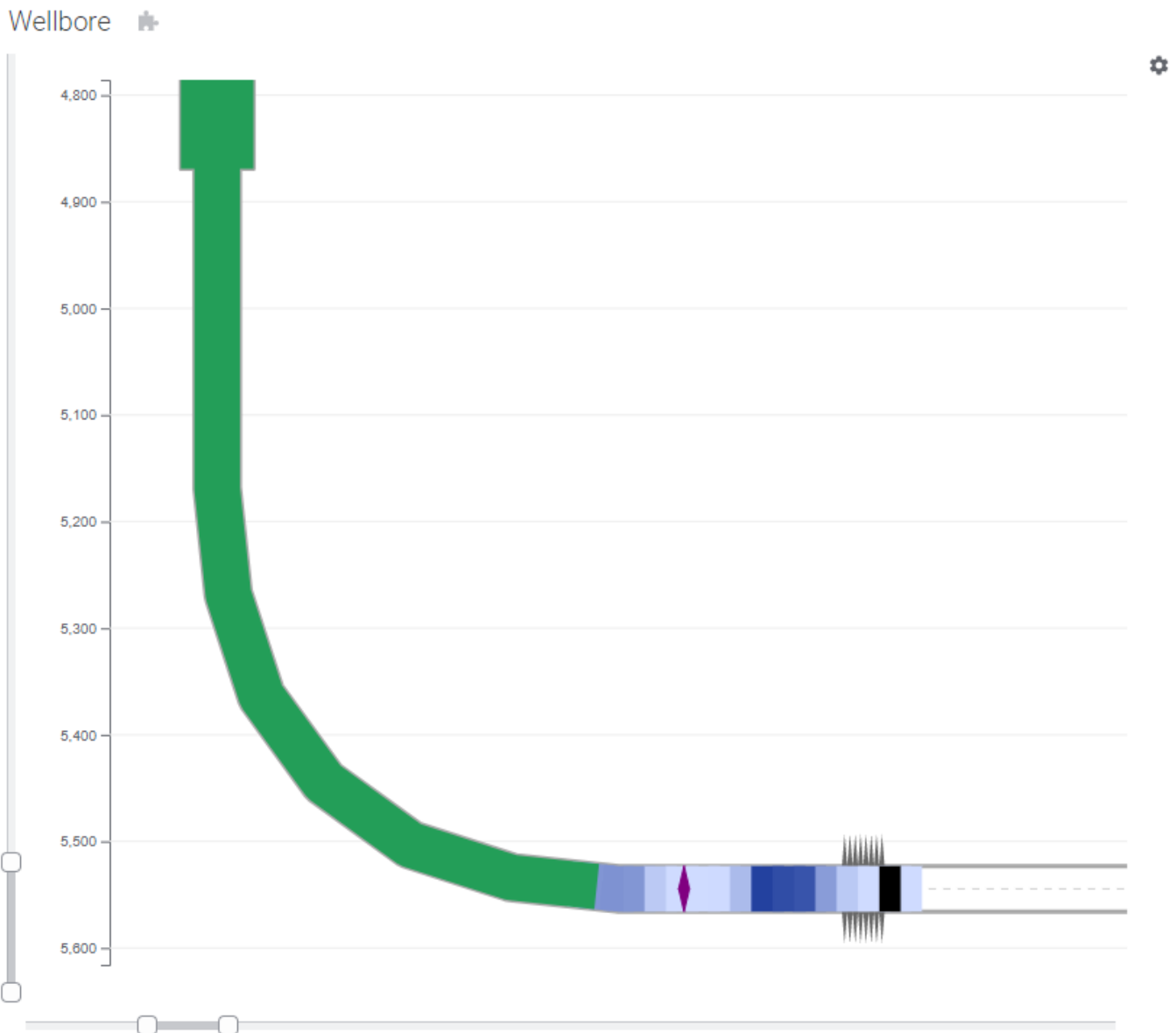# Wellbore Mod for Spotfire®

The Wellbore Mod is a schematic representation of a wellbore in 2 dimensions, plotting True Vertical Depth (TVD) versus Measured Depth (MD). It can be used to visualize fluid penetration into a wellbore during completion activities, relative positions of plugs and perforations, and plot colored values at various measured depths.

