# JMP® Apps for Visualizing, Mining, and Modeling LigaSure™ Performance Data

Jim Pappas, Susan Roweton, and J. Bruce Dunne
Tissue Effect Research, Surgical Innovations, Advanced Energy & Stapling, Medtronic, Boulder, Colorado

TAP TO GO BACK TO KIOSK MENU

## Abstract

**Medtronic R&D** engineers create thousands of *ex vivo* and *in vivo* blood vessel seals each year for the development of new **LigaSure™** devices and generators. These seals are used to evaluate important performance parameters like burst pressure and thermal spread, parameters determined by known and unknown variables.

JMP® Pro 13 has proven to be powerful for exploring the influence of experimental and electrical variables on performance parameters. Using JSL to create deployable visualization, mining, and modeling apps that can be utilized by product development teams has facilitated the creation and **growth** of a **data exploration culture**.

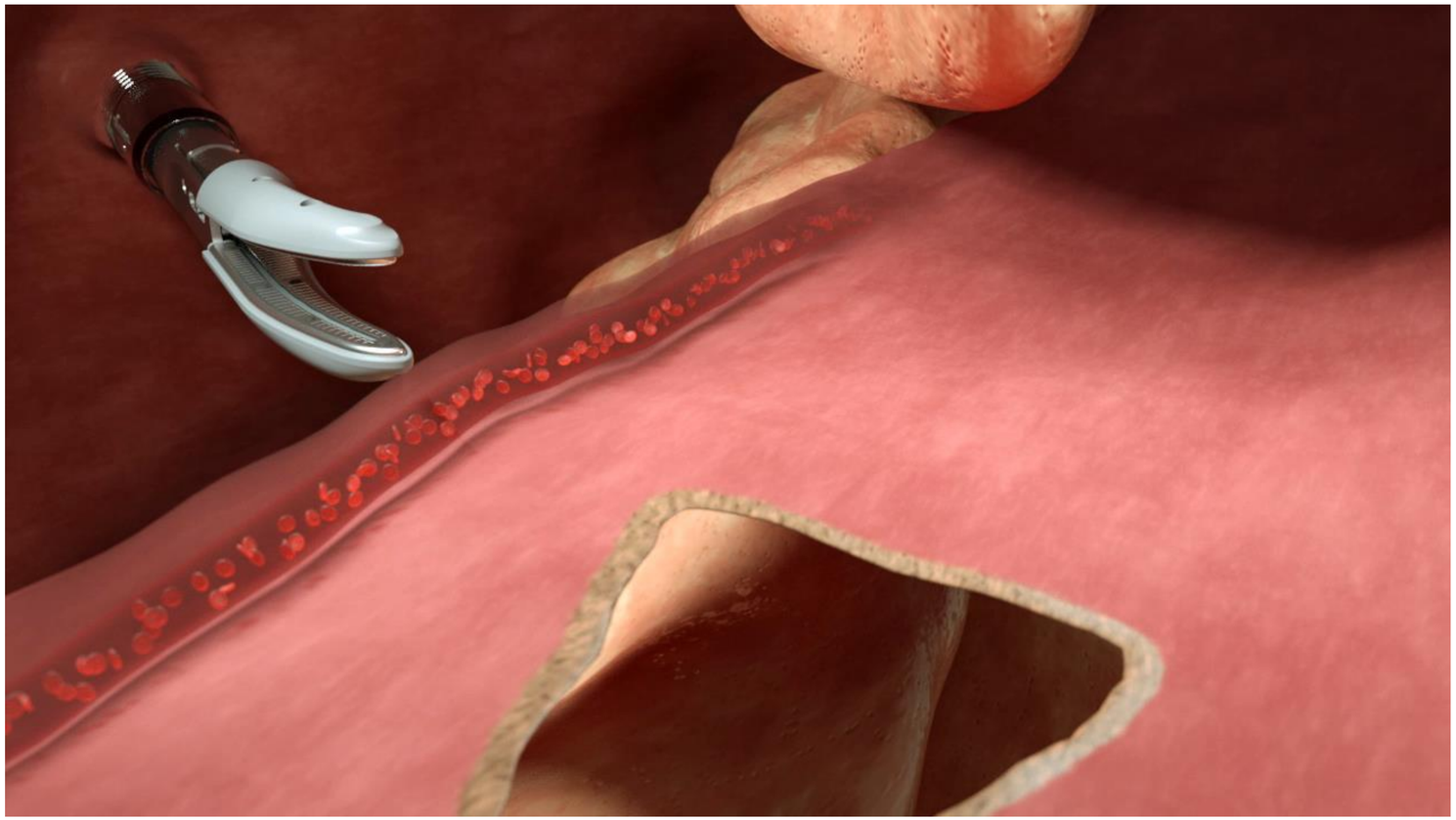
## Benefits

- Data **visualizations** drive a **greater understanding** of device performance.
