Introduction and Overview

Process and Energy Optimization (PEO)

Walt Smith, Principal
ETSI Consulting, Inc.
smithwaltp@aol.com

PEO Industrial Workshop
Co-sponsors: CERL, AMC & DOE

February 25-27, 2004
Gettysburg, PA
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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
Outline: PEO Overview

- Introduction, PEO Objectives and Goals
- The Warfighter Requirements, NADEP NI Results
- Overview: ETSI’s PEO Features and Benefits
- The Six Features (Concepts) of PEO
- Summary: PEO in Three Words, Assessment Timeline, ETSI Facts, List of Some Facility PEO Assessments at DOD Sites
Outline: PEO Overview

- List Questions on PEO for Discussion at End
- A 3 hour Breakout Session is Scheduled for Thursday 14:00-17:00 hours
- We will further explore PEO methods and tools. A “mini-demo” PEO Assessment of Cleaning Shop processes is planned that provides an opportunity for your “hands on” participation.

Please join us to really see how PEO works!!
A Little of Our History on PEO

- Our 1980 Focus on Energy Efficiency…
- The Problem: No One was really listening….
- The New Direction: Combine w/ Process…
- New Message: Let us help you help yourself
- The Birth of PEO: We are PEO Experts…
- Ten Years Later: PEO, the $ Saving Machine
- We have completed >160 PEOs over 20 years
- 40 New PEO Assessments on 2004 Schedule
PEO Objectives for DoD Fac

- Reduce energy and other operating costs by improving DoD processes to fully satisfy the requirements of the “Warfighter” customer.
- Use the strengths of the PEO approach to focus on the big $$ problems and opportunities, to change what really matters and to do it fast.
- Complement and enhance the DoD’s ongoing Lean, Six Sigma and/or Airspeed initiatives throughout the DoD.
Warfighter Requirements*

- Reduce Cycle Time for a 9 day or 90 day Surge
- Increase “Capability” of Annual Depot Output
- Reduced Depot Work In Process (WIP) Inventory
- Reduced Operating Expenses for “$$ that Matter”
- Improved Scheduling Accuracy: Make it reliable
- On-Time Delivery: Cost for only 1 week too late?
- Reduced Number of Assets in Depot Pipeline

*Reference: “Airspeed includes all aspects of Lean” (with ETSI edits) by D. Nedresky, Network Magazine, October 2003

Note: Warfighter = soldier, sailor, pilot and machine
PEO Goals & Expectations

- ID solutions to lower the annual energy and environmental costs by 15 - 20% for the targeted processes.
- Use energy to ID solutions to further reduce annual wasted $$ in Depot processes by 2-5 X the “energy only” savings.

**Depot Example:** $500 mil budget, $10 mil energy Savings: Energy= $1.5 mil, Process= $3-7mil/yr
Savings results are judged by the Depot Team.
Process Energy Optimization (PEO)

A Better, Faster, Cheaper Approach that Can Increase “Energy-Only” Savings by Two to Five Times

- What is Process Energy Optimization?
- How is PEO different?
- Features and Benefits of PEO
- How DoD can use PEO to support existing cost control initiatives?
NADEP North Island Results

“In a matter of a few weeks of intense onsite discovery efforts, 194 Process and Energy Optimization (PEO) measures were identified and 54 were quantified with supporting economics. Savings = $5,530,000 per year, Capital cost = $7,820,000 Simple Payback = 1.4years”

Jose Jiminez, NADEP North Island Project Leader / POC 1998
PEO Overview

- Features: ETSI’s Approach Methodology
- Benefits: WIIFY, the Depot & the DoD
- DoD Example Results from PEO
- Summary, Conclusions
- A Next Step… the site/facility specific “Needs Assessment Checklist for PEO”
# PEO Features and Benefits