Try this mod in Spotfire® Analyst

How to open the mod

1. Open Spotfire® Analyst, and create an analysis by loading some data.
2. Unzip the downloaded file, and locate the .mod file in the unzipped folder.
3. Drag the file into the analysis.
4. The visualization mod is added to the analysis.
5. To learn about the capabilities and limitations of this visualization mod, keep reading.

For general information on how to use and share visualization mods, read the Spotfire documentation.

Data requirements

Every mod handles missing, corrupted and/or inconsistent data in different ways. It is advised to always review how the data is visualized.

The Wellbore Mod will draw a a 2D representation of a wellbore, with associated metrics. This is generally derived from survey data. If the data is plotted using measured depth, azimuth, and inclination, then the data will need to be prepared to map the trajectory as a series of rows including TVD and MD. Refer to the sample for details of what this looks like.

- **True Vertical Depth (TVD)** - vertical distance from a surface reference point to the point being plotted.

- **Measured Distance (MD)** - linear distance along the wellbore to the point being plotted.

For perfectly vertical wells, TVD and MD are the same at any given point. For deviated or horizontal wells, the MD will start out the same as TVD, but will increase as the well deviates from vertical.

These two values represent co-ordinates for plotting the wellbore form in the visualization. Additional data can be plotted along the wellbore:

- **Perforations** - holes punched through the casing material into the formation to facilitate fluid transfer into the wellbore.

- **Guns** - tools used to create perforations.

- **Plugs** - tools that are used to isolate part of a wellbore for completion activities.

- **Fills** - a value which will apply from the top of the wellbore to a specific measured depth with a specified value. Generally you will have only one of these for a wellbore.

- **Values** - a value at a specified measured depth which will display a value at that depth, +/- half way to the next depth value provided. Generally you will have a series of these for a wellbore.

Setting up the Wellbore Mod

The Mod includes the following axes. Not all axis values are mandatory and this will be indicated.

Trellis By

Optional. The Mod supports trellising with rows being grouped by the value in this axis.

Group By

Optional. Groups rows together to render as a single wellbore.

Layer Type

Mandatory. Must contain one of the following permitted values depending on row context.

- **Trajectory** - identifies trajectory rows, drawn as a centerline and left and right borehole lines. Mandatory.

- **Value** - identifies value rows, drawn as small fills in the wellbore at the MD, +/- half way to the next MD Value row. Optional, multiple rows per visualization.

- **Fill** - identifies fill rows, drawn as complete fill from zero measured depth to the specified measured depth. Optional, generally a single row per visualization.

- **Perforation** - identifies perforation rows, drawn as triangles on the left and right borehole lines indication perforation locations. Optional, multiple rows per visualization.

- **Gun** - identifies gun rows, drawn as a diamond across the diameter of the wellbore. Optional, multiple rows per visualization.

- **Plug** - identifies plug rows, drawn as a single box across the width of the wellbore at the specified measured depth. Optional, multiple rows per visualization.

Any other value will cause the row to be ignored.

