ProductionManager™ Well Optimization

Product Overview

ProductionManager™ Well Optimization (PMWO) allows you to optimize production based on industry standard methods. This application provides your operation with continuous, real-time optimization of production as well as surface and downhole analytics. Optimization setpoints can be managed manually or by utilizing Well Optimization's auto-adjust capabilities. Well Optimization records optimization statistics needed to identify key trends, allowing you to better manage your decline curves.

Well Optimization leverages ProductionManager™ Equipment Module (PMEQ) well objects for use in well optimization, speeding deployment by simplifying configuration. In order to meet API 20.5 well testing guidelines, Well Optimization intuitively interacts with ProductionManager™ Well Test to optimize the well, when appropriate.

Features

- **Plunger Lift Optimization**
  - Intermitter, continuous or conventional plunger
  - Rod Pump (for de-liquification)
  - Extensive list of user-adjustable, open/close and lift triggers
  - Auto-adjust and user-defined options available
  - GAPL (Gas Assisted Plunger Lift) optimization

- **Gas Lift Optimization**
  - Liquid or gas maximum production or efficiency
  - Economic gas lift optimization based on maximizing revenue
  - PAGL (Plunger Assisted Gas Lift) optimization
  - GAS Lift optimization based on lowering Bottom Hole Pressure
  - API 19.2 downhole mandrel valve startup sequencing and operating status

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- **Wellhead Analytics**
  - Plunger cycle and gas lift logs
  - Last 5 Cycle Logging and Trending
  - Plunger arrival, velocity, and mileage tracking
  - Hagedorn-Brown bottom hole pressure calculation
  - Coleman Turner critical flow calculation (surface and bottom hole)
  - Foss & Gaul opening pressure calculation
  - Heading detection
  - Plunger data and statistics tracking

- **Comprehensive supporting feature set (DP kick arrival detection, swabbing, pressure build test, etc.)**

User Interface

Well Optimization is accessed utilizing FBxConnect™ software, a Microsoft® Windows® based program created to configure, monitor and service Emerson's FB3000 RTU and applications. Well Optimization's graphical user interface allows you to easily navigate, operate, and configure each well's optimization requirements to your unique specifications.

Connectivity/Requirements

Once connected, you can access all features, including editing objects, setting alerts, reporting, diagnostics and more.

- FBxConnect™ access
- FB3000 RTU
- PMWO License
- Local connectivity via USB, serial or Ethernet**

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*If you already have a method to connect to the FB3000 RTU remotely for SCADA or cloud access, you can use FBxConnect™ and that same remote link to connect to PMEQ and all other apps in the ProductionManager EDGE suite.
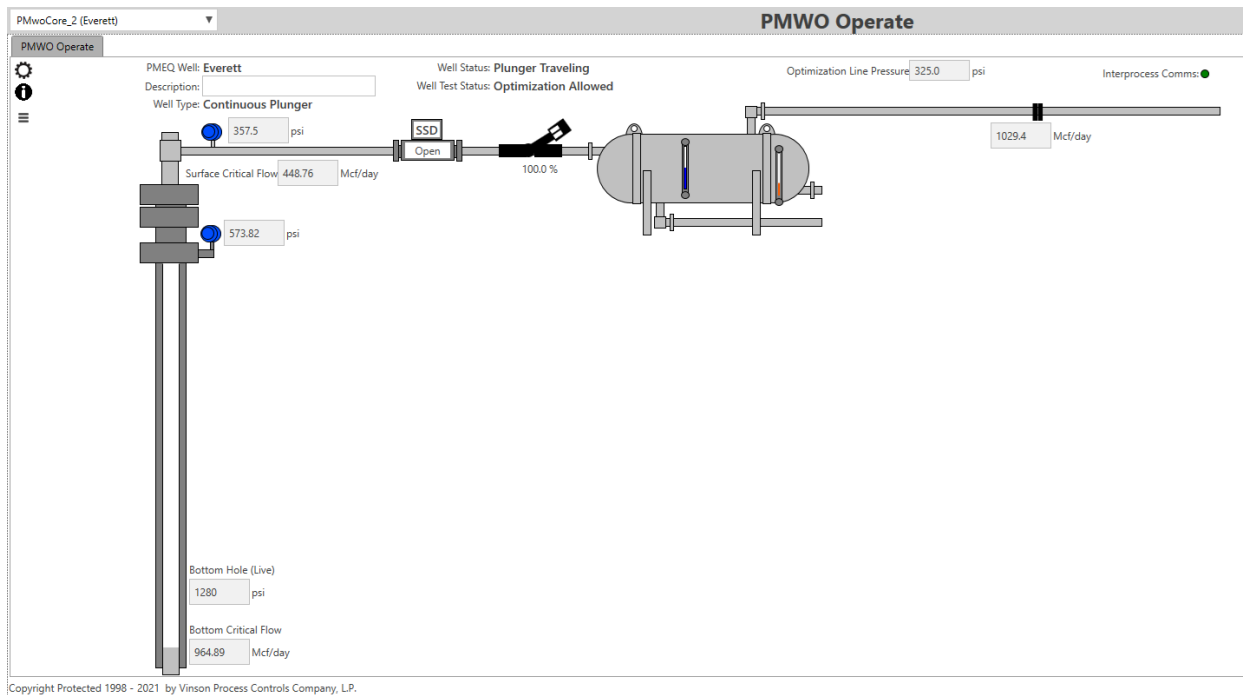
Configuration