- **JSL** and Query Builder power the creation of **deployable apps** for use by all project scientists and engineers—not just those extensively trained in data science analysis methods
- **Intuitive** and accessible **tools** all product development teams to more readily explore and utilize all of their data.
- Technical risks and **opportunities** to improve device performance can be **identified** as early as possible during product development.

## Experimental Methods

### LigaSure™ Vessel Sealing Devices

LigaSure™ devices use RF energy and pressure to fuse blood vessels. Device- and generator-specific algorithms control sealing.



*Click above to play video*

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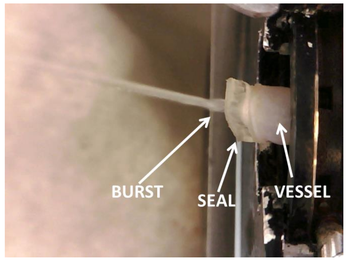
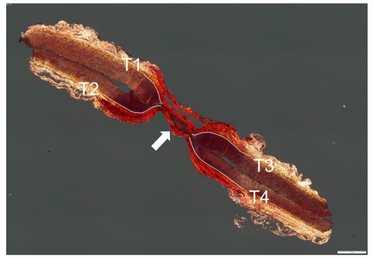
## Experimental Methods

### Burst Testing

Sealed vessels are infused with saline at a constant rate until seal failure occurs and that burst pressure is recorded.