These different row types and how they are rendered are shown in this diagram:
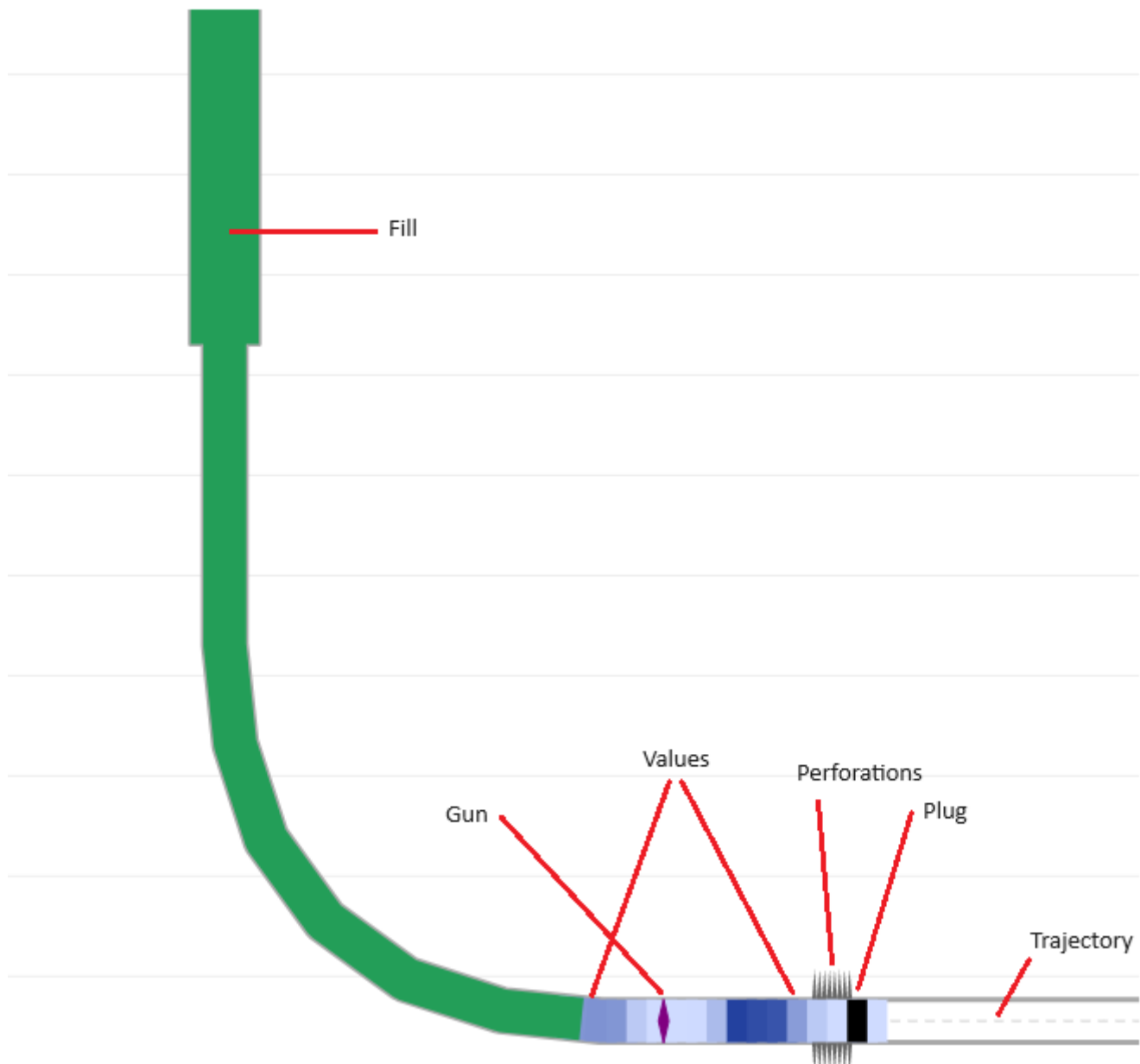
MD

Mandatory for Trajectory, Value, Fill, Gun, and Plug row types (all except Perforation). Measured depth. Must be in units consistent with Diameter and TVD.

TVD

Mandatory for Trajectory row types. Ignored for other row types. True vertical depth. Must be in units consistent with Diameter and TVD.