GAPL Operate

Gas Assisted Plunger Lift Well (GAPL) Operate screen. Displays pertinent pressures and flows with *hyperlinks* to open detailed pop-ups.
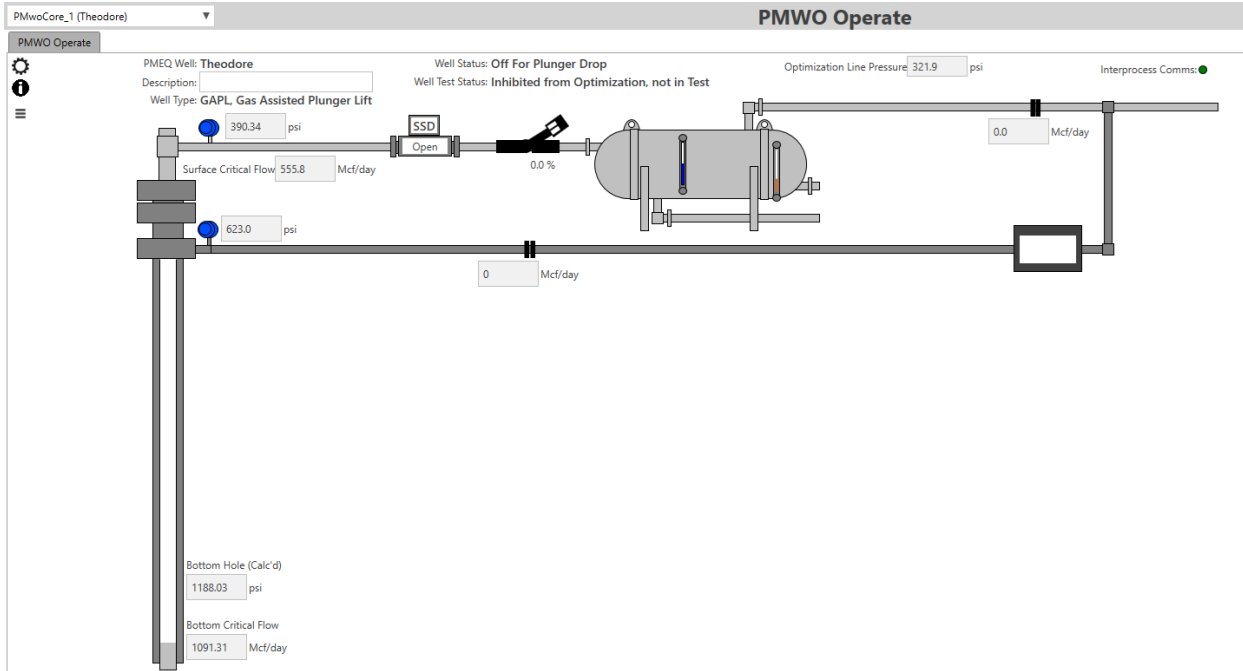
Continuous Plunger Operate

Displays pertinent pressures and flows with *hyperlinks* to open detailed pop-ups.