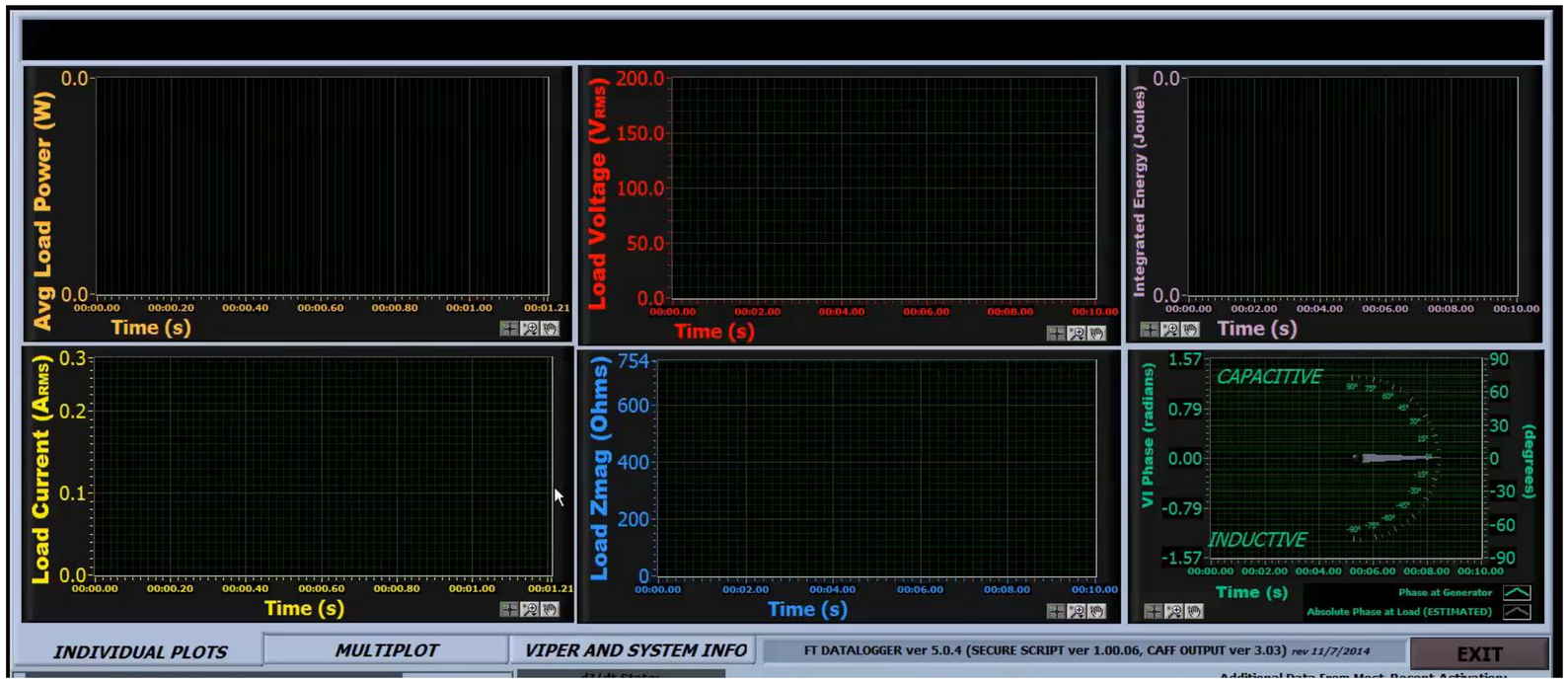




### Thermal Spread Measurement

Sealed blood vessels are examined histologically to determine the distance the thermal tissue effect extends from the seal site.

### Vessel Sealing and Electrical Data Capture

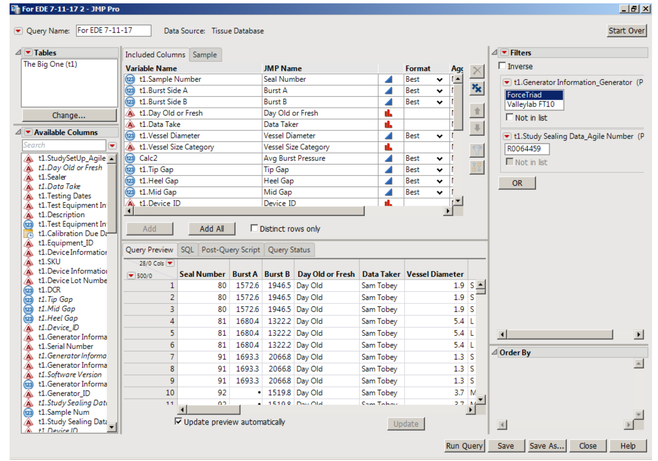
As seals are created on *ex vivo* porcine renal arteries, electrical data is captured for each seal. Electrical variables determine performance.