Diameter

Mandatory for Trajectory row types. Ignored for other row types. Wellbore diameter. Must be in units consistent with Diameter and TVD. At scale this will usually render as a single line, so it will be necessary to use an exaggeration factor to expand the diameter into something that allows the wellbore to be filled for data rendering purposes. The sample illustrates one way to do this using an expression on the axis that uses a Document Property and a slider in a Text Area to make it user settable.
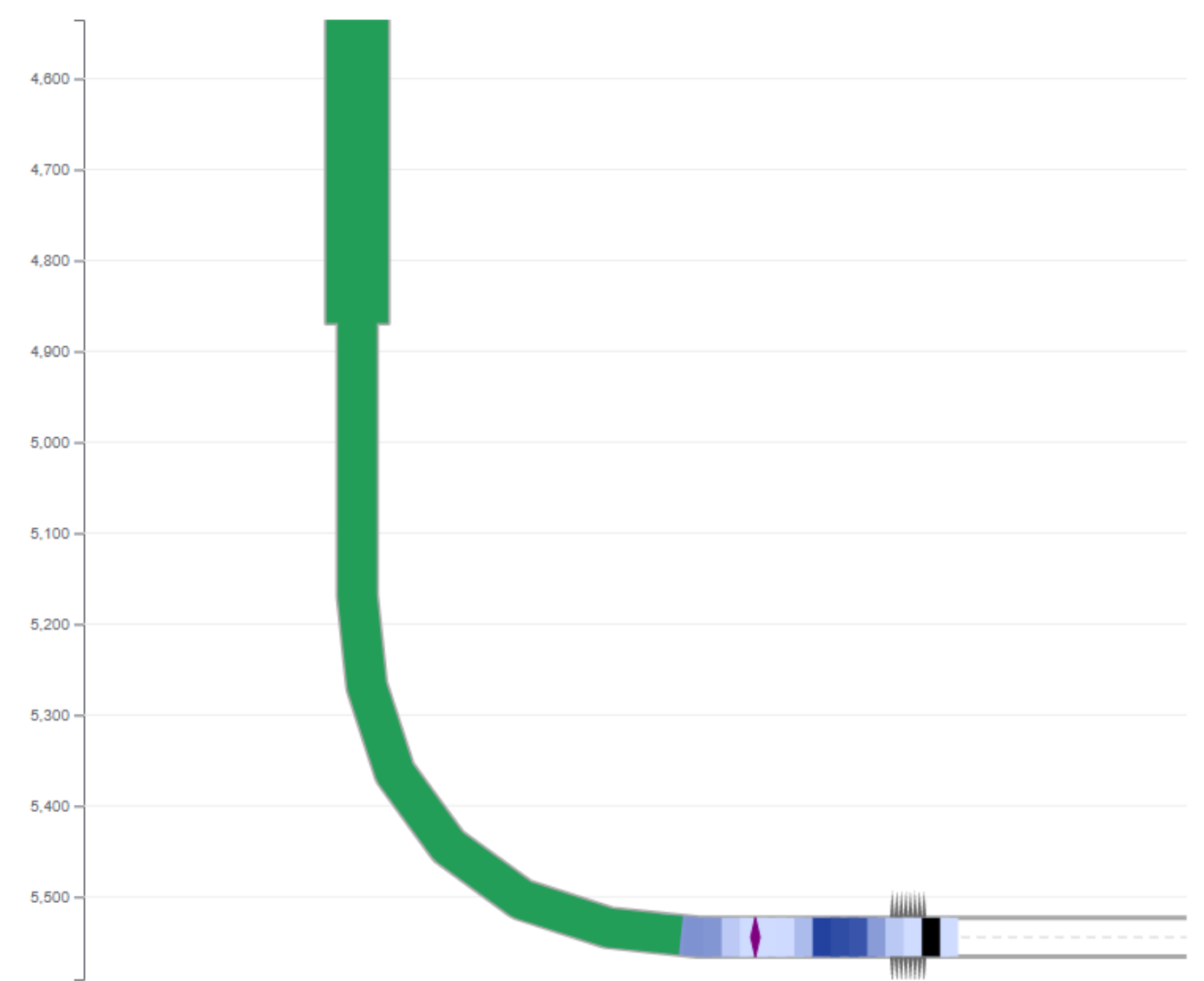
The expression looks like this, assuming TVD and MD are in feet, and the column *diameter_in* is in inches:

```
[diameter_in] / 12 * DocumentProperty("DiameterExaggeration")
```