<table>
<thead>
<tr>
<th>Features (Concepts)</th>
<th>Benefits to You &amp; the Fac.</th>
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<tbody>
<tr>
<td>Integrates Process and Energy</td>
<td>Lowers Unit Cost of Finished Product</td>
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<tr>
<td>Involves Depot Key People</td>
<td>Better Solutions, Commit to Implement</td>
</tr>
<tr>
<td>Focuses on Critical Cost Issues</td>
<td>Saves Time, Maximizes Results</td>
</tr>
<tr>
<td>Uses Financial &amp; Technical Tools</td>
<td>Higher $ Quantity and Quality Solutions</td>
</tr>
<tr>
<td>Creates Immediate $$$ Results</td>
<td>Jump Starts Program, Instant Credibility</td>
</tr>
<tr>
<td>Generates User Friendly Report</td>
<td>Quickly Present and Implement Solutions</td>
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Concept One: Integrate Process and Energy Systems as 1 System

30,000 Foot View of a Generic Process: Search by Breadth

Purpose: Cast the net wide to find solutions to problems that matter... $$-wise

- Utility Supply, Conversion & Distribu. Systems
- Processing Steps: #1 to #X
- Finished Product
- Raw Materials
- Waste Collection, Reduction, Recovery & Discharge
Integrate Process and Energy Systems as a Single System

**DoD Processes**

**High Level View: Search by Breadth**

- DoD equip. & components need repair
- 35+ Separate Shops (processes) with Steps #1-#X
- Utility Supply, Conversion & Distribu. Systems PWC
- Repaired equipment and components
- Waste Collection, Reduction, Recovery & Discharge, PWC

**Example Processes:**
- Heat Treat, Cleaning, Plating
- AC Strip/Wash, Tracked - Vehicle and Engine Overhaul
Integrate Process and Energy Systems as a Single System

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- **Integrate Process and Energy Systems as a Single System**

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**Diagram Details:**

- **Symbols and Processes**:
  - **IC**: Induction
  - **NC**: Inspect
  - **RC**: Repair
  - **C**: New Components
  - **I**: Induction
  - **F**: Failure
  - **P**: Pass
  - **M**: Maintenance
  - **D**: Discharge
  - **R**: Rework
  - **S**: Scrap

- **Process Flow**:
  - **IC** to **C**: New Components
  - **IC** to **NC**: Inspect
  - **IC** to **RC**: Repair
  - **IC** to **D**: Discharge
  - **IC** to **R**: Rework

- **Other Processes**:
  - **NC**: Inspect
  - **RC**: Repair
  - **S**: Scrap

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**Textual Representation**:

- **Integrate Process and Energy Systems as a Single System**

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**Annotations**:

- **Copyright 2003, ETSI Consulting, All Rights Reserved**
Integration of Process and Energy Reveals Where the Opportunities Are

- Energy Conversion
  - 100 Units Energy
  - ELEC
  - FUELS
  - Electricity e.g. Compressed air, ventilation, motor shaft power
  - Fuels e.g. Steam, Hot Water, Direct Fire

- Energy Distribution
  - 80 Units
  - 20 units lost
  - 10 units lost
  - Electric distribution, Compressed air lines, Steam pipe lines, Lighting controls

- Process Energy End Users
  - 70 Units
  - 30 units lost
  - 40 Units
  - PEO Analysis Begins in the Process
Integrating Process and Energy

- Identifies Legitimate Process Energy Loads
- Uses Energy and Other Means to Improve:
  - Utilization of Raw Materials (less scrap/waste)
  - Tracked Vehicle or Aircraft Cycle Time (CT)
  - Equipment & Components Quality/Safety
  - Labor Utilization (morale) and Lower Emissions
Integrating Process and Energy

Benefits:

- Maximizes Opportunities for Savings
- Lowers Cost of Delivered Product/Service
- Improves Your Value to the Organization
- Your DoD Fac. Is Now More Competitive
Integrating Process and Energy

