Uniformance® Asset Sentinel
Intelligent Process & Equipment Surveillance
Bart Winters
Agenda

• Industry Leadership

• What is Uniformance Sentinel
  – Product Overview
  – What it does
  – Benefits
  – Applications (breadth / depth)
  – Product / Solution Strategy
  – Examples

• Value

• Uniformance® Suite
Industry Leaders Are Doing It...

• Increasing Production / Utilization
  – Reduce downtime and rate loss

• Reducing Maint & Ops Costs
  – Minimize secondary damage and catastrophic failures
  – Reducing emergency work orders
  – Replacing preventative with condition based maintenance
  – Reducing troubleshooting time
  – Reducing incorrect repairs (parts, labor, lost production)

• Improve Reliability and Asset Life Extension
  – Minimize mis-operation of equipment

• Safety
... with Process and Equipment Surveillance

**Engineering**
Reliability, Maintenance, & Process

**Uniforceance Sentinel**

**Asset Model**
- Templates
  - Attributes
  - Calculations
  - Rules

**Equipment Lib.**
- Attributes
- Calculations
- Rules

**Analytics**
- Embedded
- User Defined
- UniSim
- Other

**Notifications**
(E-mail & Alerts)

**Event Detection**
(Symptoms/Faults)

**Dashboards / Displays / Trends**

**Real-time / Historical Data**

**Work Requests**
**Calc Results**
**Alerts & Data**

**Mgt. Reporting & KPI’s**

**Historian**

**Operator**

**Maintenance Mgt.**

**SAP Maximo**

**DCS / PLC Smart Instruments**

**Visual Inspections**

**Vibration Monitoring**

**Other Applications**

**Digital Transformation – changing the way you operate**
A Day In The Life Of...

• Process or Reliability Engineer
  – How do you know if compressor is limiting production?
  – How do you know if you are operating efficiently?
  – How do you know if you will make next turn-around?

• Status Quo
  – Process monitoring (DCS/Historain)
  – Instruments (DCS)
  – Control Loop Perf (stand-alone)
  – Efficiency Mon (Excel)
  – Vibration (3rd party)
  – Drive System – Engine / Electrical (stand-alone)
  – Lube system
  – Oil Analysis (standalone)

High Value Resources Spending Time on Low Value Activities
Complete Process & Equip Surveillance Solution

Performance Monitoring

Smart Instruments & Loop Health

Integrated Engineering Decision Support
Features

Asset Model
Advanced calculation engine
  • Scheduled & On-data Change
  • Embedded performance models
  • UniSim and Thermo package

Event Detection
  • Rules engine
  • Notifications

Visualization & Reporting
  • Asset dashboards, trends, reports
  • Graphics & Displays

Benefits

• Automated surveillance to predict and detect problems - free up resources for problem solving
• Ready access to information to address problems quickly
• Easy to configure and maintain with embedded content
• Consolidates multiple monitoring functions and applications in single location

Digital Transformation – How Do You Get There?
Asset Sentinel Capabilities - Asset Model

• Define Equipment Model
  – Flexible
  – Multiple Levels
  – Built from library of asset ‘templates’
  – Pre-defined Library of asset templates
  – Template defines ‘attributes’ for each asset type
  – Instance
    • Pump 1….n
    • Defines tag mapping
  – Plant Model
    • Where instance resides in plant
Asset Sentinel Capabilities - Calculations

• Calculation Capability
  – Data Driven & **Scheduled**
  – 4th Gen Scripting Language
  – Standard & Advanced Performance Library
    - Pump, Compressor, Turbine, Heat Exchanger
  – ECM Data Pre-processing
  – Thermo Calculation Package
  – UniSim Model
  – Custom Code (C#)
  – Excel Calculations
Asset Sentinel Capabilities - Event Detection

- **Symptom / Fault Model**
  - Rule logic for triggering event
  - Event Actions
    - OPC A&E ‘Event’
    - E-mail
    - CMMS (SAP or Maximo) work request
  - Define Fault Severity
  - Define Recommended Action
  - Minimize Chatter
    - ‘Contextualized’ – rule executes only when context is true i.e. pump running
    - On-Delay & Off Delay

