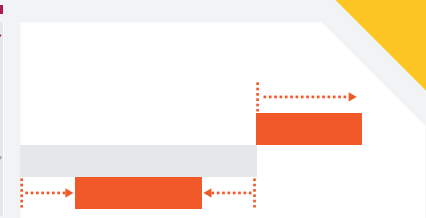
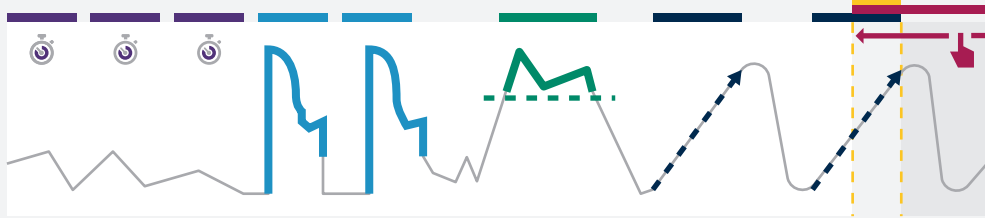


Identify for Periods of Interest (Conditions)



TIME

Repeating Periods:
Days, Weeks, Shifts, etc.
Use **Periodic Condition**
(**& Manual Condition**)

PROFILE OR PATTERN

Similar Patterns
Use **Profile Search**

VALUE

Compare data to either:
Entered Numerical or Text Value, or a
Selected Data Item (μ Signal or μ Scalar)
Use **Value Search**

CONDITION ADJUSTMENTS

Grow, Shrink, Move, Merge Conditions
Use **Formula (search Capsule Adjustments)**

CONDITION COMBINATIONS

Conditions Overlap, etc.
Use **Composite Condition**

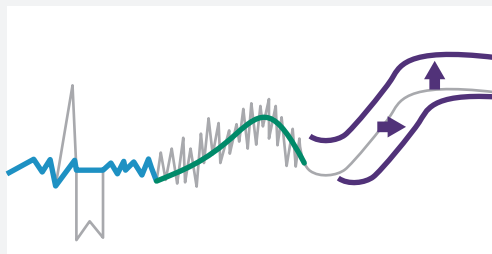
CUSTOM PERIODS

Manually Select Capsules
&/or Time Ranges
Use **Manual Condition**

TRENDS, STEP CHANGES

Use **Signal Smoothing Tool** (agile filter). Then, use **Formula .derivative()**.
Then use **Value Search** on the derivative:
> 0 (increasing) or < 0 (decreasing)
Larger derivative values indicate step change.

Cleanse



REMOVE OUTLIERS

Use **Formula**
Single-Point Outliers
`removeOutliers()`
Bad Data Sections
identify bad data Condition
then, `remove()`, `splice()`

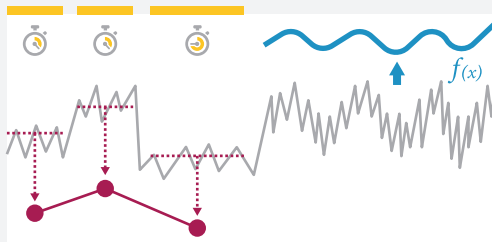
SMOOTH/FILTER

Use **Low Pass Filter**
Use **Formula**
(see **Signal Cleansing**):
`agileFilter()` is a good
first choice

ADJUST SIGNALS

Use **Formula**
Recalibrate
Time Shift: `move()`
Convert or Change Units:
`convertUnits()`
`setUnits()`

Quantify



CONDITION STATISTICS

Time or Percent Duration
Capsule Count, etc.
Use **Signal from Condition**

SIGNAL STATISTICS WITHIN CAPSULES

Integral (Totalize)
Average, Standard
Deviation, etc.
Use **Signal from Condition**

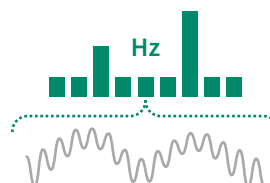
EQUATIONS

Write Equations
Function Library
Manipulate Conditions,
Signals, & more
Use **Formula**



HISTOGRAM

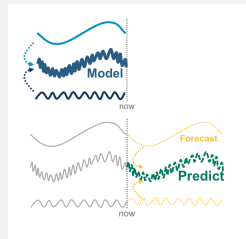
Bar Graphs
Aggregate Statistics by
Value, Condition, or Time
Use **Histogram**



