SPARTAN CONTROLS

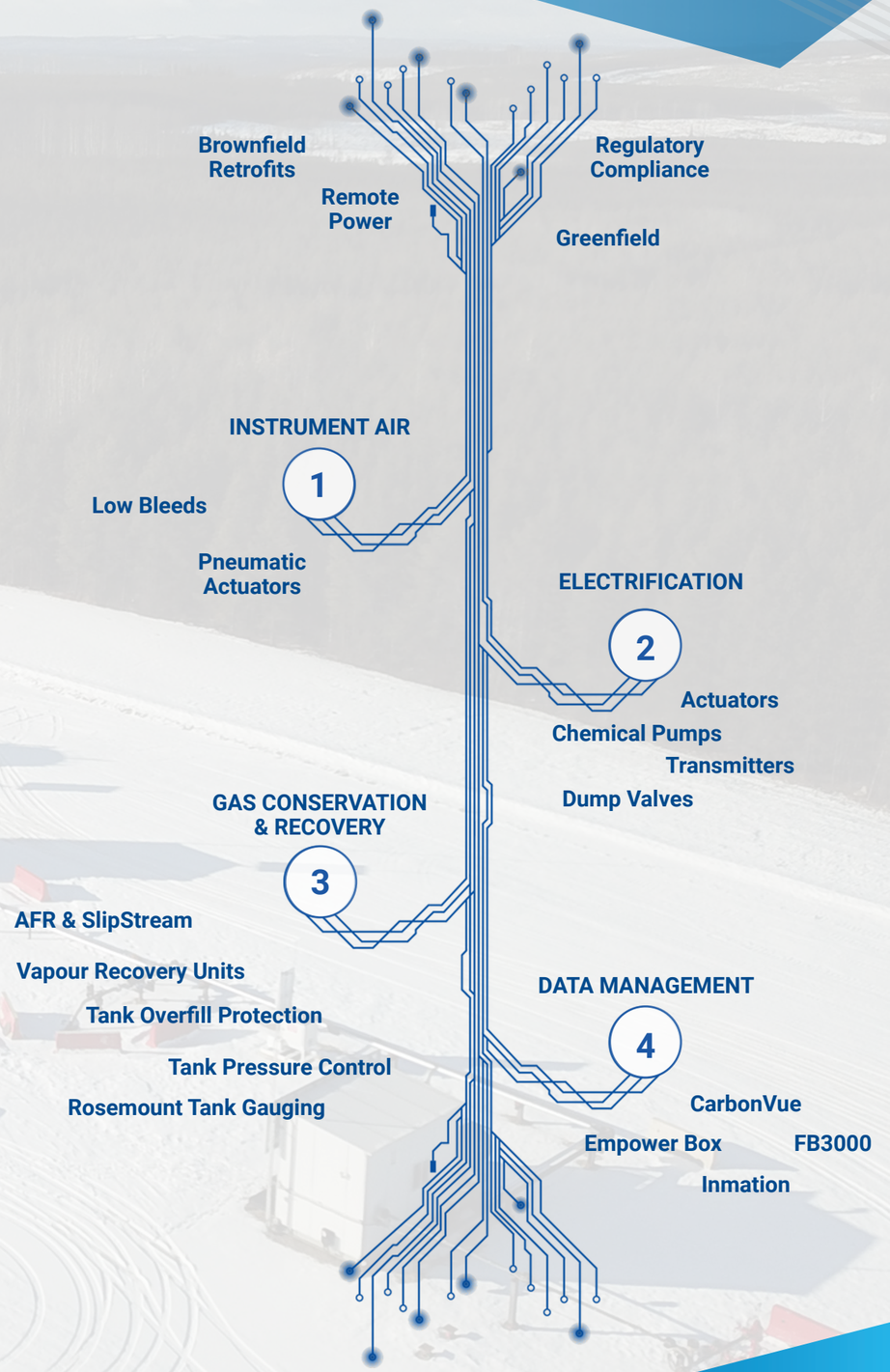
SpartanPRO™

Next Generation Electric Wellpad Program

Pathways to the Next Generation of Well Pads

The SpartanPRO™ Upstream Well Pad Solution helps oil and gas producers meet environmental standards, achieve production targets, and reduce costs. Our automation technologies optimize operations while ensuring ESG compliance. In partnership with industry leaders, we offer complete turnkey support for capital costs throughout your well pad's lifecycle.

