Changes in pressure, temperature, or oil composition often induce precipitation that can lead to deposition of organic solids in production and transportation pipe. Production system design and operating strategy must consider the control and remediation of those deposits.

RealView* live-fluid organic solids deposition analysis uses a laboratory apparatus that overcomes the limitations of conventional deposition measurement techniques by mimicking the process of wax and asphaltene deposition using live reservoir fluids under realistic production and transportation conditions.

The technology allows independent variation of test parameters to quantify the effects of pressure, temperature, composition, flow regime, and shear on the deposition behavior of waxes and asphaltenes.

Robust technology and design
Unlike conventional flow loops, RealView analysis measures live oil deposition in turbulent regimes. The cell is suitable for testing sour fluids and requires a sample volume of only 150 mL per wax deposition run. For asphaltene deposition runs in flow-through mode, the sample volume required per run is 1 L.

RealView analysis comprises a test cell, control system, and circulation system, all of which are housed on a control bench. The test cell consists of a cylindrical vessel with an axially centered heat source. The outer wall of the vessel is stationary, and the inner wall, or spindle, rotates to create a turbulent or laminar flow regime in the annular space.

The technology allows precise and independent control of pressure, temperature, differential temperature, and spindle speed, and the solid deposits are collected for quantification and qualification. High-temperature gas chromatography (HTGC) is used for wax deposit analysis and simulated distillation, and asphaltene content measurements are used for asphaltene deposit analysis. The wax or asphaltene deposition rate is then calculated from the deposit mass based on the cell surface area and test run time.
Schlumberger can provide simulation results for wax buildup over time using the improved input coefficients based on live oil deposition data from RealView analysis using OLGA 7 dynamic multiphase flow simulation.

RealView analysis offers the only direct laboratory measurement of organic solids deposition tendency that can be translated to field conditions.

The RealView analysis cell, which Schlumberger developed through a multiyear, joint-industry project with Shell, has demonstrated a repeatability level of ±15% for deposition-rate measurements in extensive testing. The cell enables the study of deposition from live fluid at turbulent flow for results that can realistically be correlated to actual field conditions. Based on more realistic experimental solid deposition data, significant cost savings can be realized through less conservative design and optimization of remediation techniques, particularly in offshore production environments.

Enhanced design of experiments
In a typical deposition study using RealView analysis, the operator sets the test apparatus at the anticipated production conditions where solids will be present then selects the number of test points and operating conditions for which deposition data are needed to

- improve organic solid deposition data scaleup to field conditions
- study the effects of various system designs (e.g., thickness of insulation for pipeline)
- study the effects of production parameters, such as production rate, temperature difference between fluid and pipeline wall, and chemical selection
- study the asphaltene deposition tendency after gas injection during artificial lift or enhanced oil recovery.

Studies performed on asphaltenic oils are primarily run at isothermal conditions, whereas wax deposition studies are performed maintaining a differential temperature between the fluid within the chamber and the outer wall. After the deposition rate is estimated, a deposit sample can be taken to characterize its chemical composition.

Scalable results
Using RealView analysis to perform wax and asphaltene deposition testing with live oils allows

- study of wax and asphaltene deposition along a production path under turbulent flow
- sensitivity studies of a single deposition parameter
- determination of deposition rate by quantifying amount of solid deposits per run
- examination of the composition of wax and asphaltene deposits
- measurement of wax solid deposition data that can be scaled to pipeline
- generation of deposition data that can be input to OLGA 7 simulation to model wax buildup over time for system design.

RealView analysis helps reduce capex and opex by enabling

- the study of chemical additives' affect on actual deposits under representative conditions
- more realistic deposition of wax and asphaltenes at field condition for more accurate systems modeling.

Scalable results
Using RealView analysis to perform wax and asphaltene deposition testing with live oils allows

- study of wax and asphaltene deposition along a production path under turbulent flow
- sensitivity studies of a single deposition parameter
- determination of deposition rate by quantifying amount of solid deposits per run
- examination of the composition of wax and asphaltene deposits
- measurement of wax solid deposition data that can be scaled to pipeline
- generation of deposition data that can be input to OLGA 7 simulation to model wax buildup over time for system design.

RealView analysis helps reduce capex and opex by enabling

- the study of chemical additives' affect on actual deposits under representative conditions
- more realistic deposition of wax and asphaltenes at field condition for more accurate systems modeling.

Enhanced design of experiments
In a typical deposition study using RealView analysis, the operator sets the test apparatus at the anticipated production conditions where solids will be present then selects the number of test points and operating conditions for which deposition data are needed to

- improve organic solid deposition data scaleup to field conditions
- study the effects of various system designs (e.g., thickness of insulation for pipeline)
- study the effects of production parameters, such as production rate, temperature difference between fluid and pipeline wall, and chemical selection
- study the asphaltene deposition tendency after gas injection during artificial lift or enhanced oil recovery.

