Pipeline Management Solution

An Integrated Solution for Pipeline Operators
Pipeline management

OG Segments

> 1- Upstream
> 2- Midstream
> 3- Downstream

Midstream

- Transport (pipeline)
- Crude, refined products and gas
- Compressor, pump & boost stations
- Metering stations & block valves
- Pipeline control & management
- Terminal & storage (tank farms)
Liquid Pipeline Main functional blocks

- Energy Management
- Decision Support SCADA
- Measurement Accounting

Corporate LAN

Main Control Center

Alternative Control Center

Enterprise

Operations

Control

Stations / Process

- Pump Stations 1
- Block Valves 1 to n
- Block Valves 2 to n
- Pump Stations 2 to n
- Terminals

Liquids Pipeline
Pipeline Management Solution Reference Architecture

**Enterprise**
- Energy Management
  - Dashboard
  - Reporting, Analysis

**Operations**
- Operator Trainer
  - Off-Line Simulation
  - Eng. Design & Plan Tools

**Control**
- Security System
  - CCTV, Intrusion
  - Access control
  - Smoke & Fire
  - Gas Detection
- Energy Management System
  - MV & LV ED
  - MV & LV MCC
  - UPS, Secure Power

**Process Automation System**
- Controllers, Safety
- Drives Systems

**Metering EFM Proving**
- Flow Metering, P,T,L
- Metering Skids
- Proving

**Process Management System**
- RTU
- Metering
- Controllers
- Safety

**Pipeline Management & Ops. System**
- Control Room, MCC
- Enterprise Scada

**Pipeline Operational Applications** (gas, liquids)
- High Fidelity Leak Detection
- Pump Power Optimization

**Telecom Network**

**Pumping/Compressor Stations /Storage /Terminal**

**Block Valves & Metering Points**
Pipeline Management Solution Ref. Architecture Detailed
Oil & Gas Pipeline Management

● The Pipeline Management Offer is centered around the OASyS DNA Control System
  ● Highly Scalable, Enterprise SCADA, Distributed Control
  ● Principles: Scalability, Security, Reliability, Regulatory Readiness

● We add value delivering applications that layer onto the control system and providing an integrated Architecture that enable safe, reliable and more efficient operations
OASyS DNA as an Oil & Gas Platform

**Open Architecture SyStem – Dynamic Network of Applications**

- Scalable – from a single station to Enterprise SCADA
- Distributed – flexible operational configuration over a wide area
- Highly available – high level of redundancy
- Secure – granular, comprehensive, deeply embedded security
- Customizable – rich tools for project and customer development and customization
- Huge library of communication protocols, corporate interfaces, operational applications
- Integrated industry applications for operations, leak detection, measurement and accounting
- Standard off-the-shelf hardware & open architecture
  - Windows and Active Directory
  - Visual Studio and .NET scripting
  - MS SQL, common information access technologies, PI historian
- 20 years as SCADA industry leader
  - Decades of experience with large oil and gas pipelines reflected in products

Scalability HMI + Enterprise
Distributed OASYS Architecture

- Nation Wide Control Centers
- Regional Control Centers
- Local Control and Connected Station OASYS
- RTUs and PLC’s

NCC
MCC
BCC

Replicate to Other OASyS Systems

Hot Ready
Hot Operational
Energy Management
& Pipeline Power Optimization

Energy is the single largest operating expense for many pipelines.

How I optimize? Thru Modeling the Power Contracts, the Pumps Efficiency and DRA usage and delivering the Optimized Set-Points.

Schneider Electric can help reduce this cost by ~10% to 20%.
How pipelines can optimize their operating costs

● Pipeline Simulation
  ● Accurately simulate behavior of pipeline at a snapshot in time

● Power Optimization
  ● Apply numerical optimization for cost against this snapshot which includes:
    ● Detailed power contracts
    ● Detailed models of pump efficiency and pipeline behavior
    ● Inclusion of Drag Reducing Agent (DRA)
Current versus Optimized Pressure Profile

Current versus Optimized Pressure Profile.
Pipeline Monitoring – Leak Detection
Multiple tiered Approach and Rupture Monitoring from a Single Vendor

The impact of a leak significantly impacts the industry and the pipeline operator.