PEO Enhances your Existing PI* Initiatives

- PEO complements Lean, 5Ss and Six Sigma
- PEO adds value to Process Improvement Teams
- PEO ‘speed’ can accelerate PI (done in days not mos)
- PEO loves AIRSPEED ‘thinkers’
- PEO hates WASTE (Materials + Labor + Output + $$)

* PI is short for “Process Improvement”
Concept Two: Very Important! PEO Involves Your Key People

- Process Improvement Thinkers
- Shop-Floor Veterans
- Quality Control/Scheduling
- Cost Analysis & Control
- Facility Management
- PWC & Site Energy Systems
- Process Engineering
- Maintenance Expertise

Involves Key People ONLY on an ‘AS NEEDED’ basis.
Why Involve Your Key People?

Your Key People Deliver Better Projects with Faster Execution

“PEO Implementation Model”

- Involvement of KEY people
- Commitment of KEY people
- Gives You Better & Faster PEO Solutions
- Results in Internal “Buy-In”
Involves Your Key People

Benefits:

- Best use of everyone’s time-on as needed basis
- Better quantity (2X) and quality of solutions
- Involvement produces practical* solutions
- Results are implemented in half the time

*judged by Depot participants, not consultants
Concept Three: Focus Only on Critical Cost Issues (CCIs)

- Areas of Waste and Missed Opportunity
- Focuses on What Financially Matters
- Work **Only On** the “top” Critical Cost Issues
- The Depot sets the Scope of Work by Selecting the Target CCIs and their respective Processes
Focus on Critical Cost Issues

Benefits:

- Saves You and Your Team Time ($$$)
- Energizes Team to Make a $$ Difference
- Helps Your DOD Fac. Stay Competitive
- Maximizes Your Financial Results
## Hypothetical DoD CCIs

<table>
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<th>What is the CCI?</th>
<th>Where is the CCI?</th>
<th>Cost ($/yr)</th>
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<tbody>
<tr>
<td>Energy System Losses</td>
<td>Distribution System “A”, End User “B”</td>
<td>? $</td>
</tr>
<tr>
<td>Cycle Time Problems</td>
<td>Ops Schedule, Bottlenecks in “Shop C”</td>
<td>? $</td>
</tr>
<tr>
<td>Ineffic. Comp. Air Sys</td>
<td>Shops “F and G”, Systems 3 and 5</td>
<td>? $</td>
</tr>
<tr>
<td>Environmental Issues</td>
<td>Emissions/Wastewater in Process “H”</td>
<td>? $</td>
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**What CCIs come to mind at Your DoD Fac.?**
Focuses on Critical Cost Issues

NADEP, North Island Example

- CCI: High energy and wastewater disposal costs in Plating Shop processes (Annual Cost > $1 million)
- Savings = $647k/yr
- Capital Cost = $1,417k
- Payback = 2.2 years
Concept Four: ETSI’s Special Financial & Technical Tools

- Uses Unique Financial Modeling (10% what ifs)
- IDs the “Cost Equation” for the CCI (k$/year)
- Develops One Line Balances (OLBs)
- Simplifies Process Understanding (PFD)
- Brainstorming Produces Best Solutions
- Clear Calculations of Solution Economics
Uses Financial & Technical Tools

An Engineering Model

- THE SYSTEM (EQUIPMENT)
- THE PROCESS
  - TEMPERATURES, ETC.
  - PRACTICES
  - TECHNOLOGY
- THE OPTIMIZATION LINKS
  - RAW MAT’L
  - EXPENSE $
- FINISHED PRODUCT
- SCRAP
- LABOR $
- OTHER $
- ENERGY $
- REWORK

A Financial Model

- DEPRECIATION, TAXES, INSURANCE $
- THE BUSINESS UNIT
- A PROFIT CENTER
- GROSS SALES $
- NET SALES $
- RETURNS & DISCOUNTS $
- SCRAP $
- REWORK $
- WASTEWATER TREATMENT $
- AIR EMISSIONS $
- SOLID WASTE DISPOSAL $
- PROFIT$
- ENERGY $
Uses Financial & Technical Tools

