Increased Equipment Reliability Using Smart Data Analysis

Rob Barrie - Rotating TA
Matt Cole - Process TA
Objectives

- How Chrysaor are intending to use smart data analysis to achieve the following on topside equipment:
  - Maximise production
  - Reduce cost
  - Reduce onshore and offshore man hours
- Early findings from one of our process modules using Smart Data Analysis
- The current plan for Smart Data Analysis trials in Chrysaor
Big Data Analysis - Where this fits in

- Pipeline Data
- DCS and ISS Data
- Process Data
- Various Logs
- Equipment Panel Data
- Fluid Analysis
- Barrier Model Management
- Financial Data
- Safety and Environmental Data
- Production Threat Tracking
- Production Tracking
- Metocean Data
- Logistics
- Computerised Maintenance System,
Smart Data Analysis Levels

**Real-time Analytics**
- Processing of real-time data
- Typically done Ad hoc
- Some monitoring tools can be used with alerts

**Descriptive Analytics**
- Assessment of historical data
- Tools used to filter data, compare events and produce trends
- Used for KPIs on dashboards, Root Cause Analysis etc.
- Typically used for Process data & maintenance data, etc

**Predictive Analytics**
- Analytical model based on assessment of steady state operation
- Models could be deterministic or non-deterministic
- Algorithms used to assess all the data simultaneously with human intervention for QA/QC and improve the model
- Used to pick-up deviations from normal and informs of consequences

**Prescriptive Analytics**
- Comprehensive model based possible operation
- Models could be deterministic or non-deterministic automatic with self leaning
- Can pick up deviations from normal, knows why the deviation has occurred and offers recommendations to correct

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The goal of an Equipment analysis system, is to do this accurately, as well as time and cost effectively.
Example - Compressor Bearing Deterioration

Change picked up here after restart and tracked - Luckily picked by diligent Engineer otherwise would have been missed

Intervention planned before trip was reached and tied in with pit stop to minimise deferment
Data Processing

- Manual Logs
- Data logger data
- Fluid analysis
- Integrated Safety System Data
- Process Control system Data
- Control Panel Data
- Handheld vibration data
- Handheld emission data

Electronic Historian (e.g. PI Historian)

Threat Management
- Early Indication of Bad actors
- Reduce Unscheduled deferment
- Reduce offshore manhours
- Reduce cost

Condition Based Maintenance
- Push out maintenance risk based
- Reduce Scheduled deferment
- Reduce offshore manhours
- Reduce cost

Equipment Failure Management
- Quick and effective RCA on equipment failure allowing reliable start up
- Reduce Unscheduled deferment for repeat failures and delays finding root cause

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Potential Smart Data Process

- Process changes
- Smart Analysis Pick Up changes
- Changes reviewed and checked by data analysis engineer
- Final validated changes check by a team of discipline engineers
- Potential Threats identified and raised with the Asset

In house or from supplier ????

- Data continuously reviewed against model
- All changes highlighted
- Data analysis engineer to validate changes are genuine
- Learnings used to update model
- Discipline engineers review the changes to determine if they are a threat
- Threats ranked and validated
- Credible threats highlighted to Asset
- Solution to threats also proposed

System Learning
Example of Success with Smart Data Analysis

- Issue raised due to instability of primary vent pressure and back pressure PCV on dry gas seal system
- Investigation confirmed PCV control was not operating correctly
- PCV bypass PSV was not set correctly approx. 1.5 barg over design set point
- Indications are that DGS on the DE was hung up due to fouling TBC as facility shut down due to other issue and could not be restarted
Summary

- Chrysaor are intending to use smart data analysis to achieve the following on topside equipment:
  - Maximise production
  - Reduce cost
  - Reduce onshore and offshore man hours

- Early indications on a trial shows that using Smart Data Analysis can be beneficial

- Further 12 months trail to be carried out with OPEX on two Chrysaor installations from Q3 2018 - 2019, then re-evaluate if there is value doing this

- One of the key challenges will be getting the data & telemetry digitized cost effectively so it can be made available for analysis now an in the future