Plato

Production Logging Analysis Software

Probabilistic methodology - a proven advantage
The deterministic approach to production logging analysis can be unreliable and has long been a source of frustration to analysts.

Many factors inhibit confident decision-making: small sample ranges, manual calculation of flow rates, the inability to capture missing data and the exclusion of material balance all contribute to a result which is at best unreliable and at worst entirely meaningless.

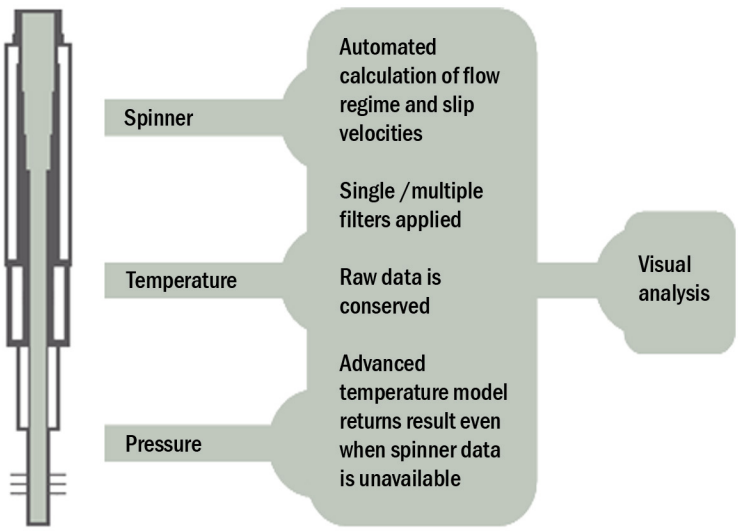
In addition, lack of constraints results in poor quality control and varying degrees of accuracy.

Plato is different.

Genuine three phase production logging analysis
Plato is based on global statistical modeling of the entire well. Probabilistic modeling enables simultaneous use of the entire data set, meaning all available data is used in conjunction with all surface information to deliver a comprehensive visual representation of well activity.

Flow rates are calculated by optimizing a global model of the entire well, and material balance is enforced through the use of mass flow rates as opposed to volume in order to minimise unknown values. Uniquely, Plato uses a complex temperature model to produce a result even when spinner data is unavailable.

In short, Plato delivers where no other product can.



- Probabilistic method
- Genuine three phase analysis for production and injection wells
- Advanced spinner data processing
- Complex temperature modeling ensures delivery of results even when spinner data is unavailable or unreliable
- Flow profile calculated using Dukler Taitel method
- DTS installation feasibility
- Integrated simulation capabilities
- Material balance is enforced
- Multi rate analysis
- Ability to plan production logging jobs and model reponses in advance
- Seamless integration of new and existing data
- Fully interactive workflow-led graphical user interface
- Fully automated, customizable report generation

Through the concurrent application of any number of tools and constraints, Plato ensures greater accuracy and quality control. In a typical analysis the temperature log, pressure derivative and stationary spinner measurements are used in conjunction with the standard tool set.

Estimated surface production rates are verified by alignment to measured production rates.

Plato's end-to-end probabilistic approach delivers a significant advantage over traditional production logging analysis. More accurate results enable faster, better-informed decision making, enabling analysts to retain source data integrity and optimize production.

Plato

Production Logging Analysis Software

Why use probabilistic modelling?

The biggest downfall of using the deterministic approach is the inability to verify results. There will always be a result, but its value will be inconsistent. By contrast, the probabalistic method delivers a comprehensive profile which is meaningful, reliable and offers proven accurate results where no other product can deliver.

	Traditional approach	Plato approach
Spinner processing/ calibration	Flow data is restricted to activity within the pipe. Calibration based on linear regression - extrapolation of data from stable non-producing zones.	Automatic spinner reversal and polarity determination. Slope and threshold values are calculated by aligning projected spinner passes to measured data. Calibrations are optimized within zones, and velocity is then optimized for each sample. Ability to detect thief or injection zones through changes to velocity.
Holdup determination	Limited to tools such as DEFT, GHOST. Only one technique can be used; remaining information is discarded.	Holdups are incorporated as part of the well model which is globally optimized during successive iterations. All available data is incorporated in a genuine three-phase approach.
Temperature modeling	Inaccurate as temperature is recorded only at intervals in the flowing section.	The Plato model takes into account all sources of temperature change and temperature is modeled in both flowing zones and production zones, allowing the analyst to model frictional heating or Joule-Thompson cooling.
	No ability to produce results when spinner data is unavailable or inaccurate.	Complex temperature modeling based on enthalpy balance ensures results are produced even when spinner data is unavailable or unreliable.
Flow regime	User-specified, resulting in increased margin for error/interpretational variances.	All available data is employed simultaneously to determine the flow profile: any conservation law may be applied as a constraint (e.g. material balance, momentum balance, energy balance). Plato calculates the flow profile using the Dukler Taitel method. For a given production profile, the well model predicts the tool responses and compares them to the data.
Slip velocities	Manually taken from charts, and best match slip correlation applied, leading to possible human error inaccuracies.	Once the flow regime is known, the slip velocities are found from empiric relations. These slip velocities are then compared to the slip velocities associated with the flowrates.
Integration	Integration of new data requires the complete redesign of the analysis algorithms.	Continuous logs and stationary data can be used at the same time. New data is seamlessly integrated with existing data as and when available.
Simulation	No simulation capability.	Sophisticated simulation possibilities (Monte Carlo) allow prediction of pressure and temperature behaviour of producing/injecting wells. These predictions are extensively used for DTS/PLT planning and can be used to optimize the well geometry.
Quality control	Limited quality control and verification.	Plato offers superb quality control. A global model of the entire well is compared to all the available data, Plato utilises all available data and computes on the basis of mass rates as opposed to volume. This gives a more stable and accurate result, even with deteriorated data.
Material balance	Material balance is ignored. Velocity and slip rates are modified to match the surface rates.	Material balance is enforced through the use of mass rates as opposed to volume rates as they remain constant in non-producing zones.
Audit trail	Raw data is overwritten when applying filters, exposing the analyst to risk of lost or amended data with no means to verify against source data.	Clear audit trail - when filters are applied raw data is not overwritten but is saved and accessible, enabling reversals and/or investigation of suspect results.