 2 back, the first person through the wall DOES usually get bloody. Any attempt to beat the organization into change creates equal resistance, we must listen and understand first, really get into the situations properly and not from the viewpoint we brought into them.

The less you’re hyper-focused on the image of the future state that’s been created mentally, the more you can enjoy the journey. Let the ends and the means converge.
Highlights from the Sutphen Transformation..

Key Points—fundamental as Apple Pie, with ice crème of course.

- Picking the ‘right’ projects
- Mapping the Value Stream AND the focal Process and understanding ‘control points’
- Utilizing the power of failure mode identification and analysis
- Sticking to the sequence of fundamental questions
- Creative use of visuals, learning to create AHA moments
- Apply Creation Skillful Methods before you apply Creative Problem Solving Methods
- Map and Analyze the flow of value, focus on optimizing flow
- Learn how to manage ‘resistance’ creatively
- Adopt the Measure What Matters, OKR approach espoused by John Doerr—agile, sprints through stages to Tollgates
  - Utilize discipline Integrated Master Planning, stay focused on DONE
- Great example of a multi-year migration strategy, a real transformation with leadership persistence and support.
2022 Webinar Topics under Development

• 7 April, 3 May, 17 May—Personal and Professional Mastery (Change Leadership/Management) Training Modules 2, 3, 4  contact ssink@jumpcurves.com to register


• June: PACCAR Six Sigma Case Study Presentation & Flex Business Excellence Case Study Overview

And don’t forget IISE’s new Operational Analytics Certification Program...
Customer and Member Satisfaction and Feedback Survey

Integrated LeanSigma Part II: Case Examples of Fix the Process Methodology

You can download the deck (handouts)
You can go to this IISE link soon and get deck and recording.

Certificates of Participation will be e-mailed to you within 3 business days.
Thank You!

Eleanor Cooper & Mettler Toledo
Jared Frederici & Kahiki
August Secue & Baesman
Printing
Cody Havaich & Smiths Medical
Jon Corsetti & Sutphen

OSU ISE ILSS Certification Program

Contact us for More Info:

For *more information* on how IISE can play a role with your ILSS training needs:

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For *questions* about our IISE Webinar Series and our IISE Operational Analytics Certification Program:

**Scott Sink:**  ssink@jumpcurves.com

Special Thanks to our Sponsor for this Webinar:

[https://www.thepoiriergroup.com/](https://www.thepoiriergroup.com/)

For *more information* on how the Poirier Group can play a role with your Operational Excellence and ILSS deployments:

**Jared Frederici:**  jared.frederici@thepoiriergroup.com
An Operational Analytics Certification will significantly enhance your foundational training.

Overview

Organizations are swimming in data, colloquially they are data rich and information poor.

Migrating from Data to Information to Insights and Understanding to Decisions/Actions and ultimately to Business Benefits Realization is the end game.

Organizations are losing at this game today because they don’t have the right knowledge and skill sets to execute the right strategies to harness the power coming from More Data and the ability to move it faster.

Professionals, perhaps most importantly, students in ISE, that become proficient at Operational Analytics will have unprecedented career opportunities.

This program is focused on building your knowledge and skills in a tiered fashion—Understanding to Principles, Methods, Tools to Application Skill Development as the foundation. This comes from this initial blended training program.

Sitting on top of that base, we’ll support your migration to higher levels of Mastery (Analysis, Solution Creation, System Design and Development, Deployment) with the Certification portion of this program.

Investment Requirement

Certificate:
~ 3-6 mos. Elapsed time
~ 220 hours (e.g. equivalent to 1, 3 credit hour U/G level class
$450 for ISE Students (must be members of IISE)
$575 for Professional IISE members, $725 for professional, non IISE members

Certification:
$250 for Student IISE members
$950 for Professional IISE Members, $1250 for Professional Non-Members of IISE
Who was this designed for

We had several target audiences in mind when we designed and developed this course:

1. Industrial and Systems Engineering Undergrads (Seniors) and Grads who want to augment their BSISE degrees;

2. Young Professionals who want to expand Career possibilities, strengthen Resumes, Linkedin Profiles and have a strong appetite for Analytics;

3. Business Intelligence Professionals who sense that there is more to Analytics than just creating lots of Power BI Reports and realize the real Leaders and Managers are overwhelmed with Data and frustrated that they can’t get IT to support them, as customers, better.

Our Faculty Member, Ben Amaba, likes this slide!!
We have 10 Core Modules in the Course:

1. **Course Overview and Guidance**
2. **Operational Analytics Perspectives and Points of View from Thought Leaders**
3. **Operational Analytics: The Data Management Role**
4. **Operational Analytics: The Analyst Role**
5. **Operational Analytics: The Data Scientist Role**
6. **Operational Analytics: Business Process Improvement and Integrated LeanSigma Role**
7. **Visible Measurement Systems, how to deploy to support Study-Adjust**
8. **Operational Analytics: The Management Systems Engineer Role**
9. **Operational Analytics: Case Studies**
10. **Operational Analytics Final Exam**

### Learning Objectives

- Understand the Fundamentals of Operational Analytics through the Voice of Thought Leaders in this field
- Understand and Practice with the Data Management Role—how to get data, store it, organize it, cleanse it, integrate it....
- Understand and Practice with the Data Analyst Role—how to understand the voice of the ‘customer’, how to understand the fundamental questions that need answered, how to convert data to usable information
- Understand Data Sciences—advanced data capture, data management, data analytics by building intelligence and learning into our ‘machines’
- Understand and Practice with the application of Op Analytics to Business Process Improvement and Integrated LeanSigma
- Understand and practice how to bring all this together in the form of Engineered Management Systems and to integrate in Visible Measurement Systems and effective Study-Adjust processes.
Program Highlights

Recently pre-recorded webinar recordings in 60 minute digestible chunks provided by thought leaders and faculty in our program. On-Demand.

Best-in-class Case Studies
- Op Analytics embedded in Process Improvement Projects (6 practical, industry diverse tollgate decks to help you internalize how this works)
- Data Sets from real world projects to aid you in developing reduce to practice skills

The LearnUpon LMS is intuitive and easy to use and has a way for us to Track your Practice work and interact as appropriate.

Virtual Coaching Sessions by Module provided by Faculty
Community Q&A/Chat Boards.
Live, synchronous training sessions monthly.
Competency Development Model

- Take the course, pass the exam
- Successfully Complete an OA Project (prove you can reduce to practice)
- Complete the Mastery Level Program (In Development) Proof of breadth and depth

- Advanced Mastery Level (Advanced Certification)
- Reduction to Practice Skills (Certification)
- Foundational Principles, Methods, Tools (Certificate)

Take the course, pass the exam
Special Offer to Webinar Participants today…

https://www.iise.org/TrainingCenter/CourseDetail/?EventCode=OAO

The 10% off Coupon Code is OpAnalytics10