> **Aligning with customers to lower methane emissions, elevate ESG standards, and improve access to premium markets and capital resources.**



The Benefits Of Switching Off Fuel Gas Control

Switching off fuel gas control enhances operational efficiency by reducing methane emissions which will allow you to meet the required regulatory requirements and standards.

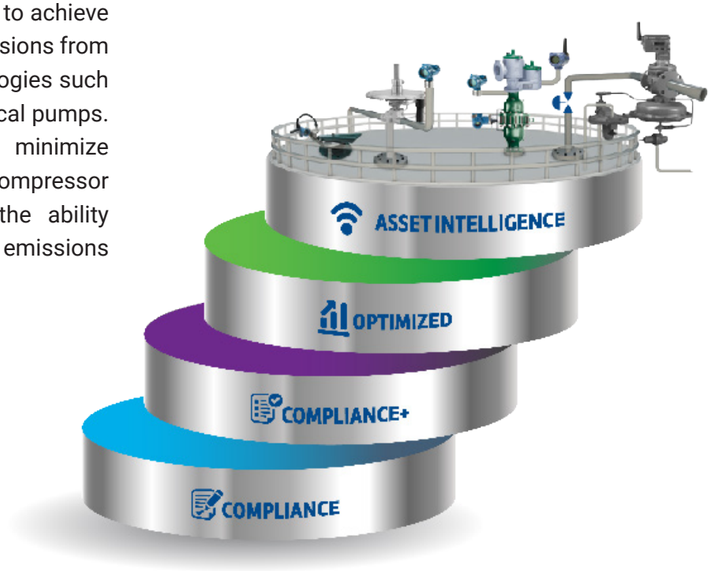
SpartanPRO™ Programs

PRO Technology + **Integrated Solutions** = **PRO System**

CarbonVue™
Operational Carbon Accounting & Verification

Program Tiers

Implementing various tiers of programs to achieve regulatory compliance by reducing emissions from the well pad through innovative technologies such as electric actuation and electric chemical pumps. Additionally, integrating solutions to minimize emissions and conserve gas from compressor stations and tanks, while ensuring the ability to measure, monitor, and verify the emissions reductions from upstream assets.



Experience Industrial Innovation

DELIVERABLES	Compliance	Optimized	Asset Intelligence
IRIS Asset Health Audit	✓	✓	✓
Regulatory Compliance Review	✓	✓	✓
Safety & Reliability Improvements	✓	✓	✓
EPC & Project Consulting	✓	✓	✓
Revenue Generation Suggestions		✓	✓
Performance Optimization Review		✓	✓
Smart Tank Monitoring (MMV)			✓
Remote Connectivity			✓
VALUE PROPOSITIONS			
General Check-Up	✓	✓	✓
Carbon Tax Savings		✓	✓
Carbon Offsets		✓	✓
Blanket Gas Savings		✓	✓
Real-time Data			✓
Auditable Verification			✓
Cost Savings Solutions			✓
Increased Production			✓

Wellhead & Gas Lift Retrofit

Electric Actuated Wellhead Choke Valve

Bettis RTS Linear CM-32C-4M0HB-L1-0K Electric Actuated Wellhead Choke Valve

Pneumatic Automated Wellhead Choke Valve

Bettis RTSM Multi-Turn CM-32C-4M0HB-GE-0-K Fail Last Electric Actuated Wellhead Choke Valve

Pneumatic Automated Wellhead Choke Valves

Bettis EM 500 Series Multi-Turn Electric Actuated Automated Wellhead Choke Valves

Upstream Measurement Solutions
Pressure and Temperature

Pressure

- Patented Coplanar transmitter platform provides flexibility to support a wide variety of pressure, level, and flow assemblies
- Performance of 0.065 percent with high accuracy option
- Lightweight, compact design for cost-effective installation
- Absolute and gauge pressure ranges up to 10,000 psi (2088 in Range 5)
- Lower tiers for non-critical applications

Temperature

- Maintain optimal temperature levels and ensure smooth operations with reliable measurement
- Minimize downtime using advanced diagnostics for early detection of issues
- Diverse mounting configurations, including head, field, or rail mount, with many enclosure options

