Use of SCADA Data for Optimization

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Automation and SCADA

Automation equipment and SCADA data can be used to:

- Operate efficiently
- Maximize production
- Identify issues quickly
- Reduce downtime
- Decrease exposure

To help achieve these results Devon

- Developed integrated tools to deliver informative data to operational and production staffs
Devon Automation Environment

- PLC and RTUS
  - SCADAPack
  - Fisher Roc
  - TotalFlows
  - Allen Bradley

- Hardware
  - Rosemount
  - Foxboro
  - Vega
  - ElectroLab
  - Wika
  - Micro Motion
Devon SCADA Environment

- SCADA Host
  - Cygnet
    - Host at primary field offices
    - Replicated back to OKC
  - XSPOC
    - Centralized server at primary data center
- Historian
  - OSIsoft PI
    - Using AF structure to standardize data between different Cygnet sites
    - OPCDA and OPCHDA
- SSRS Reports
Devon Communication Environment

- **Current Design**
  - High Throughput radios to facilities/central batteries
    - 900 MHz Ethernet Radios to any remote locations
  - Corporate WIFI available on pad
- **Legacy**
  - Mostly 900 MHz Ethernet radios
  - Few serial networks
    - 900 MHz and Licensed 450 MHz
- **On Pad Wireless**
  - Signal Fire
  - OleumTech
  - Phoenix Remote IO
  - FreeWave Remote IO
DSCs (Decision Support Centers)

- Centralized production rooms built to increase base production and reduce LOE
  - Manage by Exception
  - Enhanced Collaboration
  - Remote Operations
  - Role-Based Analytical Decision Making
Operate Efficiently/ Maximize Production

- RTU and PLCs
  - Make changes to operational parameters remotely
  - Log key data pieces at high interval for troubleshooting and optimizing
  - Uses accepted engineering calculations for updating operating set points automatically
    - Turner’s equation
    - Foss and Gaul
    - Incremental time-based changes (Plungers)
    - Incremental rates changes (Gas Lift)
      - In design phase
Operate Efficiently/ Maximize Production  -
High Interval Data and Event Logging

Data Logging
- Allows for very detailed troubleshooting and data validation

Event Logging
- Allows operators to see what is occurring without having to be on location or watching it full time.

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Operate Efficiently/ Maximize Production - Exceptions Reports

Daily exception reports show under performers, helps operators prioritize their daily routes

• Pad or well level prioritization
• BOE calculations to equalize gas and oil
• Built per field specifications
• Delivered in PDF or Excel on scheduled basis, but can be ran on demand
Gas Lift Analysis Tool - Dashboard

- Integrated SCADA and Wellbore data
  - Cygnet
  - PI
  - WellView

- Visualization of gas lift valves in use with trend capability

- Calculated data to help show how effective the system is running
Gas Lift Analysis Tool - Dashboard

- Customizable Trend
- Data from multiple field devices and systems can be added to the trend
Operate Efficiently/ Maximize Production - Gas Lift Analysis Tool - Selection Grid

Grid show all wells by production area

Configurable columns

Filters for exception based viewing

Ability to configure columns and make filters

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Theta Oilfield Service Product

- Uses XDIAG to run analysis and the data.
- Provides report of findings and assigns a system score to the unit.
Identify Issues - Liquid Loading

- Rate Differential Ranking
  - Historical look at wells production to look performance
- Critical Rate Analysis
  - Detailed look of rate differential and identifies abnormalities
- Decline Curve Analysis
  - New wells
    - Helps ID when well will need artificial lift
  - Mature wells
    - Compares performance to potential
- Casing and Tubing Differential Analysis
  - Identifies wells of possible liquid loading

Loading Indicator from Casing-Tubing Differential: Possible Loading
ESP Analysis Tool - Dashboard

- Real-Time data and lookback at shutdowns
- Operating condition calculations
- Operating Point to identify out of range pumps
  - Visualization and historical views
• Clamp Predication graph

Motor Current with Clamps
Interval: 6 Months

Output Current, A

2016 Aug  Sep  Oct  Nov  Dec  Jan 2016

Upper Clamp
Lower Clamp
Reduce Downtime - ESP Analysis Tool - Selection Grid

Grid show all ESPs by production area

Configurable columns

Filters for expectation based viewing

Ability to configure columns and make filters

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Other SCADA Data Integration Points

- Data dump into Field Data Capture system
  - approximately 150,000 values a day

- GIS system
  - Oil and Water Inventory Dashboards

- SCADA Mobile
  - In development
Real-Time Data flowing into other areas

WellCON
- 24/7 Performance Engineering support
- Drive data-driven decision making
  - Geosteering
  - Drilling Engineering
  - Survey Management / Well Planning
  - Frac / Completions
  - Flow Back
  - Remote Production DSCs
In Conclusion

With increasing communication capabilities, remote hardware technologies, integrated solutions, and the desire for quicker responses as well as predictive solutions. The need for high resolution data will continue to grow and become a more important piece across the whole company.

Thank you