

Virtual Flow Metering (VFM)

Cost-Effective Production Monitoring with Real-Time Data Access

Production operators and engineers need maximum information about what's flowing through their pipes to ensure safe and efficient production. Aspen METTE™ Virtual Flow Metering (VFM) is a powerful new web-based application that analyzes real-time sensor measurements to estimate the flow of oil, gas and water. The application delivers predictive results by leveraging physics-based multiphase flow models and optimization algorithms to continuously find the best match between field sensor data and multi-phase flow simulation.

Aspen METTE VFM enables effective production and reservoir monitoring through its advanced visualization capabilities, giving operators insight into their assets that allow them to take timely action and react to unwanted scenarios. These include visualization of sensor data, flow rates, additional parameters and how they change over time.

Multiphase Metering

VFM is a cost-effective software-based solution for multiphase metering. No new hardware installation is required - a server with real-time access to sensors and equipment readings in the production system can handle hundreds of wells. The application is flexible and customizable, and can reach high accuracy (5%), depending on the available instrumentation, fluid properties, well test data and quality of the sensor readings.

VFM minimizes the difference between calculated and measured sensor values. The optimal match is achieved after an iterative search for the best phase flows consistent with all available data.

In scenarios where a multi-phase flow meter (MPFM) is present, VFM is still relevant, both as an independent metering system and for backup and validation. In this case, VFM works in the same way as in stand-alone metering - it uses the MPFM sensors and estimates the flow rates. The redundant flow rate allows system validation by comparison, which cannot be done with the MPFM alone.

Deviation in the flow rates warns the user, who can then investigate the cause. It can be a result of production issues, such as the precipitation of solids in the pipes, or it can be a sign that the MPFM needs re-calibration.

Production and Reservoir Monitoring

It is difficult to understand what's happening in a production system by only looking at the sensor readings. VFM uses multiple sensor readings distributed throughout the production system and turns them into valuable data using analytics.

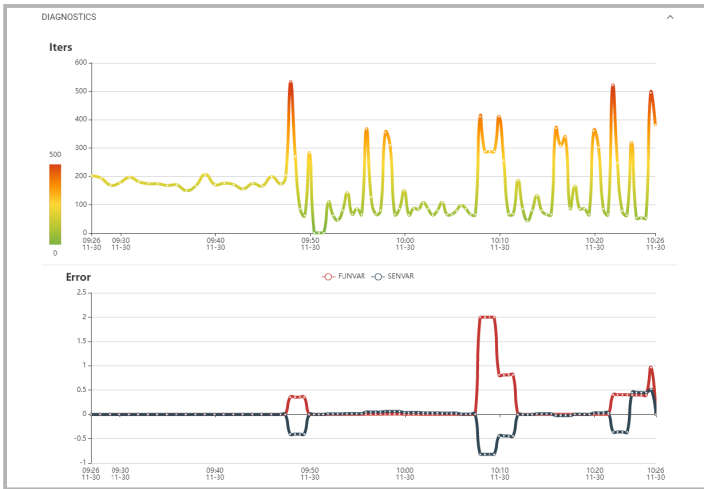
Aspen METTE VFM shows the total production system and quantifies changes in well behavior. Engineers and operators can discover wells that are underperforming and deal with the problems at hand. The VFM application allows users to select and visualize multiple parameters simultaneously, so they can identify unwanted changes in production, e.g. water coning or breakthrough.

VFM is a soft sensing technology, which means that it can extrapolate any flow related parameters, such as pressure, holdup and velocity, at any point in the production system. Aspen METTE VFM can safeguard the system by reporting hydrate formation temperatures and erosional velocities with adherence to international standards. VFM also allows reservoir engineers to monitor the reservoir and track changes in formation pressure and bottomhole pressure over time.

All of Aspen METTE VFM's features enable early identification of unwanted events, allowing operators to achieve high uptime of their producing wells.



Aspen METTE Virtual Flow Metering User Interface



Advanced diagnostics allow users to assess the performance of the VFM algorithm.

Aspen METTE VFM supports OPC DA servers as data input, allowing connection to online data streamed directly from field devices and sensors. Through OPC DA, Aspen METTE can interface all relevant production data to perform near real-time virtual flow metering and production monitoring.

VFM is an integral part of Aspen METTE

Aspen METTE is the engine for the Virtual Flow Metering System, which focuses on production monitoring in live producing fields. From production data in Excel, Aspen METTE can back-allocate production rates based on historical data from sensor measurements and equipment from producing fields.

Key Benefits

- Excellent and proven performance in both calculation speed and large system handling capacity
- Easy to access and use
- Provides insights into producing fields
- Track and identify operational changes to optimize production
- Added security through customized, role-based accessibility to selected features
- Minimal downtime by effective response to events that impact flow, from reservoir to topside
- Enhanced user flexibility through the ability to set/update model constraints at any time

Interoperability

- OPC DA Servers
 - SCADA (OpenEnterprise™) and DCS (DeltaV)
 - Production historians - OSIsoft PI, Aspen InfoPlus.21
- Tempest™ VIEW
- Excel

Key Capabilities

- Web-based
- For data acquisition, real-time access to sensors and equipment readings in the production system
- Customizable to existing instrumentation and field layout
- Ability to access multiple field projects in one user interface and choose the relevant one
- Takes both well and network model sensors into account
- Model calibration multipliers can be imported or manually input, and easily modified and logged at any time
- Customizable sensor weights
- Report of last events and user updates through History Log; restore previous versions in case of a data loss event
- No new hardware installation required