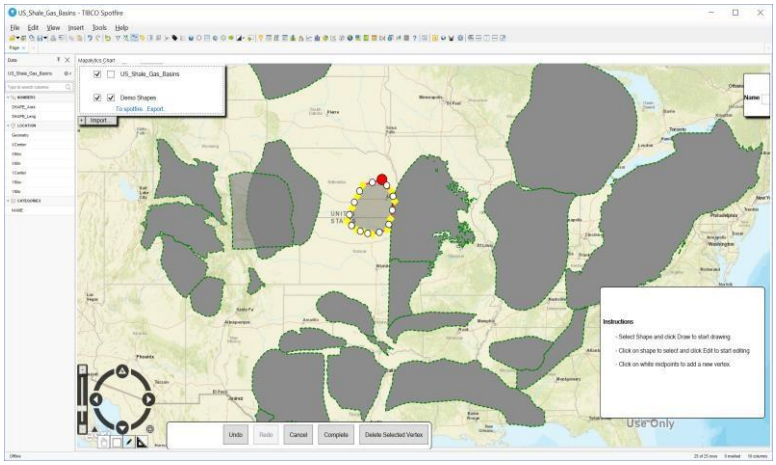
BLUE RIVER ANALYTICS: ENERGY ANALYTICS WORKBENCH (EAW)

Overview

Blue Rivers' **Energy Analytics Workbench (EAW)** provides a complete, end to end Spotfire workflow. With direct live access to all of your vendor data (e.g. IHS, Drilling Info, FracFocus), forecasting the life and economics of a well, interactively fitting any data to statistical distributions, or adding your own editable polygons via Mapalytics, is drastically simplified. Our goal is to radically improve decision making by utilizing the most advanced analytic tools. We make our customers smarter.

Below is a summary of the EAW components:

- **Mapalytics:** Blue River Analytics' new geo-analytics software creates a seamless integration between Esri maps with Spotfire. Mapalytics appears as a native Spotfire control similar in appearance to the Spotfire map chart and includes the most commonly used ArcGIS data creation functionality: dropping new well locations, plotting wells by location, labelling points, creating shape files, and measuring distances. Furthermore, Mapalytics plots well locations from the Spotfire data table and eliminates - the need for using two separate applications. Key product features:



Screenshot of the Mapalytics tool

    - Can draw/add your own polygons, circles or points to a Spotfire map
    - No longer need two separate applications for mapping

- **Decline Curve Analysis – TERR**: Takes production rate information from a Spotfire data table, and performs decline curve fitting using an exponential decline model. Marked wells' production rate data are averaged to calculate a single 'type curve' which is added to the marked well data as an additional well entity. This type curve is also fit with an exponential decline curve. In addition, this

template estimates approximate economics for wells, including the Net Present Value (NPV), Payout and Internal Rate of Return (IRR). Users specify average per-well drilling cost, operating expense and expected product price over time, along with taxes and cost-of-capital assumptions. Key product features:

- Estimate best fit decline rates, IP's and other decline parameters in real time, across a user defined group of wells
- Calculates EUR's for economic analysis, reservoir characterization, and discovery of relationships between areas of low and high recovery with other parameters such as completion technique, operator, zone, etc.
- Calculates a type-curve aggregation across all marked wells, giving engineers a reference decline curve against which other wells (e.g. with limited or poor data, in different areas of the field) can be compared.

Blue River's Decline Curve Analysis:

