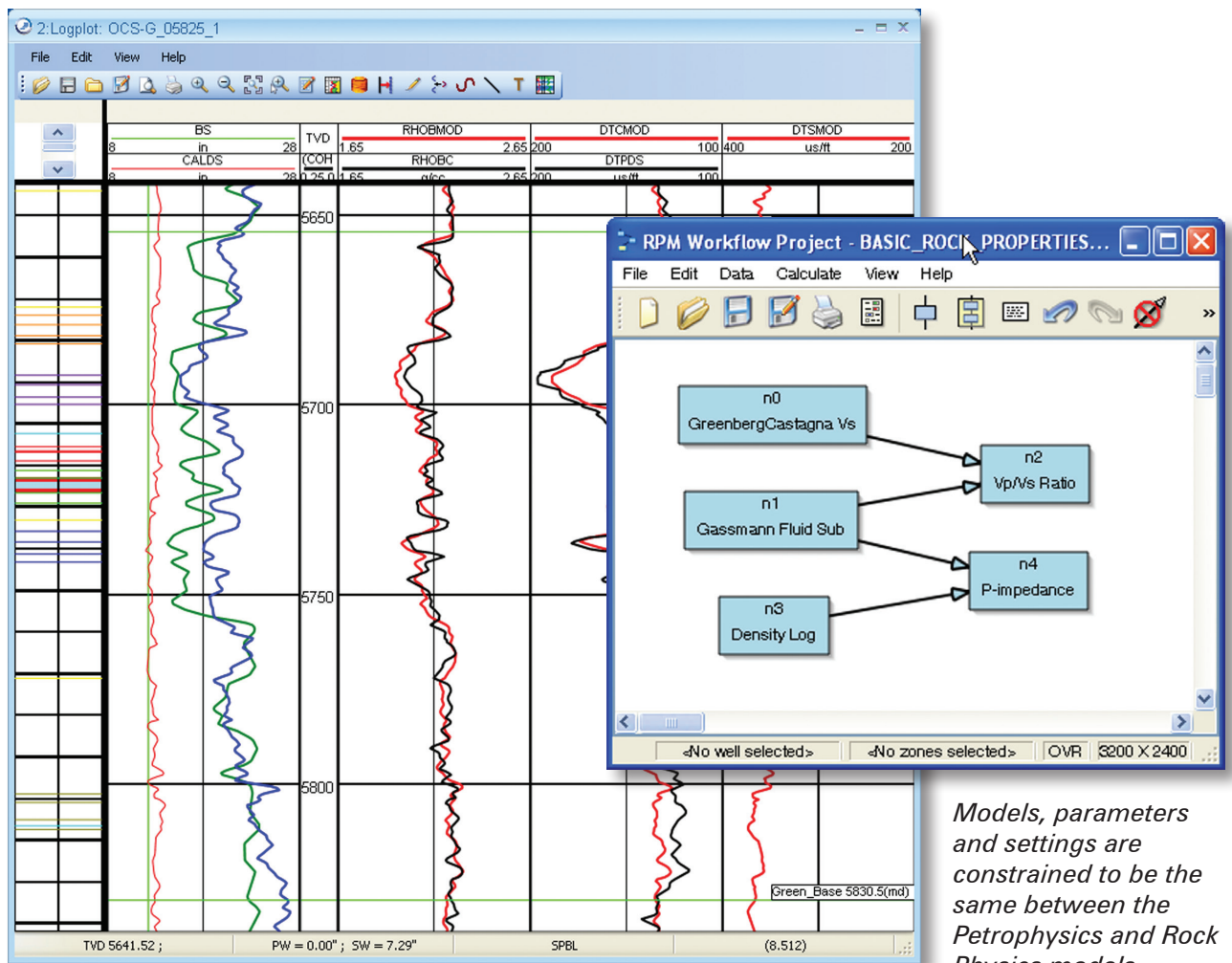


## Rock Physics integrated with PowerLog Petrophysics



*Models, parameters and settings are constrained to be the same between the Petrophysics and Rock Physics models.*