Separators

CONVERTED TO

Fisher™ 667 on Modified Quarter Turn Choke

CONVERTED TO

Bettis™ RTS Linear Mechanical Spring Fail Closed Electric Actuator

4 years continuous service with no downtime

Electric Actuated Y-Pattern Inlet Choke Valve

CONVERTED TO

Bettis™ TorqPlus Quarter Turn Electric Actuator

2 years continuous service with no downtime

Electric Solutions

2” Inlet Pneumatic D Series Body Control Valve

CONVERTED TO

Fisher™ D3e Easy-Drive Electric

2” NPT Pneumatic D Series Control Dump Valve

CONVERTED TO

Fisher™ 2” NPT D3e Easy-Drive Electric

2” 600 Pneumatic ET Back Pressure Control

CONVERTED TO

Bettis™ RTS Linear Electric Actuator on 2” 600 D-body or Fisher ET TorqPlus Linear

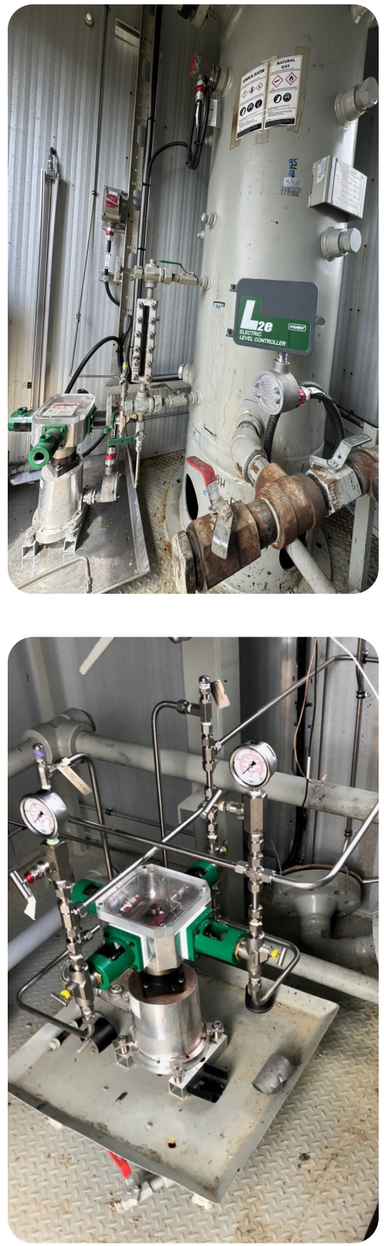
These conversions resulted in 2 years continuous service with no downtime.

Brownfield Separator Pneumatic Converted to Fisher & Bettis Electric Solutions - Methane Reduction

Norriseal High Bleed Pneumatic Level Controller

CONVERTED TO

Fisher L2e Electric Level Controller Zero Bleed



High Bleed Pneumatic Chemical Pump utilizing fuel gas as power source - methane emitting

CONVERTED TO

LCO Zero Methane Emitting Chemical Pump

Production Testing Skid: Pneumatic Actuators Converted to Fisher & Bettis Electric Solutions - Methane Reduction

Fisher D3 Pneumatics & Fisher L2 Pneumatic Level Controllers

CONVERTED TO

Fisher D3e & D4e Electrics on -off or Throttling & Fisher L2e Electric Level Controllers

CVS Pneumatic Linear Actuator on 3” HPT Control Valve

CONVERTED TO

Bettis RTS Linear Fail Last Actuator on Fisher 3” HPT or Fisher ET Control Valve

Pneumatic Solutions

Pneumatic Automated Wellhead Choke Valve

CONVERTED TO:
- Bettis RTSM Multi-Turn CM-32C-4M0HB-GE-0-K Fail Last Electric Actuated Wellhead Choke Valve

Pneumatic Linear Inlet Control Valve
Fisher HPT, D-Body, & Inline Choke

CONVERTED TO:
- Bettis™ RTS Linear Fail Last & Safe Modulating
- Bettis™ TorqPlus Quarter Turn Modulating
- Fisher™ D4e easy-Drive - Fail Last & Safe with RPU 100 Supercapacitor
- Fisher™ 200L Linear

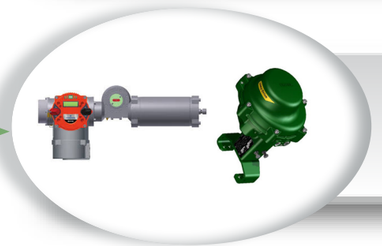
Pneumatic Linear Level Control Valve (Dump Valve)
Fisher D-Body (D2, D3, & D4)

CONVERTED TO:
- Bettis™ TorqPlus Linear
- Fisher™ D3e easy-Drive on/off
- Fisher™ D4e easy-Drive on/off