A diameter without exaggeration would look like this:
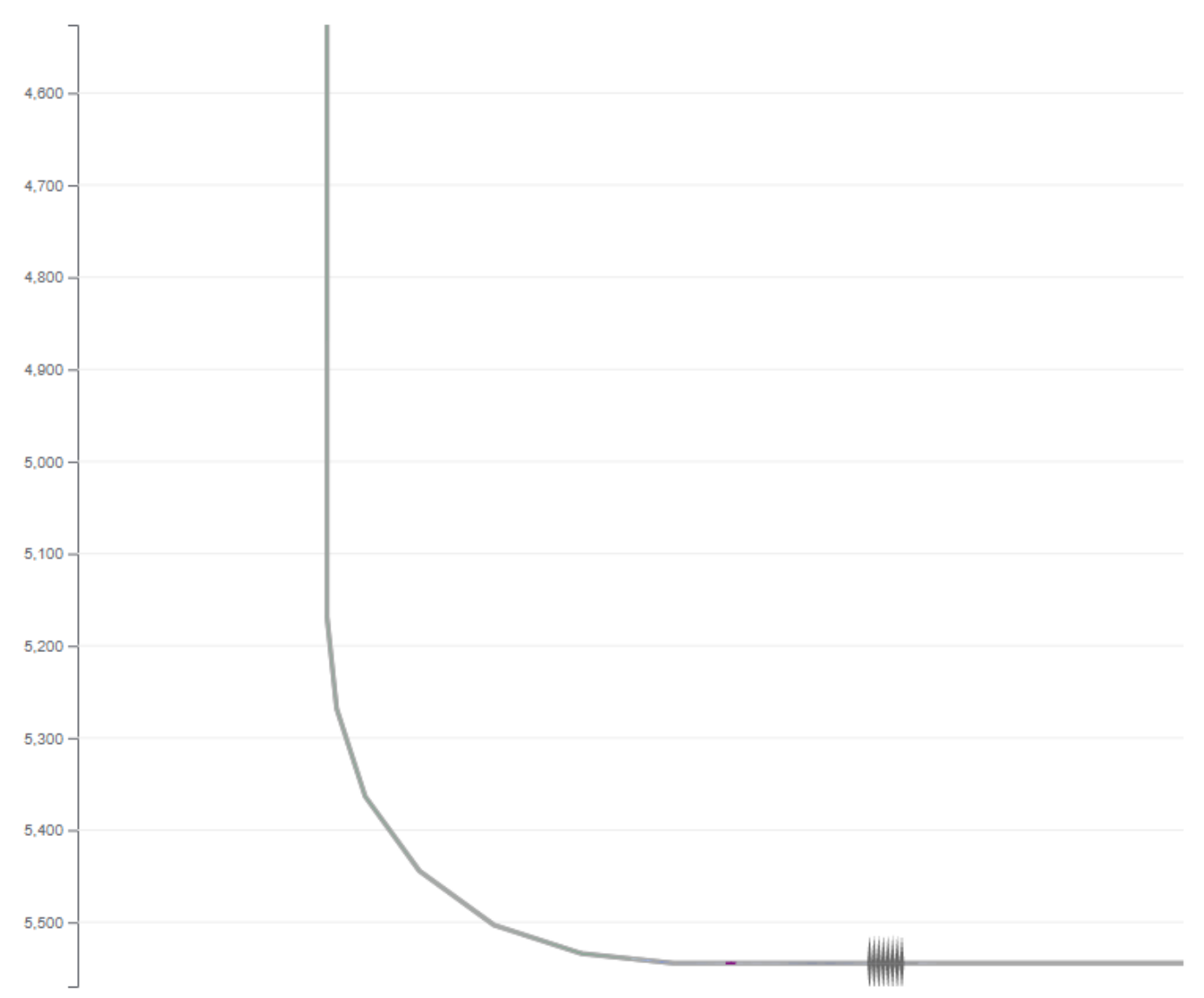
And with an exaggeration factor of 200:

