Doing More With Less

- less expense budget,
- less capital,
- less manpower.

The only way to do more with less is to do it differently.
Learning Objectives

1. Define World Class Reliability
2. Evaluate Current State
3. Define Future State
4. Develop a plan to close the gap
Reliability Operating Systems

- Total Productive Manufacturing (TPM)
- Toyota Production System (TPS)
- Total Quality Management (TQM)
- Lean
- Six Sigma
- Benchmarking
  - Society for Maintenance & Reliability Professionals
  - Institute of Industrial Engineers
  - Amazon Books
Common Elements

• Set Vision
• Define Organizational Structure
  – Roles
  – Responsibilities
  – Decision Making Rules
• Set Tactical Goals
• **Implement; Start; Change the Way You Operate**
• Measure Tactical Goals
• Prioritize and Fix Defects as They Arise
• Continuously Improve
Vision

For The Boss
- Improve Uptime
- Optimized Cost
- No Repeat Failures
- Zero Breakdowns

Clear
Concise/Repeatable
Personally Meaningful
Visual/Observable

For Yourself
- Weekends Free
- No Emergency Calls
  - From Crew
  - From Boss
- Planned Week
- Real Vacation
- Personal Development Time
Performance Improvement
19.3%
Believe

- Commit to the change
- Practice the new operating system
- Do not let anything interrupt the vision
- Be visible and constant cheerleader for strategy
- Welcome feedback
Plan Elements

- Asset Data
- Equipment Maintenance Plans
- Work Execution Management
- Staffing / Work Roles
- Materials Management
- Continuous Improvement
- Vendor Partnership / Management
Asset Data

• Identify all assets
  – Infrastructure (ISO 14224 defines the standard for equipment taxonomy when establishing your equipment hierarchy)
• Parent/Child Relationships
• Components
• Bill of Materials
• Repairable/Swappable Equipment
• Rank Equipment
Equipment Maintenance Plans

- Inspect to Detect
- Time-Based Repair/Replace/Rebuild
- Run to Failure
- Develop asset health plan for all equipment
- Balance the work load across all equipment
Equipment Maintenance Plans

• Preventive Maintenance
  – Replace/Rebuild based on historical expectations

• Inspections
  – Monitor until equipment defect occurs
Cost Comparison of Maintenance Programs

Source: EPRI Power Generation Study
Inspections / Condition Monitoring

• Continuous Monitoring
  – Algorithm for alarm
  – Alarm Reporting

• Tool Inspections
  – Vibration; Infrared; Ultrasound; Thickness NDT
  – Training Criteria / Qualification
  – Frequency

• Sensory Inspections
Uptime / Availability

- Mean Time Between Failure (MTBF)
- Mean Time to Repair (MTTR)
Work Execution Management

1. Identify Work
2. Estimate Work
3. Approve Work
4. Plan Complete Work
5. Schedule Work
6. Execute Work
7. Follow-up Work
8. Recurring Work
9. TECO Work Order
Organizational Structure

• Staffing/ Work Roles

- Maintenance & Reliability Leader
- Plant Engineering
- Maintenance Planning & Scheduling
- Condition Monitoring Team
- Maintenance Supervisor & Team
- MRO Materials
Business Processes

- Map RACI / Swim Lanes
  - Responsible
  - Accountable
  - Consulted
  - Informed

- Reliability Plan
  - Involve everyone in understanding the system
  - Expectations
  - Publish metrics
Continuous Improvement

• Precision Maintenance
• Engineering
• Data Mining
• Root Cause Analysis
• Metrics / Steering the Ship
• Communication Plan
Current State

• Determine barriers to vision
  – Equipment Health
  – Access to Equipment
  – Organization / Responsibilities
  – Skills
  – Organizational Support
Define Future State

• Write down plan
• Define trigger to move to next step
• Constantly refer to the playbook
• Be prepared for resistance
• Short-term vs. long-term costs
Determine Metrics

• Set up CMMS to give them
  – Mean Time Between Failure (MTBF)
  – Schedule Attainment
  – On Time Work Completion
  – % Work Emergency
  – Downtime
    • Mean Time to Repair (MTTR)
    • Number of Stops/Defects
To Pilot or Not To Pilot

**What Good Looks Like**

- Is there enough coverage?
- Is the frequency correct?
- Is there a Process Quality standard?
- Is there a Personnel Quality standard?
- Is there consistency of execution?
- Is it efficient execution?
- Is performance improving?
- Is there an innovation or corrective action process?

**Everyone Involved**

- Is everyone included?
- Do all colleagues have a role?
- Is success critical to everyone?
- Are pilot boundaries reflective of overall operation?
- Is work prioritized to reflect new goals?
- Do you have the manpower resources to manage the entire operation?
Data Mining

- MTBF
- Bad Actors
- Population
- Continuous Improvement

Metrics are essential to tracking progress and determining when to make corrections to the activities around reliability.
Develop a Plan

• Write down the plan
• Publish metrics regularly
• Organize to the new work rules
• Believe in your plan
• Budget for initial costs
Strategy to World Class Reliability

- Define your Vision
- Project plan to achieve vision
- Organize resources to support plan
- Train to meet expectations
- Define triggers to ensure progress
Questions?

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