**Benefits:**

- Gets Everyone’s Head in the Game
- SIG Generate More Ideas Faster
- Creates Higher $$ Impact Solutions
- Able to Better Quantify Solutions
Uses Financial & Technical Tools

NADEP North Island Example

- Effectively analyzed the combined value of energy, environmental and TAT (k$/yr) from installing a ‘closed-loop’ vapor solvent cleaner in the Cleaning Department.
- Net Savings = $242k/yr
- Total Capital Cost = $500k
- Simple Payback = 2.1 years
Concept Five:
Creates Immediate $$ Results

- No-Cost Solutions (SDs)
- Low-Cost Solutions (LUs)
- Very Practical Solutions
  (Judged by Depot Team)
- Credible Economics
Creates Immediate $$ Results

**Benefits:**

- Jump Starts Program… Savings Start Now
- Enhances and Provides “Lift” to Airspeed
- Enables Depot to Package Projects
- Quickly Provides PEO Team Credibility
NADEP North Island Example

- Identified ‘no-cost’ opportunities to reduce weekend and night time energy loads for 10 buildings.
- Savings = $92 k/yr
- Capital Cost = $0 k
- Payback = Immediate
Concept Six: Generates User Friendly Report

- New View of Process & Energy as One System
- Clear Understanding of Proposed Changes
- Clearly, Concisely Documents All Assumptions
- Shows Complete Solution Calculations
- Shows Savings, Cost & Simple Payback
Generates User Friendly Report

Sample EOM* and POM* “Write-Up” Outline

- Title / Facility / Area
- Background of Issue/Opportunity (base case)
- Descriptive Scope of Work (what changes?)
- List of Operating and Economic Assumptions
- Budget Savings and Cost Calculations
- Summary Results Table

Generates User Friendly Report

**Benefits:**
- Preliminary Results Backed Up with Data
- Quickly Can Develop Internal Presentation
- Priorities & Fast-tracks Project Implementation
- Allows the PI Teams to set Realistic Goals
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Summary: PEO in Three Words

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<th>Focus</th>
<th>Only Work on Critical Cost Issues</th>
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<tr>
<td>Change</td>
<td>Solutions that Financially Matter</td>
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<td>Speed</td>
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Summary: Typical Timelines

Draft report delivered within 6 weeks of last day onsite

Done in 1-6 weeks of onsite time over a 3-6 month period

Last day of each work session concludes with summary presentation to management

ETSI prep starts 1-2 months prior to onsite
Example Military PEO Assessments

Re-Manufacture & Maintenance Facilities

- Pine Bluff Arsenal, AR
- NADEP North Island, CA
- Watervliet Arsenal, NY
- Norfolk Naval Shipyard, VA
- Crane Navy Base, IN
- Ft. Leonard Wood, MO
- Fort Carson, CO
- NADEP JAX, FL (Jan-July 2004)
Questions, Comments or Ideas

- Is there a need for PEO in your DoD Re-Mfg. and Repair Facilities? The NAC* will show the need.
- PEO lets you set the scope of work by targeting processes that have the most $$ potential
- PEO identifies specific CCIs and top solutions each with a clear descriptive scope and supporting economics (savings, cost and PB)

* NAC is a Needs Assessment Checklist (for PEO), available from ETSI via Email. Your input determines the need.
Tomorrow’s Breakout Sessions

- A PEO Group Workshop is scheduled for Thursday from 14:00 till 17:00 hours.
- You and your Team will learn more about the PEO methodology and specific tools.
- You will get an opportunity to role play in a “Mock, Mini” PEO analysis for a typical DoD repair/re-mfg. shop process.

You are invited to join us and see how PEO is done!