Value

Mandatory for Value row types, optional for Fil row types. Ignored for other row types. Value at the specified MD for Value row types and the value up to the specified MD for Fill row types. Does not render on the visualization directly, but will be visible in the tooltip.

Perf Start MD

Mandatory for Perforation row types. Ignored for other row types. Starting measured depth for perforation interval.

Perf End MD

Mandatory for Perforation row types. Ignored for other row types. Ending measured depth for perforation interval.

Color

Optional. Sets the color of the Fill or Value row. This axis supports both continuous and categorical expressions.

Configuring the Wellbore

Additional configuration for the mod can be accessed by clicking on the small settings icon in the upper right corner of the visualization area. This will display the configuration properties over the visualization. Maximize the visualization if necessary to update the fields. The configuration panel will only be accessible when the analysis is in Editing mode.

Display	
Row Limit	1000
Trellis Direction	Columns
Max Trellis Panel Count	10
Show Tooltips	☑
Show X Axis Zoom	☑
Show Y Axis Zoom	☑

Wellbore	
Gun Width	10
Gun Color	purple
Perf Base Width	5
Perf Color	dimgrey
Perf Length	30
Perf Left	☑
Perf Right	☑
Plug Color	black
Plug Width	10
TVD Scale Display	☑
TVD Scale Grid Display	☑

Close Reset

Property	Description	Remarks
Row Limit	Maximum number of rows to render	If the row count is exceeded then an error message will be displayed. This is a safety feature to keep from accidentally rendering too much data.

Property	Description	Remarks
Trellis Direction	Direction for trellis panels	Columns or Rows
Max Trellis Panel Count	Maximum number of trellis panels to render	If the panel count is exceeded then an error message will be displayed. This is a safety feature to keep from accidentally rendering too much data.
Show Tooltips	Display tooltips	Applies to wells and formations
Show X Axis Zoom	Display X-axis zoom slider	
Show Y Axis Zoom	Display Y-axis zoom slider	
Gun Width	Gun width in pixels	
Gun Color	Gun color	May be any valid HTML color name or hex color code
Perf Base Width	Perforation base width in pixels	Depending on wellbore scaling it might be necessary to adjust this setting and perf length to get a reasonable render
Perf Color	Perforation color	May be any valid HTML color name or hex color code
Perf Length	Perforation length in pixels	
Perf Left	Show perforations on borehole left	For horizontal wells, this will be the bottom
Perf Right	Show perforations on borehole right	For horizontal wells, this will be the top
Plug Width	Plug width in pixels	Depending on wellbore scaling it might be necessary to adjust this setting to get a reasonable render
TVD Scale Display	Show TVD scale	
TVD Scale Grid Display	Show TVD scale grid	

Using the Wellbore

Once the mod is configured it will render a schematic representation of a wellbore, associated fills and values, guns, perforations, and plugs. All data rows are keyed on MD and fills and values will be computed to follow the wellbore size and geometry.

Marking

The mod supports marking of value and fill rows if configured. Click a value or fill to mark it. Use CTRL-Click to add additional rows to the marking, or remove an already marked row. To clear the marking, click in any open area.

Building the Project

In a terminal window:

- `npm install`
- `npm start`

In a new terminal window:

- `npm run server`

More information about Spotfire® Mods

- [Spotfire® Visualization Mods on the Spotfire® Community Exchange](): A safe and trusted place to discover ready-to-use Mods
- [Spotfire® Mods Developer Documentation](): Introduction and tutorials for Mods Developers
- [Mods by Spotfire®](): A public repository for example projects