- **Simple & Complex Rules**
Asset Sentinel Capabilities – User Interface

- Tree-Map – Overviews
  - Based on Fault Priority
- View Graphics
- Analyze Trends
  - Baselines
  - Performance Curves
- View Events
- Access Recommended Actions
- Access Linked Information
Tag based trends vs. Equipment Based

**Tag Based**
- Must know/find tag names

**Equipment Based**
- Select attribute of interest (no tag names needed)
Cost of Unplanned Capacity Loss

- **Unit Shutdown**
- **Critical Eq. Failure**
- **Non-Critical Eq. Failure**
- **Process Deviations**
- **Degraded Efficiency**

<table>
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<th>Reduced Capacity Loss</th>
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Depth & Breadth of Capabilities

Industry
- Oil & Gas
- Refining & Chemicals
- Pipelines
- Power
- Mining

Monitoring Applications
- Process
- Health
- Efficiency
- Safety
- Energy

Type of Equip / Complexity
- Software
- Valve
- Pump
- Compressor
- Turbine
- Instrument
- Heat Exchanger
- Haul Truck
- Unit
Dolphin Energy Equip Cond Mon Mon Solution

• Overview
  – Monitor over 1200 process and equipment assets
  – Combine electrical, mechanical, and process performance data in single health monitoring location
  – Measures equipment performance to improve energy utilization
  – Detect performance degradation as leading indicator of equipment health

• Benefits
  – Pro-active vs reactive (find problems early & eliminate preventative maint)
  – Smarter turn-around planning (eliminated bearing inspections)
  – Prevent mis-operation of equipment (extend asset life)
  – Energy monitoring – 15MgW savings per year

“Process changes have a significant impact on equipment behavior and reliability, which in turn show up in the process data. We can now see how the process parameters affect the asset performance. It is the missing link that Uniformance Sentinel provides.”

– Reliability Mgr.
Shell Bridge – Exception Based Surveillance

EBS Uses advanced alerting capabilities to improve data quality and apply condition / multi-variate functionality

1. Raw Bottom Hole Pressure (BHP) data noise, shutins, and data dropouts make it difficult to discern any long term trend through direct observation.

2. Alarm software removes data dropouts.

3. Alert software removes periods of shut-in.

4. Alert software removes data offsets.

5. Exponential smoothing and regression are applied to compare 4-week slope to 1-week slope. Software would generate an alert if the change in the rate of BHP decline exceeded a threshold set by the production engineer.

Sources of Value

Increase Asset Utilization up to 10%
- Reduce unplanned downtime by predicting failures and providing pro-active response
- Minimize rate and efficiency losses

Increase Operating Efficiency up to 10%
- Monitor energy usage to achieve up to 10% reduction in costs
- Improve engineering effectiveness with continuous monitoring, remote collaboration, and ready access to required information
- Increase engineering efficiency with an integrated decision support environment

Reduce Maintenance Costs up to 10%
- Pro-active response to minimize equipment damage and emergencies
- Optimize maintenance based on real asset conditions
- Improve reliability and extend equipment life

Increase Safety
- Minimize risks by ensuring normal and stable operations
- Eliminate production stops for safety system verification
The new face of Uniformance®

Adding Asset data and calculations as well as process KPI’s

The traditional Process Historian expanded with advanced asset based calculation capability as well as KPI visualization.

PHD
Capture and store real-time process and event data across the enterprise

Asset Sentinel
Monitor plant performance and equipment health with powerful analytics

KPI
Define, track, analyze & improve KPI’s for effective performance management

Insight
Visualize process conditions and investigate events from any web browser

Driving better and faster decision making
Uniformance Asset Sentinel

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Changing the way you do business with Digital Transformation
Architecture

L4 Network
- Data Replication
  - Asset Sentinel Shadow Server
  - Asset Sentinel Client Station
  - Asset Sentinel Client Station

L3.5 DMZ Network
- Historian Server
  - Asset Sentinel Server
  - Web Server
  - Application Server
  - Database Server
  - Asset Sentinel Client Station
  - Asset Sentinel Client Station

L3 Network – Control System Network
- DCS Server
- DCS Server