Asset Performance Management for Collaborative and Integrated Operations

David Watkins
Agenda

• Definitions
• Eco system
• Process
• Integration to business
• Visualization
Integrated Operations (IO)

New work processes and ways of performing oil and gas exploration and production which is facilitated by new information and communication technology.

….. Collaboration with a production focus ….

Asset Performance Management (APM)

encompasses the capabilities of data capture, integration, visualization and analytics tied together for the explicit purpose of improving the reliability and availability of physical assets. APM includes the concepts of condition monitoring, predictive forecasting and reliability-centered maintenance (RCM).  

Gartner.
Where are our opportunities?

- Integrated and repeatable processes for all assets
- Integration of quality data: design, operation etc (big data)
- Integrated visualization
- Integration of reliability processes with operation performance
- Prediction and Optimization

Benefits: Cost savings, few people in ‘hot’ areas, improved efficiency, reduced risk
Integrated ECO System

Analysis and Design

Installation

Operations and Maintenance
APM Solution Focus for Refinery

Risk Based Inspections  Asset Health Monitoring  Reliability Centered Maintenance  Root Cause Analysis

VIZUALISATION, MOBILE SOLUTIONS, OPTIMISATION
Asset Performance Process flow

ERP/EAM

- Equipment & Functional Locations
- Failure Cause Codes
- Maintenance Plans / Task Lists
- Work Order History

Asset Performance Management

- Asset Hierarchy
- Prioritize Assets
- RBI
  - TANK
  - WELL
- HAZOP
- SIMS
- PIMS
- SIF

- RCM
  - Task Analysis
- Functions & Functional Failures
  - Failure Modes & Effects / Risk Severity
- Develop / Update Action Plans
- APM Jobs and Tasks
  - CBM Indicators & Check Sheets
- Manage CBM Alarms
  - Create Failure Records
- Dashboard
  - Analysis
  - Asset Health Index
  - Life Cycle Costing
  - Availability Analysis
  - Root Cause

Risk/Strategy

- Risk Mitigation Tactics

Execution

- Plan
- Do
- Check & act

Improvement

- SCADA/DCS, Historians
- Inspection records
- External Systems
- Production Performance/Loss

ISO 55000

SAP Certified

Copyright © 2014 Bentley Systems, Incorporated
Using production and asset data for reliability

Sensors for Heat, Density, Flow, Corrosion, Temperature etc.

APM

States
Rules
Strategies
Warnings
Alarms

ERP

Replace
Upgrade
Repair
Risk Analysis

Failure Mode: Degradation of a metal as a result of reaction with oxygen at high temperatures.

6748-Super Heater tubes Corrosion Group 1

46 Failure mode

Reference: 1
Asset: 6748

Degradation of a metal as a result of reaction with oxygen at high temperatures.

Criticality
- Not analyzed
- Low
- High

Confidence
- Negligible
- Low
- Medium
- High

Probability
- Not analyzed
- Low
- Medium
- High

Economic
- Not analyzed
- Slight Damage < $10K
- Minor Damage $10K - $100K
- Local Damage $100K - $1M
- Major Damage $1M - $10M
- Extensive Damage > $10M

Health and safety
- Not analyzed
- Single Injury
- Minor Injury
- Major Injury
- Single Fatality
- Multiple Fatalities

Environmental
- Not analyzed
- No/ Slight Effect
- Minor Effect
- Localized Effect
- Major Effect
- Massive Effect

Consequences
- Not analyzed
- Low
- Medium
- High

Note:
Breakdown of Super header will lead to shut down of boiler and the Power plant
Protective Barriers for Risk mitigation and Effectiveness
Degradation Indicator – predictive technology / remnant life

![Degradation Indicator Diagram]

- Asset design:
  - Starting value: 17,2000 millimetres
  - Start date: 04/10/1993 12:00:00 AM
  - Minimum: 15,5000 millimetres
  - Allowance: 1,7000 millimetres
- Most recent reading:
  - Value: 16,8710 millimetres
  - Collected: 04/10/2008 12:41:24 PM
  - State: Acceptable thickness
  - Yearly rate: 0,0218 kilometres
  - Rate type: Long-term rate
  - RA: 1,3710 millimetres
- Previous reading:
  - Value: 16,9970 millimetres
  - Collected: 04/10/2003 12:41:24 PM
  - Status: Acceptable thickness
  - Yearly rate: 0,0224 kilometres
  - RA: 1,4790 millimetres
- Degradation:
  - Status: Same as previously selected
  - Rate difference: -0,0066 kilometres
- Next inspection expected:
  - Value: 16,1855 millimetres
  - Date: 07/09/2040 12:00:00 AM
  - RA: 0,6855 millimetres
- Regulatory frequency:
  - Frequency: 5,000 years
  - Last inspection: 04/10/2008 2:12:42 PM
  - Next inspection due: 04/10/2013 2:12:42 PM
Production Analysis – Planned vs Actuals
Lost Production – Critical Asset downtime

Critical Asset Downtime by Site

Dashboard: Global Reliability Dashboard
Bad Actors are incidents which are responsible for Production slippage. The above Graph shows the Bad Actors reported in RED. Production data can be merged as line graph over the stacked bar.
Dashboards
Next Gen Mobility Solutions – Visualization
Thank You

david.watkins@bentley.com