Pneumatic Linear Back Pressure Control Valve
Fisher ET, D3e, & D4e

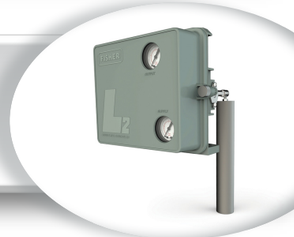
CONVERTED TO:
- Bettis™ RTS Linear Fail Last & Safe Modulating
- Fisher™ 200L Linear
- Fisher™ D4e or D3e Fail Last Throttling or Safe with RPU 100
- On/off & Modulating - 50% Duty Cycle

Pneumatic Emergency Shutdown Valves (ESDV)
Ball Valves & V-Balls



CONVERTED TO:
- Bettis™RTS Quarter Turn Fail Safe Mechanical Spring
- Fisher™ 200R Quarter Turn with RPU-100
- Bettis™ Self Contained Hydraulic Actuator

Fisher L2 - Pneumatic Level Control



CONVERTED TO:
- Fisher™ L2e Electric Level Control
- Fisher™ L2tThrottling Level Control

Electric Solutions

Current Upstream Electric Applications & Solutions - Producer #1 in Montney Region - Electric Wellpad

Challenges

- How to maximize production while meeting emission targets
- Elimination of Methane of new and existing wellpads
- Power source for 6-8 wells in remote location
  - pneumatic or power

Ran two trials, Pneumatic & Electric Pneumatic Design

- Retrofitting valve actuators on existing well pads to run on compressed air
- Reliability became a concern
  - Air compressor duty too high
  - Instrumentation consumption too high required additional solar/power system
- Higher maintenance and start up costs

Electric design on next generation well pads

- Utilizing fuel cell w/TEGs along w/Remote Power System - 6-8 wells per pad
- Bettis RTS Linear Electric Fail Last w/Hart Card on BPCV
- Bettis RTS Linear w/Hart Card on Wellhead and Gas Lift Chokes
- Fisher D4e easy –Drive electrics on inlet and dump valves
- Electric Chemical Pump

Results: Standardized on electric actuators – 40+ Pads

- New Pads remove 90%+ of gas emissions
- New Pad design cost lower by 15%
- Increased production by 40-46%
- Advanced Diagnostic capabilities
  - Asset monitoring key factor in going with electrics

Current Upstream Electric Applications & Solutions - Deep Basin Producers - Electric Wellpads

Deep Basin area-200+ Electric wells

- 1 to 4 Well Electric Pad
- **Challenges**
  - Pneumatic Wellpads Unreliability & higher costs for air compressors
  - Remote locations require 1.5+ KW of power
- **Solutions**
  - Utilizing Solar with Batteries for Power
  - Target 7-10 days autonomy

Bettis RTS Fail Closed

- Standby = .9A continuous
- Travelling open = approximately 20 seconds to go full open from close @ 4.0A continuous
- Traveling Closed = approximately 15 seconds to go full open from close @ 4.0A continuous

CROSSSFIRE Chemical Injection (2 headed)

- Injecting 20 L/Day @ 1000psi = 6 Watts
- Injecting 40 L/Day @ 1500psi = 11 Watts
- Injecting 80 L/Day @ 3000psi = 25 Watts
- Sizing assistance for any scenario
- Standby = <1 Watt

Fisher Easy Drive Dump Valves

- Opening = Approximately 4 seconds to open @ .8A
- Closing = Approximately 3 seconds to open @ .4A

Fisher L2e Electric Level Controller

- Idle = .015A
- Startup/Running = .5A

Results

- New separators are non-venting
- Customized separator combining electrics with instrument air
- Improved power efficiency and achieved environmental compliance and reduced maintenance costs

Upstream Measurement Solutions
Flow and Water Cut

Coriolis

- Micro Motion Coriolis flow meters offer unmatched accuracy, and functionality for critical processes
- Net oil calculation, LACT, and custody transfer
- Smart Meter Verification checks both meter and process health
- Advanced phase measurement handles liquid or gas flow in limited multiphase conditions
- Tools provide insight into process events, fluid quality, and measurement stability
- Real-time clock timestamps process data, alerts, and audit logs

Water-Cut

- Density-corrected water-cut ensures custody transfer accuracy
- Phase Dynamics' patented oscillator load-pull technologyinstantly responds to changes in materials within the Analyzer's Measurement Section
- Each Phase Dynamics Analyzer is factory calibrated to precisely control temperature, pressure, and material properties