*Click above to play video*

## Query Builder

### JMP Queries Tissue Effect Research SQL Database



## JSL & Visual Apps

### JSL Ideal for Making User-Friendly Apps

```
If( !Contains( col_name_list, "Avg Burst Pressure" ),
dt << New Column( "Avg Burst Pressure", character, "numeric" ) // create Average Burst Presure
);
If( !Contains( col_name_list, "Min Burst Pressure" ),
dt << New Column( "Min Burst Pressure", character, "numeric" )  // create Minimum Burst Pressure
);
For Each Row( :Avg Burst Pressure = Mean( :Burst A, :Burst B ) );   // do the math
For Each Row( :Min Burst Pressure = Minimum( :Burst A, :Burst B ) );   // do the math

Glue( xCol = Column( "Vessel Diameter" ), yCol = Column( "Avg Burst Pressure" ), sealNum = Column( "Seal Number" ) );

// ------------------------------------------------------------------------------------------
// GET PARAMETERS OF INTEREST (EX. EVARIABLES, COL, GRAPHSIZE, ETC)
//
//-------------------------------------------------------------------------------------------
colDlg = Column Dialog(
title( "JMP Electrical Data Explorer 1.0 - Tissue Effect Research and Data Analytics, Medtronic" ),
eVariables = ColList( "Columns that contain variables to explore", MinCol( 2 ), DataType( "numeric" ) ),
gVariables = ColList( "Optional Columns for Group values and/or Validation status* ", MinCol( 0 ), DataType( "character" ) ),
pVariables = ColList( "* Optional columns containing model predictions", MinCol( 0 ), DataType( "numeric" ) ),

HList( "Table = " || Char( tablename ) ),
HList( "Seal Number entered into Database" ),
HList( "Y = Average Burst Pressure (mmHg) " ),
HList( "X = Vessel Diameter (mm)" ),
HList( " " ),
HList(
"  low burst averages at: ",
lowburst = EditNumber( 500 ),
"  high burst averages at ",
highburst = EditNumber( 1500 ),
```

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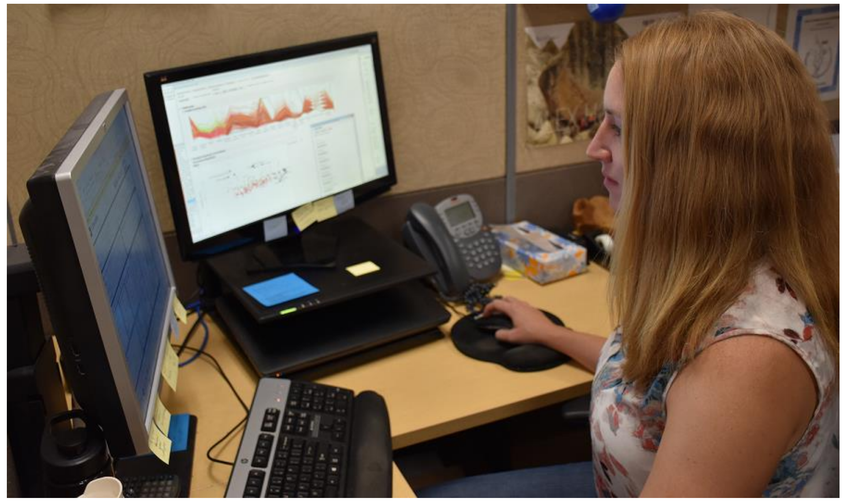
## Growing Exploration & Analysis Culture



### Feedback from Team Members:

*"With the click of a button, I get a great summary of my data and plots that are easy to read and follow."*

*"I use it on every study I do."*

*"… much faster and less work intensive … "*

*"… really eases the analysis when you have a large number of different data responses across a number of different factors."*

*"… get a better picture of different interactions that I would miss on my own."*

*"… substantially decreases analysis time on burst studies, improving the Tissue Group's time efficiency. "*

## Electrical Data Explorer

### Electrical Data Explorer™

Application for visually analyzing trends and patterns between electrical variables and seal burst pressure or thermal spread.


*Click above to play video*

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## Interactive Performance Dashboard

### Interactive Performance Dashboard™

Analysis of historical and comprehensive performance data deployed as interactive HTML's to internal customers and project teams.

Interactive Performance Dashboard

*Click above to play video*

## Next Steps

### Database Creation

- Ongoing assessment of production device performance provides valuable Quality data
- Comprehensive database required for effective predictive modeling

### Modeling with Additional Experimental Factors

- Pressure and temperature data not typically acquired
- Work ongoing to capture this data with electrical and burst data

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