Gas Lift Operate

Displays pertinent pressures and flows with *hyperlinks* to open detailed pop-ups.
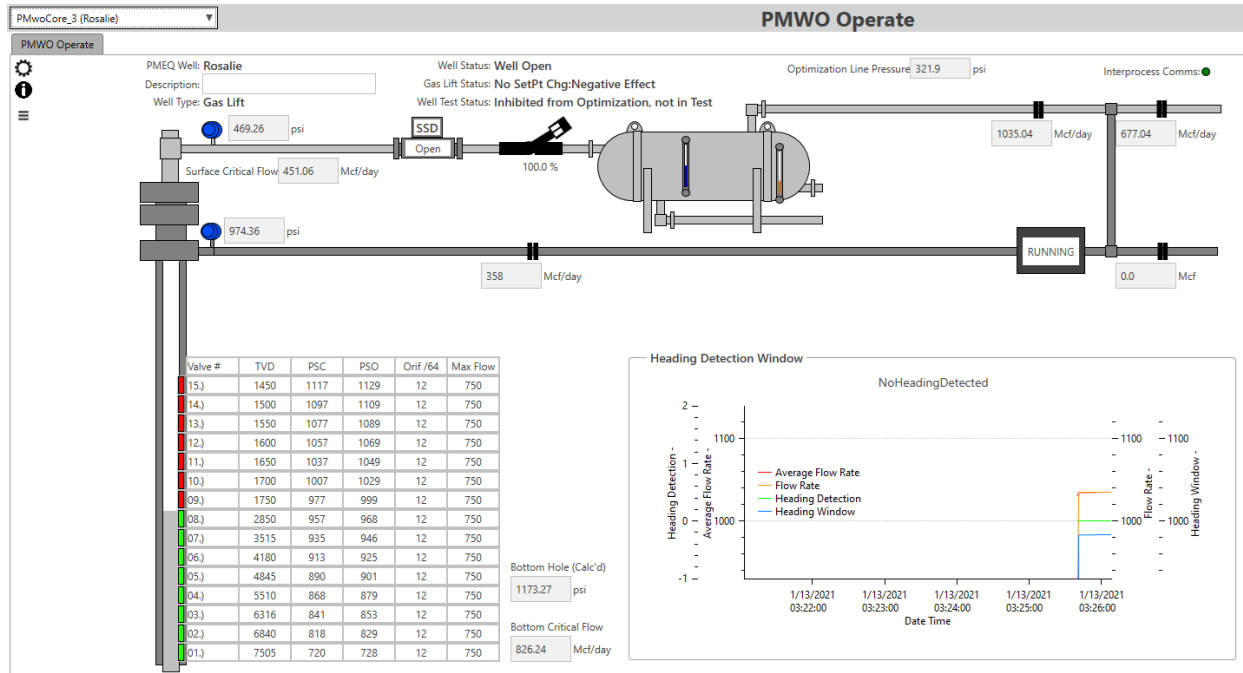
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Plunger Assisted Gas Lift (PAGL) Operate