Alternative Flow Solutions

Non-Intrusive, Clamp-on Ultrasonic

- From liquids to gases, Emerson's Flexim non-intrusive, clamp-on ultrasonic flow measurement and refractometer technologies measure virtually anything that flows
- Dependably measure the flow of almost all fluids, whether liquid or gas, and excel in measuring steam without interrupting operations
- Measuring instruments designed for use in explosive environments ensure accuracy, safety, and reliability in all conditions

Thermal Mass

- Fox Thermal manufactures advanced thermal mass flow meters
- Direct mass flow measurement of air and gases
- Low-pressure drop, no moving parts, cost-effectiveness
- Broad measurement range: up to 1000:1 (100:1 typical)
- Measures flow rate and temperature
- Data Logger with seven-year history

Electric Solution

CROSSFIRE PUMP Precise Chemical Management
Reduce Methane Emissions & Minimize Chemical Waste

Smart Controller &
MODBUS Communications

Electrically Driven (24VDC)
with High System Autonomy

Customization Available for
Fluid End Size, Packings, &
O-rings

Replace up to Four
Pneumatic Pumps

Challenges with Pneumatic Pumps

High Gas Consumption
- Methane Emissions
- Gas Odours

Wearing of Moving Parts
- Damage to Packing, Thrust Rod, Check Valves & Switching Valves
- Gas/Chemical Leaks

Debris Collection
- Frequent Maintenance
- Mechanical Inneficiences

Inefficient Chemical Injection
- Limited Stroke Length
- Chemical Waste

Chemical Injection Pumps: Pneumatic vs Electric

CROSSFIRE

- Test separator package in northwestern Alberta with four pneumatic chemical pumps
- Each chemical pump utilizing fuel gas as power source
- Produced **363 tCO2e/y** of methane emissions

Carbon Offsets at 1/3 of that:

- 120 tCO2e/y
- $50 / tCO2e
- $6,000 revenue/year

- 2030 Compliance

One Electrical Chemical Pump (24 vdc) with 4 heads can replace up to four pneumatic chemical pumps

- Runs off Solar Power – utilizes 6.6 Watts
- Smart / diagnostics / connectivity (SCADA / RTU)
- Zero Methane Emissions
- Carbon Credit Generator - Brownfield

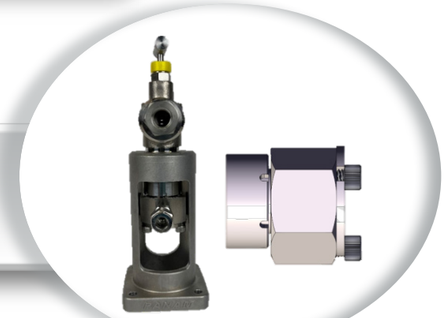
CROSSFIRE Chemical Pumps: New Developments

ONE 'N' DONE

- Packing cartridge
- Chemical capability
- Reduce maintenance runs

CHEMKEEPER

- Secondary containment
- Eliminate leaks & chemical loss



OTHER DEVELOPMENTS

- Two piece suction check valve
  - Simplifies o-ring replacement & allows material compatibility
- Manual 15 firmware implementation

Ultra Low Power Solutions

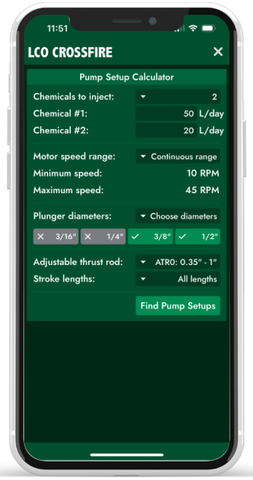
CROSSFIRE Smart Controller

- High-performance 32-bit processor
- Compact, lightweight design with DIN rail mountability
- User-friendly interface, controllable via serial cable or smartphone Bluetooth
- Variable speed and programmable logic control
- Modbus communication for remote monitoring and SCADA control
- Time-stamped status and non-volatile memory for event logs, ideal for carbon reduction programs
- Extremely durable with built-in protection schemes

CROSSFIRE Air Receiver

- Options for 30-gallon and 60-gallon vertical air receivers
- 1,300 SCFD @ 35psi with 35psi, 50psi, or 100psi options available
- Integrated Rosemount 2088 Pressure Transmitter
- 200psi safety relief and ½” connection
- Custom designs available upon request