Studies performed on asphaltenic oils are primarily run at isothermal conditions, whereas wax deposition studies are performed maintaining a differential temperature between the fluid within the chamber and the outer wall. After the deposition rate is estimated, a deposit sample can be taken to characterize its chemical composition.

Scalable results
Using RealView analysis to perform wax and asphaltene deposition testing with live oils allows

- study of wax and asphaltene deposition along a production path under turbulent flow
- sensitivity studies of a single deposition parameter
- determination of deposition rate by quantifying amount of solid deposits per run
- examination of the composition of wax and asphaltene deposits
- measurement of wax solid deposition data that can be scaled to pipeline
- generation of deposition data that can be input to OLGA 7 simulation to model wax buildup over time for system design.

RealView analysis helps reduce capex and opex by enabling

- the study of chemical additives' affect on actual deposits under representative conditions
- more realistic deposition of wax and asphaltenes at field condition for more accurate systems modeling.

Enhanced design of experiments
In a typical deposition study using RealView analysis, the operator sets the test apparatus at the anticipated production conditions where solids will be present then selects the number of test points and operating conditions for which deposition data are needed to

- improve organic solid deposition data scaleup to field conditions
- study the effects of various system designs (e.g., thickness of insulation for pipeline)
- study the effects of production parameters, such as production rate, temperature difference between fluid and pipeline wall, and chemical selection
- study the asphaltene deposition tendency after gas injection during artificial lift or enhanced oil recovery.

Studies performed on asphaltenic oils are primarily run at isothermal conditions, whereas wax deposition studies are performed maintaining a differential temperature between the fluid within the chamber and the outer wall. After the deposition rate is estimated, a deposit sample can be taken to characterize its chemical composition.

Scalable results
Using RealView analysis to perform wax and asphaltene deposition testing with live oils allows

- study of wax and asphaltene deposition along a production path under turbulent flow
- sensitivity studies of a single deposition parameter
- determination of deposition rate by quantifying amount of solid deposits per run
- examination of the composition of wax and asphaltene deposits
- measurement of wax solid deposition data that can be scaled to pipeline
- generation of deposition data that can be input to OLGA 7 simulation to model wax buildup over time for system design.

RealView analysis helps reduce capex and opex by enabling

- the study of chemical additives' affect on actual deposits under representative conditions
- more realistic deposition of wax and asphaltenes at field condition for more accurate systems modeling.

Enhanced design of experiments
In a typical deposition study using RealView analysis, the operator sets the test apparatus at the anticipated production conditions where solids will be present then selects the number of test points and operating conditions for which deposition data are needed to

- improve organic solid deposition data scaleup to field conditions
- study the effects of various system designs (e.g., thickness of insulation for pipeline)
- study the effects of production parameters, such as production rate, temperature difference between fluid and pipeline wall, and chemical selection
- study the asphaltene deposition tendency after gas injection during artificial lift or enhanced oil recovery.

Studies performed on asphaltenic oils are primarily run at isothermal conditions, whereas wax deposition studies are performed maintaining a differential temperature between the fluid within the chamber and the outer wall. After the deposition rate is estimated, a deposit sample can be taken to characterize its chemical composition.

Scalable results
Using RealView analysis to perform wax and asphaltene deposition testing with live oils allows

- study of wax and asphaltene deposition along a production path under turbulent flow
- sensitivity studies of a single deposition parameter
- determination of deposition rate by quantifying amount of solid deposits per run
- examination of the composition of wax and asphaltene deposits
- measurement of wax solid deposition data that can be scaled to pipeline
- generation of deposition data that can be input to OLGA 7 simulation to model wax buildup over time for system design.

RealView analysis helps reduce capex and opex by enabling

- the study of chemical additives' affect on actual deposits under representative conditions
- more realistic deposition of wax and asphaltenes at field condition for more accurate systems modeling.

Enhanced design of experiments
In a typical deposition study using RealView analysis, the operator sets the test apparatus at the anticipated production conditions where solids will be present then selects the number of test points and operating conditions for which deposition data are needed to

- improve organic solid deposition data scaleup to field conditions
- study the effects of various system designs (e.g., thickness of insulation for pipeline)
- study the effects of production parameters, such as production rate, temperature difference between fluid and pipeline wall, and chemical selection
- study the asphaltene deposition tendency after gas injection during artificial lift or enhanced oil recovery.

Studies performed on asphaltenic oils are primarily run at isothermal conditions, whereas wax deposition studies are performed maintaining a differential temperature between the fluid within the chamber and the outer wall. After the deposition rate is estimated, a deposit sample can be taken to characterize its chemical composition.

Scalable results
Using RealView analysis to perform wax and asphaltene deposition testing with live oils allows

- study of wax and asphaltene deposition along a production path under turbulent flow
- sensitivity studies of a single deposition parameter
- determination of deposition rate by quantifying amount of solid deposits per run
- examination of the composition of wax and asphaltene deposits
- measurement of wax solid deposition data that can be scaled to pipeline
- generation of deposition data that can be input to OLGA 7 simulation to model wax buildup over time for system design.