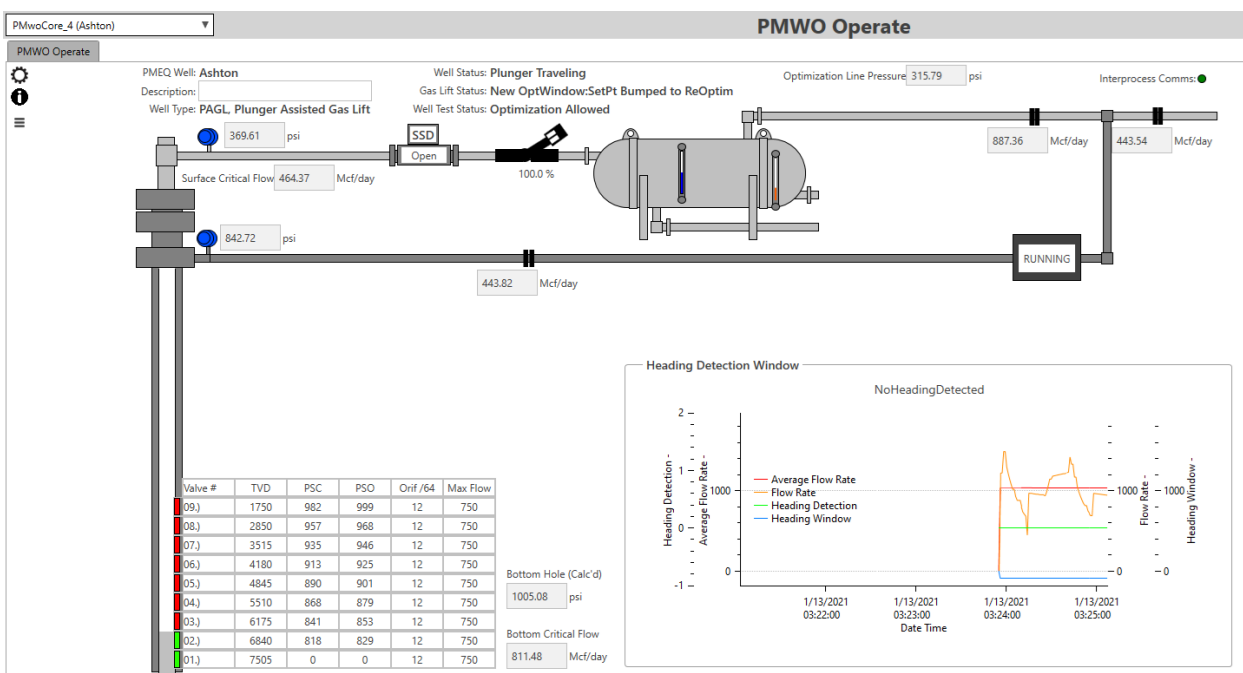Displays pertinent pressures and flows with *hyperlinks* to open detailed pop-ups.

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Cyclic Triggers Operate

Allows defining and tuning Open, Close and Lifting Triggers, with *hyperlinks* to open detailed pop-ups.

Cyclic Triggers

PMwoCore_1 (Theodore) ▼

Cyclic Triggers

Well Status: **Assisted Lift**

Lifting

Timer	Preset Mins	Elapsed Mins	Secs
Plunger Wait Time:	45.0		
Dry Arv. Wait Time:	3.0	4.07	244
V/G/A Trigger Delay:	1.0	0.0	0

Apply V/G/A Trig. Delay To: Flow/DP ▼

Vent/GAPL/Abort Triggers

Flow	1905.0 <=	0.0	Mcf/day	
Auto Adj Flow Trigger to	100.0	% Crit		
DP	235.8 <=	0.0	in wc	
Line	322.7 >=	0.0	psi	
Tbg-Lin	32.3 <=	0.0	psi	
UsrDef	0.0 >=	0.0		

GAPL

Inj Now

Injection Rate: 400.0 Mcf/day
Injection Setpoint: 400.0 Mcf/day

Now Open

Afterflow

Timer	Preset Mins	Elapsed Mins	Secs
Minimum Afterflow:	1.0	0.0	0
Close Trigger Delay:	1.0	0.0	0