FREQUENCY ANALYSIS

Common Frequencies
Frequency Distribution
Use **Frequency Analysis**

Model & Predict



MODEL/SOFT SENSOR

Best-Fit Equation Based on Variable(s) Other Than Time

- Virtual Sensors
- Statistical & Empirical Models

Use **Prediction**

FORECAST

Project a Signal into the Future

Use **Formula**

Show Boundaries into the Future

Use **Reference Profile**

```
forecastConstant()
forecastLinear()
forecastSplice()
```

PREDICT

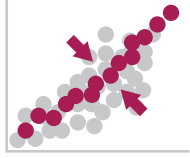
Best-Fit Equation Based on:

- Forecasted Variable(s)
- And/Or Time

Use **Formula**, `timeSince()` to make time elapsed signal

Use **Prediction**

VALIDATE & OPTIMIZE MODEL



Evaluate Model Fit

Use **Scatterplot View** to view model against original data

Use **Prediction** to see correlation coefficients & p-values in "Prediction Model" box

Improve Model Fit

Cleanse input signals

Use **Prediction** to edit Inputs, Scale, Regression Method, Training Window

EQUATION - BASED MODELS

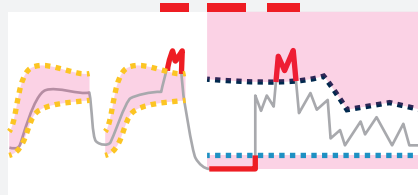
Enter Known Model Equations

1st Principles

Use **Formula**

$$f(x)$$

Monitor



THRESHOLD DEVIATIONS

Compare data to either:

Entered Numerical or Text Value, or a Selected Data Item (Signal or Scalar)

Use **Value Search**

CALCULATE THRESHOLDS

Statistical (\pm std dev, etc.) Limit

Use **Reference Profile** calculate statistics within a Condition Equation

Use **Formula** enter equation, calculate statistics, etc.

SHADING AND FORMATTING

Shade Inside Bounds

Use **Boundaries**

Enter value, signal, or scalar threshold

Use **Scorecard Metric** with optional thresholds

Shade Outside Bounds - **Trend View**

Shade Table - **Table View**

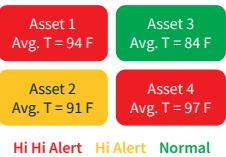
VISUALIZE THRESHOLDS

Variable

Use **Data tab**: load signal, Customize line type

Constant

Use **Formula**: enter value, click **Execute**



MONITOR MULTIPLE ASSETS

View Statistics &/or Conditions For Each Asset

Use **Treemap**

Ave Temperature	104.1 °F
Max. Flow	150.2 kg/h
Total Production	2,528 kg

TABLE

Signal Statistics & Values Condition Statistics

Color by Value Range (Constant or Varying Limit)

Use **Scorecard Metric** in **Table View**

Document & Publish

PUBLISH REPORTS & DASHBOARDS

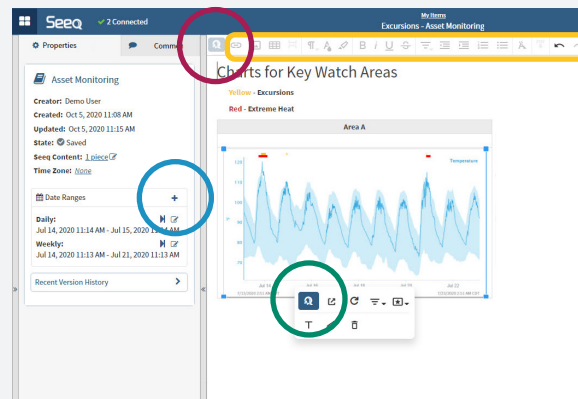
Collect & Display figures from one or more Workbench Analysis

Add Text, Tables, Comments, and Images

Apply scheduled, updating, or static Date Range(s) to figures

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INSERT CONTENT

Choose or supply a link to a Worksheet containing a figure

MAKE DATE RANGES

Add one or more Date Range(s) to apply to figure Click Auto-Update to make the figures update

FORMAT & UPDATE FIGURES

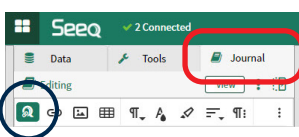
Apply custom date range to figure

Change figure size and font

Update from Worksheet to insert latest Analysis version

CUSTOMIZE LAYOUT

Add Text, Images, or Hyperlinks & Align content using Tables



DOCUMENT ANALYSES

Document and Collaborate

Include Relevant Images & Tables

Use **Journal**

ACCESS TIME RANGES, DATA, & PREVIOUS STEPS

Use **Journal Links** to Time Ranges, Data, & Previous Steps