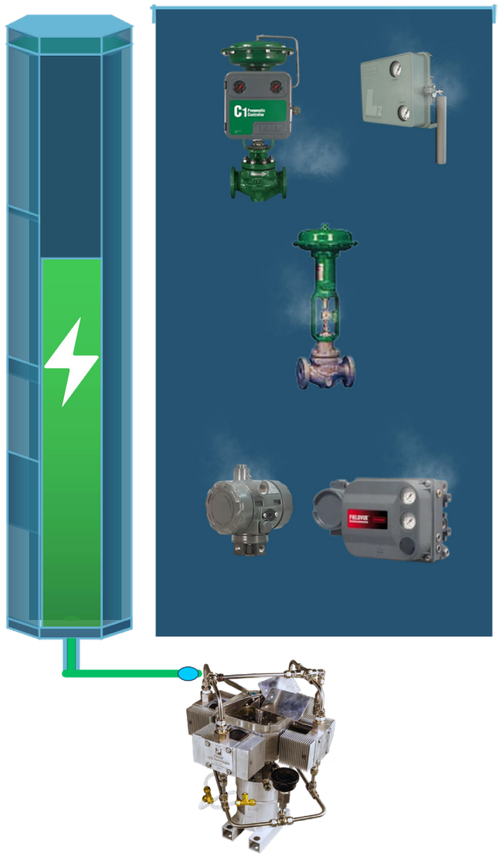
> The CROSSFIRE Platform is a complete ultra-low power environmental solution for methane emission reduction.



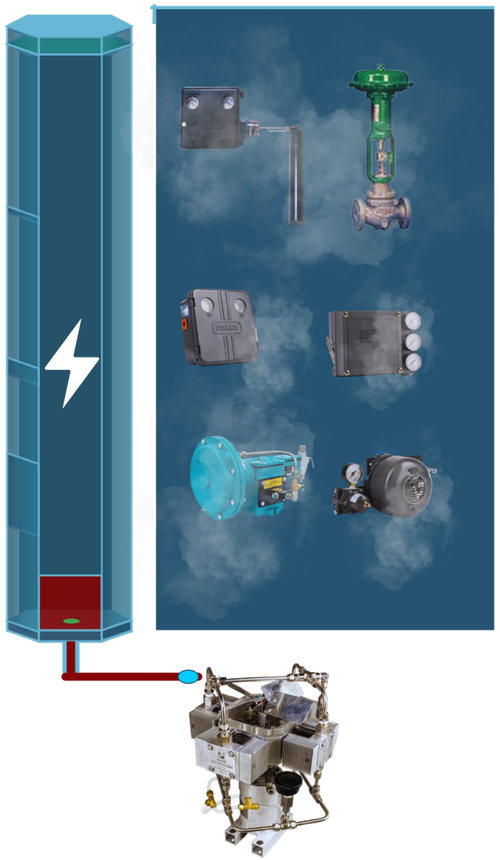
Pneumatics on Instrument Air

Converting high-bleed instruments to low-bleed devices is a highly effective strategy for meeting environmental compliance while reducing air consumption and power usage. While non-venting operations can be achieved by replacing natural gas with air, this approach often necessitates large or multiple air compression units, which can significantly increase power demand.

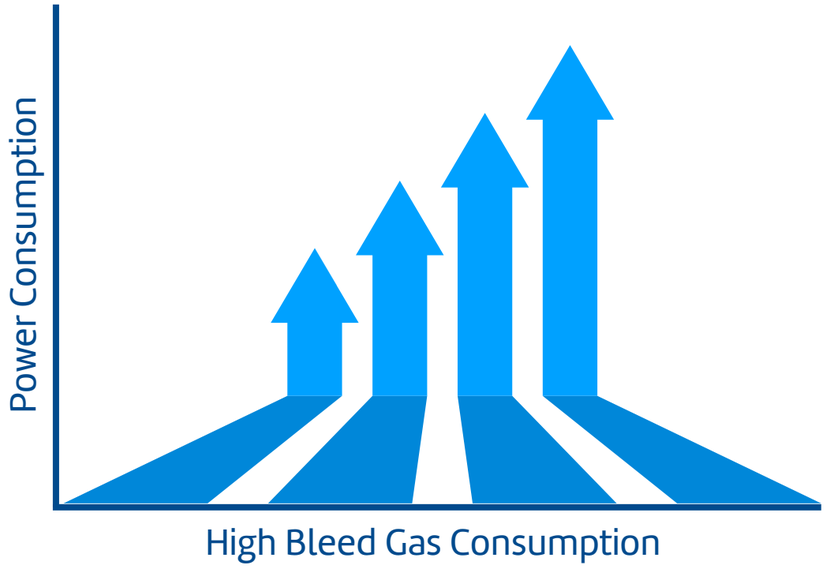
Low Bleeds on Air



High Bleeds on Air



Optimized Air Demand ≈ Effective Power Consumption



RECOMMENDATIONS

- Retrofit high bleeds with low bleeds to save on air consumption
- Low air consumption results in power consumption savings

Upstream Liquid Level Measurement Solutions

The Analytical & Detection (A&D) business provides solutions to help understand the quality and composition of gas and liquid process streams and to help mitigate risk by monitoring industrial environments to keep people and plant assets safe from fire, combustible, and toxic hazards.