Apply Close Trig. Delay To: Flow/DP ▼

CloseTriggers

ON Time	4.07 >= 1440.0	Min	
	0.07 >= 24.0	Hrs	
Aftr Flw	0.0 >= 1440.0	Min	
	0.0 >= 24.0	Hrs	
Casing	625.8 <= 0.0	psi	
Tubing	354.9 <= 0.0	psi	
Csg -Tbg	270.9 >= 0.0	psi	
Tbg -Lin	32.3 <= 0.0	psi	
Csg -Lin	303.2 >= 0.0	psi	
CsgUP%	0.1 >= 0.0	%	
MeterDP	235.8 <= 0.0	in wc	
✓ Flow	1905.0 <= 450.8	Mcf/day	F
✓ Auto Adj Flow Trigger to	85.0	% of Critical Flow	
Net Flow	1505.0 <= 0.0	Mcf/day	
UsrDef1	0.0 >= 0.0		
UsrDef2	0.0 >= 0.0		

Unarmed Shut-In

Minimum Shut-In Time

Timer	Preset Mins	Elapsed Mins	Secs
Preset in Effect:	5.0	0.0	0

Plunger Drop Time 5.0 Mins
Max Non-Arrival Shut-In Time: 120.0 Mins

Well Control Panel

Manual Mode

Conventional Plunger

Well Flow/DP Setpoint: 240.0

Conventional Stage Advance
Assisted Lift ▼

Armed Shut-In

Foss and Gaul Open Trigger Recomendations

Tbg-Lin >=   Load Fct <=
Csg-Lin >=   Waiting for Armed Shutin

Open Triggers

OFF Time	0.0 >= 480.0	Min	
	0.0 >= 8.0	Hrs	
Armd Tm	0.0 >= 480.0	Min	
	0.0 >= 8.0	Hrs	

○ AND Triggers Below   ● OR Triggers Below

✓ Casing	625.8 >= 650.0	psi	F
Tubing	354.9 >= 0.0	psi	
Csg -Tbg	270.9 <= 0.0	psi	
Tbg -Lin	32.3 >= 0.0	psi	
Csg -Lin	303.2 >= 0.0	psi	
Load Fct	41.4 <= 0.0	%	
✓ Casing	0.0 >= 1.2	psi	F
Time	0.0 == 2.0	Min	
Tubing	0.0 >= 5.0	psi	
Time	0.0 == 2.0	Min	
UsrDef1	0.0 >= 0.0		
UsrDef2	0.0 >= 0.0		

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Last 5 Operate

Displays opening and closing values for each cycle and allows user defined trending.

Last Five Cycles

Current Serial Number

Well is:	Open	18307	MM/DD HH:Min	Event	Ref. Val	Casing	Tubing	Line	Total ON	Minutes OFF	Load Fct	Low Csg	AftFlo Mins Armed Mins	DP	Cycle Vol.	Flow Rate	Crit Rate	Casing - Line	Tubing - Line
Prev	Close	18306	13-Jan-2021 15:20:44	Flow Rate <=	451.3	622.7	355.8	323.4		6.0		622.1	16.28	10.6	30.1	407.5	530.9	299.3	
	Open	18307	13-Jan-2021 15:26:44	Csg/Time >=	1.2	626.3	501.3	323.4	32.38		41.4		1.0						302.9	177.6
2nd Prev	Close	18305	13-Jan-2021 14:40:24	Flow Rate <=	451.3	621.8	355.8	323.4		7.95		621.1	16.23	10.6	30.0	408.0	531.0	298.4	
	Open	18306	13-Jan-2021 14:48:21	Csg/Time >=	1.2	626.6	501.3	321.1	32.33		41.0		2.95						305.5	180.2
3rd Prev	Close	18304	13-Jan-2021 14:02:06	Flow Rate <=	451.9	621.9	356.6	324.2		5.97		621.4	16.25	10.6	30.1	408.4	531.6	297.8	
	Open	18305	13-Jan-2021 14:08:04	Csg/Time >=	1.2	625.7	500.5	322.7	32.4		41.3		0.97						303.0	177.9
4th Prev	Close	18303	13-Jan-2021 13:23:44	Flow Rate <=	450.9	622.4	354.9	322.7		5.97		621.7	16.28	10.6	30.0	407.3	530.4	299.7	
	Open	18304	13-Jan-2021 13:29:42	Csg/Time >=	1.2	626.0	500.8	321.1	32.32		41.1		0.97						304.8	179.6
5th Prev	Close	18302	13-Jan-2021 12:45:26	Flow Rate <=	451.3	622.6	355.8	323.4		5.98		622.0	16.3	10.6	30.1	407.6	530.9	299.2	
	Open	18303	13-Jan-2021 12:51:25	Csg/Time >=	1.2	626.2	501.0	322.7	32.38		41.3		0.98						303.6	178.3