*Tightly integrated workflow ensures consistent results between the petrophysical and elastic properties.*

## RPM

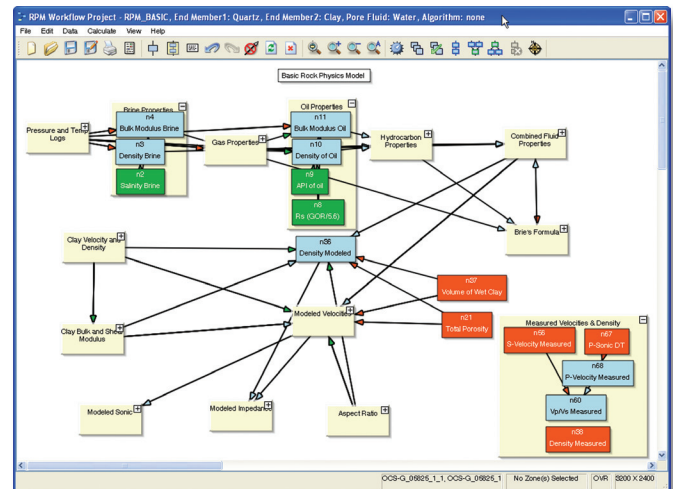
RPM is a Rock Physics add-on module for PowerLog that integrates the log analysis of PowerLog with rock physics elastic modeling for seismic AVO analysis and other uses. A common problem in AVO analysis and seismic inversion is the fact that DT logs are available but DT-S logs are not. There is therefore a need to be able to generate quality synthetic shear sonic logs that are consistent with the compressional sonic and density logs.

The propagation of acoustic waves in fluid-filled porous rock depends on the rock matrix composition and structure, as well as the properties of the pore fluids. Estimation of velocities by RPM can either be based on compositional models that make use of these same properties, or based on empirical relations such as Greenberg-Castagna. Both estimation approaches can easily be calibrated in PowerLog by regression of the RPM-synthetic to the available elastic sonic logs.

In addition to a number of simple averaging methods (Wyllie, Voigt, Reuss, Hashin-Shtrikman), RPM contains the following rock physics algorithms:

- Self-consistent
- Grain-supported
- Matrix supported
- A fast approximation of Xu & White's model
- Greenberg & Castagna's relation
- Gassmann's equation
- Gardners relation
- Modified upper & lower Hashin-Shtrikman method
- Fluid-properties estimation relations based on measurements.

Once a rock model is constructed, fluid-substitution studies and invasion corrections can be easily performed. Use of a compositional rock model also enables prediction of elastic curves for lithology that are not present in the wells (lithology substitution), plus estimation and correction of anisotropy in deviated wells which is critically important for long offset AVO seismic inversion work. Compositional models are also important in resource plays such as Shale Gas where understanding of mechanical property relationships is still being developed.



RPM Workflow Canvas for Rock Physics analysis

## DIRECTED GRAPH

The user constructs an RPM directed graph on a workflow canvas. This is superior to spreadsheet approaches because you can much more easily see the flow from one calculation to others. How the cells interact in a spreadsheet can be much more difficult to determine. Also in RPM, functions (nodes) can be put into a group, and then collapsed to a single icon making the view more readable. Arrows connecting the nodes and groups indicate both the workflow and the dependencies. Updating the workflow or changing parameters is much easier with this graphical approach compared to a spreadsheet.

RPM provides easy access to a large library of algorithms, and has smart menus to provide guidance for correct inputs for the function parameters.

Calculations can be done for independent nodes, groups, paths, or for the entire workflow with a few simple mouse clicks.

When calculations are finished, the resulting logs are immediately available for plotting in PowerLog. Also, user-controlled rock, fluid, and mineral properties can be stored in a table with customized parameters for individual projects.