Non-Contacting Radar

- Emerson's Rosemount FMCW radar level technology provides accurate measurement in any application
- 80GHz Fast Sweep Technology offers increased reliability
- Solutions for tanks and reactors
- Designed for safety with low failure rates, and high diagnostic coverage
- Advanced diagnostics ensure processes are under control

Guided Wave Radar

- Suitable for most level and interface applications
- Reliable in challenging processes
- Dynamic vapor compensation ensures accuracy
- Direct switch technology and probe end projection
- Online device verification and high-level detection

Upstream Analytical & Detection Solutions

Safety Solutions

- Solutions for the detection of toxic or combustible gases and fires
- Horns, strobes, and complete public address/general alarm systems to alert employees to problems such as gas leaks, fire, or other emergencies
- Industrial IP video and thermal

Analyzers

- Full range of process and natural gas chromatographs
- Low power consumption 25 watts in the steady-state mode reduces operating costs
- A fully serviceable maintainable module combines all critical functional parts in one assembly, allowing quick and easy field replacement or repair

Upstream Measurement Solutions
RTUs and Flow Computers

Flow Computers and RTUs

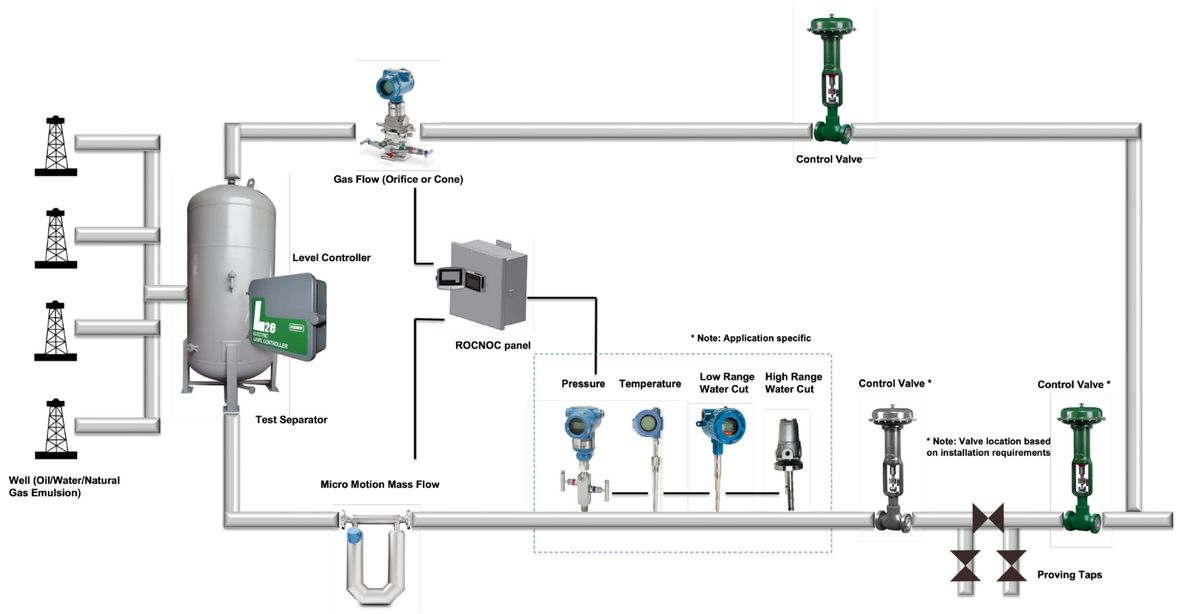
- From measurement to host systems, we focus on integrating our technology with your SCADA system of choice
- Suite of oil and gas applications
- Modern, cyber-secure communication protocols
- Rugged and low-power solutions designed for wide-area networks
- Improving productivity and efficiency in your applications
- Our products and systems enable you to:
  - Monitor, control, and measure remotely
  - Optimize assets with greater visibility into your field
  - Enhance safety by streamlining process knowledge
- Multivariable sensor capable of measuring differential pressure, static pressure, and temperature