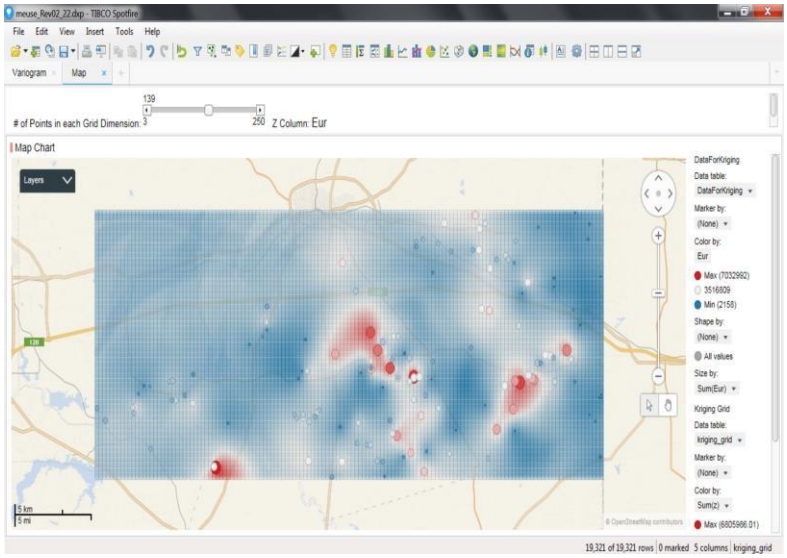
This screen shot shows fitting results for 143 wells in the Arkoma Basin, using hyperbolic to exponential fitting model. Aggregated type curve with best fit (black and grey lines respectively) are shown with individual well fit. Best fit parameters for the marked (displayed) well along with any other well can be reviewed in the table visualization at top.

- **<u>Probability Plot—TERR:</u>** Uses the advanced modeling power of Spotfire to interactively fit any data to statistical distributions. The application allows the user to select and drill down on any measures and dimensions for analysis through Spotfire's intuitive interface, and view the statistical or

bootstrap fit probability values in a visual environment. Applications include petrophysical modeling, completions analysis, production surveillance, and more. Key product features:

- Flexibly fit any data set to statistical distributions and visualize the results.
- Choose single or multiple measures and dimensions for fitting in an intuitive interface.
- Easily return additional information about the data set, including goodness-of-fit, ratios like p10 to p90, bootstrap statistics, or fitting to other distributions

- **Kriging—TERR:** Takes irregularly-spaced mapped values of any quantity in Spotfire, and performs sophisticated interpolation of these values onto a regular user-defined rectangular grid. Interpolation is preceded by an analysis (called a variogram analysis) of the influence of nearby known values as a function of distance from each interpolated grid point. The template provides the capability to identify any numerical quantity associated with a latitude and longitude, and generates a data table in Spotfire with the interpolated / kriged values associated with the latitudes and longitudes of the grid.



This screen shot shows interpolated grid of EUR's on a map visualization in Spotfire, with well control points as larger circles on the grid

Key product features:

- Provides regular grid of interpolated data points for visualization, and projection of known quantities into unsampled areas of the map for doing predictions and forecasting, which in turn provides professional staff and decision-makers with important decision-support data for future drilling, workover and other field activity.
- Output data table with the gridded data values provides visualization support, potentially eliminating areas of no-data in Spotfire maps. Table can be exported into a text file and used outside of Spotfire in any other analysis or modeling application of interest.

- **Acquisition Analysis:** There are two main areas of focus that the template covers. First, is allowing the user to pick an asset they are interested in acquiring, and then analyze said asset to gather

valuable answers. The second, is allowing the user to pick an operator they are interested in and comparing that operator to all other operators within the chosen asset.
    - Visualizations will quickly show how the production values differ between operator of interest and the rest of the asset
    - Visualizations will also show completion and treatment variable comparisons.

- **Energy Data Conduit**: A set of programs that regularly download and synchronize your licensed commercial data into a local SQL Server replica database and local file shares. This application also includes a data explorer program, WellFinder, for viewing and extracting from the local replica database. Key product features:
    - Local SQL Server replica of your commercial well/production/rig/completion data
    - Direct, high-performance access by Spotfire, ArcGIS, GG&E Apps, SQL or WellFinder
    - Quickly and easily review data before extraction and analysis
    - Make commercial data accessible to everyone in your organization
    - Reduce manual, static extracts of your commercial data
    - Automatic, fast and reliable daily database updates

About Blue River Analytics:

Blue River Analytics makes our customers smarter. Utilizing deep expertise in the energy industry and TIBCO Spotfire, we create easy-to-use applications for visual and predictive analytics, enabling our customers to make faster, smarter decisions.

Contact:

Blue River Analytics

720-295-7242

info@blueriveranalytics.com