Schneider Electric’s multi-tiered leak detection solution complements Rupture Monitoring.
Leak Detection Overview

- **Real-time Transient Model (RTTM)**
  - Full featured detailed hydraulic model
  - Well suited to complex pipelines and operating conditions, or where high sensitivity and performance is required

- **Compensated Volume Balance (CVB)**
  - Simplified line pack calculation by segment.
  - Fast implementation and excellent performance on less complex pipelines and operating conditions.

- **Pipeline Monitor (PLM)**
  - Simple Modified Volume Balance solution for steady state pipelines
  - Fast implementation and good performance on less complex pipelines and operating conditions

- **Pressure / Flow Rate Monitoring (Press Mon)**
  - Monitors the relationship between pressure and flow measurements at specific locations and alarms on unexpected responses. Adapted for Rupture Monitoring using Rate of Change
Flow Measurement & Validation. Reliable transporting the commodities to Customers with reliable measurements @ host & validation – for audit trails.
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Enables pipeline operators to accurately and efficiently bill their customers

Supports gathering, pre-financial verification and correction of field data
Measurement Architecture

Gas Chromatograph → RTU → Flow Computer → Polling Engine → Calculation Engine

Flow Meter → Flow Computer → Polling Engine → Validation Engine

Meter → Chart Readings → Estimation Engine

Meter → Outside Volume record → Data Standardization → Financial

Gas Chromatograph → Lab Analysis → Measurement Database → Balancing

Sample → Lab Analysis → Measurement Database → Measurement Database
Benefits of a measurement solution

- Financial control of measurement data
  - validation limits
  - user authentication and roles

- Efficient, accurate correction of field errors

- Flow data auditability supporting financial compliance

- Raise the confidence (quality) of measurement data
  - estimation for late/missing
  - validation (including extensibility)
  - standardization
  - spreading, aggregation, prediction
Case Study – Caspian Pipeline Consortium

- Transports oil from Tengiz field to the Black Sea. With goal of growing capacity to 67 million tons of crude oil per year
- 1,510 km (940 mi) long oil pipeline

Solution
- Enterprise Control - OASyS DNA
- Operations - Liquid Management System
- Leak Detection - SimSuite Pipeline
- Energy management – EMAS (SimSuite)
- Training – Operator Training (SimSuite)
- Telecommunications
- Power Control & Protections - MV, LV, Motor C. Centers

Source: cpc.ru
Case Study – Oil Pumping Stations Upgrade

Customer Challenge:
• Upgrade & modernize automation systems
• System availability and reliability
• Logic and process control optimization through system classification
• Implementation of a diagnosis centre and a centralized management system using a Ethernet communication platform.

Solution:
• SCADA, Historian, Redundant PLC’s

Benefits:
• Enhanced availability & reliability
• Migration solution & tools minimized down-time
• Original investment preserved
Case Study – TransCanada (Keystone)

- Operates transportation / storage infrastructure delivering product across North America
- Operations controlled with Schneider Electric platform

Solution
- Enterprise Control – OASyS DNA
- Operations – Liquid Management System
- Leak Detection – SimSuite Pipeline
  - High fidelity pipeline model leveraged for offline engineering activities and operator training/qualification
- Training – Operator Training (SimSuite)
- Engineering – SimSuite Pipeline
Customer pain points
• Safe, Reliable and Efficient Operations
• Manage Energy Cost
• Mitigate Risks (leaks, accidents, hazards)
• Secure Power & Communications

Customer benefits
• Enhanced performance and safety
• Optimize Energy usage (Lower Opex)
• Reduce Operational Risk & rapid response to events
• Increased Availability & Uptime

References
• TransCanada (Keystone)
• Pembina Pipeline
• Caspian Pipeline Consortium
• Pertamina
• Ecopetrol