ProductionManager EDGE™

- Software applications address the operational control and fiscal management requirements of oil and gas well pads and the associated central processing facilities
- Allows the producer to manage the lifecycle of this production from the free-flowing stage to artificial lift and tertiary/EOR phases on the same RTU platform
- Safely increase overall production, provide timely and accurate fiscal custody and allocation production information, enhance producers' manpower utilization effectiveness, and facilitate the safe and responsible operation of well sites and related facilities

SpartanPRO™ NOC

- Part of the SpartanPRO™ suite of applications built for the FB3000
- Accurately determine oil and water components in a flowing emulsion by using either a dedicated water cut analyzer or inferred-density water-cut from Micro Motion Coriolis meter
- Accommodates up to two separators that could be used for well testing or LACT measurements
- Compliant with provincial regulator agencies (i.e., AER Directive 017) for hydrocarbon gas and liquid measurements
- Electronic Flow Meter system compliance maintained to API MPMS Ch 21.1 & 21.2 audit trail and reporting requirements



Process Data, Methane & Asset Management

Filter and focus on assets or elements of your energy system to understand where your costs are versus where they could be.

Multi-device group type:

- Understand the distribution of alerts amongst the class/type of asset
- Identify the bad actor in the group for these assets
- Understand how much this alert contributes to alarms

Single Smart Device:

- Contribution of total alerts to the system
- Understand the distribution of alert types across the specific device

OPERATING COST
($ / MONTH)

$6,799,595.31
-14% compare to target

Understand your consumption and generation across your cost centers.

SCES-EDGE: Securely connect to the cloud

CarbonVue™ MMV/MRV (Measure, Monitor (Report), and Verify

- Comprehensive emissions measurement and reporting
- Secure, auditable data structures
- Real-time monitoring and insights
- Verification engine to simplify auditing

CarbonVue™ Carbon Intensity Verification Engine

- Essential for third-party verification within MMV/MRV frameworks
- Helps owner/operators meet verification requirements
- Mitigates risks related to offsets and performance credits
- Reduces stress by providing access to necessary data and infrastructure

Diagnostic dashboard applications that we can build to showcase the analytics from the assets

Five Step Programmatic Methodology to Realizing Positive ESG Outcomes

1

ENGAGEMENT

Refine the project scope, align on initiatives, and gain a thorough understanding of operational and economic factors.

2

PRELIMINARY ASSESSMENT

Evaluate functional requirements, feasibility, and economic motivations, ensuring alignment with corporate initiatives.

3

STRATEGIC ANALYSIS

Validate on-site findings, establish baseline performance, conduct cost-benefit analysis, and prioritize outcomes.

4

PROJECT EXECUTION

Implement solutions, coordinate with stakeholders, and monitor progress to ensure objectives are met.

5

REPORT & VERIFY

Review findings, identify key opportunities, and develop an actionable roadmap for solution deployment, use, and sustainment.

Upstream Oil & Gas Program Solutions

COMPLIANCE CONSULTATION | **DATA MANAGEMENT & ANALYSIS** | **FUNDING PROGRAM SERVICES** | **CARBON ACCOUNTING** | **FACILITY WALKDOWNS & ASSESSMENTS** | **SUPPORT & FIELD SERVICE**

Our commitment to innovation and customization enables clients to maximize production, minimize downtime, and achieve sustainable growth.

Integrated Approach: Spartan offers a comprehensive suite of solutions that integrate automation, safety, and data management for a seamless operational experience.

Customization: Solutions are tailored to meet the specific needs of clients in the upstream oil and gas sector.

Partnerships: Collaborates with leading technology providers to enhance product offerings and stay at the forefront of industry innovations.

MEASUREMENT & AUTOMATION

MEASURE, MONITOR, & VERIFY

CarbonVue™ Operational Carbon Accounting & Verification

BLUEMARVEL

STORAGE TANK SOLUTIONS

EMISSIONS & ENGINE TESTING

SIGNET Monitoring & Analysis Inc. — A Spartan Controls Company

VENT CAPTURE SOLUTIONS

LOW BLEEDS & INSTRUMENT AIR

ELECTRIC ACTUATION

ELECTRIC CHEMICAL PUMP

SPARTAN CONTROLS

Experience Industrial Innovation

Our team of experts are **ready to assist** you in optimizing your upstream greenfield and brownfield well pads, while reducing your methane emissions.

Call us today or request a quote online 24/7

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spartancontrols.com