1st Value: Lowest Casing Pressure At Closing ▼ — Lowest Casing — 629 — 622, 621.7, 621.4, 621.1, 622.1 (5P 4P 3P 2P P)

2nd Value: Casing Pressure Closing ▼ — Casing At Close — 629 — 622.6, 622.4, 622.1, 621.8, 622.7 (5P 4P 3P 2P P)

3rd Value: Tubing Pressure Opening ▼ — Tubing At Open — 507 — 501, 500.8, 500.5, 501.3, 501.1 (5P 4P 3P 2P P)

4th Value: Load Factor % at Opening ▼ — Open Load Factor% — 42 — 41.3, 41.1, 41.3, 41, 41.4 (5P 4P 3P 2P P)

5th Value: Critical Rate ▼ — Critical Rate — 537 — 530.9, 530.4, 531.6, 531, 530.9 (5P 4P 3P 2P P)

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How Will Well Optimizatin Benefit Your Operation?

If optimizing well production in the field or behind a desk is important to you, Well Optimization can be of great benefit.

- **Field Operations**

  Ease-of-use and configuration, measurement, current operating status, production optimization
- **Facility Engineers**

  Standardized deployment of equipment and facilities
- **Production/Reservoir Engineers**

  Better reservoir management through captured data and well analytics
- **Management/HSE/Accounting**

  Safety controls, standardization, custody transfer measurement and log retrieval
- **SCADA/IT Administration**

  Standardized data model provides consistent access to optimization, analytics and operational parameters

Support

- Help desk support is available 24/7.
- Training classes are offered year-round.
- Onsite configuration assistance is available upon request via your local Emerson Impact Partner.

ProductionManager EDGE® Suite

The ProductionManager EDGE® suite of applications is designed to provide standardized yet flexible solutions to common processes in the Oil & Gas production field. The suite is designed to assist with managing the lifecycle of the well (from flowback to abandonment), managing well testing for allocation purposes, and complete fluids management from well-to-sell. This comprehensive suite of applications has been enhanced by input from Major and Independent E&P companies alike, and utilized in North America for over 20 years with tremendous success.

ProductionManager™ Equipment Module (PMEQ)

The ProductionManager Equipment Module (PMEQ) gives you the ability to define, build, monitor, track and diagnose the equipment installed on your upstream production site. PMEQ allows for operational analysis and diagnostics of onsite equipment.

ProductionManager™ Well Optimization (PMWO)

ProductionManager™ Well Optimization (PMWO) allows you to optimize production based on industry standard methods. This application provides your operation with continuous, real-time optimization of production, as well as surface and downhole analytics. PMWO records optimization statistics needed to identify key trends, allowing you to better manage your decline curves.

ProductionManager™ Well Test (PMWT)

ProductionManager™ Well Test (PMWT) allows you to maintain accurate allocation measurement while achieving facility cost reduction goals. Now you can rest easy knowing that potential issues with allocation, scheduling, multiple testers and optimal test results are a thing of the past.

ProductionManager™ Surface Controls (PMSC)

ProductionManager™ Surface Controls allows the user to perform control, logic, and mathematical functions using easy to configure pre-designed menus. Surface Controls facilitates configuration of your complete cause and effect narrative, handling temporary or permanent shutdowns, permissives, bypasses, alarming and other utility functions.

Coming Soon

- **ProductionManager EDGE™ Fluid Logistics (PMFL)**
- **ProductionManager EDGE™ Interface (PMEI)**
- **ProductionManager EDGE™ Chemical Manager (PMCM)**