



ACCELERATING
INNOVATION

3-1466 - DeltaV Live Tips & Tricks: A Customer's Perspective

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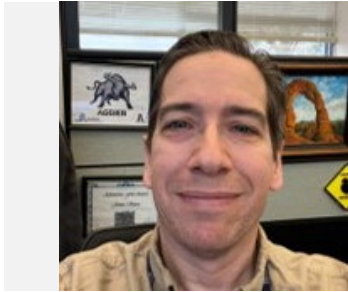
Inquiries should be directed to:
EmersonExchange@Emerson.com



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James Suisse

Principal Engineer – Control Systems Expert

James is the Control Systems Expert for the Covestro-Baytown, TX site. He has worked there for the last 10 years supporting 19 DeltaV systems. His primary responsibility is to support the Control System maintenance, life-cycle planning, and is the local caretaker of the DeltaV Live library. Previous to Covestro, James worked as a Control Systems engineer at the Rio Tinto - Kennecott Utah Copper Smelter for 7 years. James graduated from Utah State University as an Electrical Engineer. He currently lives in Southeast Texas with his wife and 6 children. His main hobby is (obviously) finding a place to take a nap.





A little about Covestro...

Leading manufacturer and supplier of premium polymers

Previously a division of Bayer

Headquartered in Germany

€18.0 bn in group sales

18,000 Employees

46 production sites worldwide

Products:

- Polycarbonates
- Urethane Components
- Base Chemicals
- Engineering Plastics
- Coatings and Adhesives
- Tailored Urethanes
- Thermoplastic Polyurethanes
- Specialty Films
- Elastomers



46 Production Sites Globally





A little more about Covestro...

Baytown, Texas Site

- Largest Covestro Production Site in North America
- 30-minute Drive East of Houston
- Built in 1971
- 1,100 Employees
- 19 Separate DeltaV Systems
- ~54,000 DSTs

About DeltaV Live

- 1 system entirely converted (~250 displays)
- 5 systems with L1 and L2 displays (~50 displays)
- Estimated ~4700 displays left
- Planned to complete by end of 2030



Agenda

Getting Over the Learning Curve

Using Standards Every Chance You Get

Help with Scripting

Making Colors and Objects more User Friendly

New Pages: Template, Tutorial, Toolbar

New GEMs

New and Improved Faceplates

Getting Over the Learning Curve

Bottom Tabs (Graphics Explorer vs Library Explorer)

Selection Pane vs Palette

Routing Lines

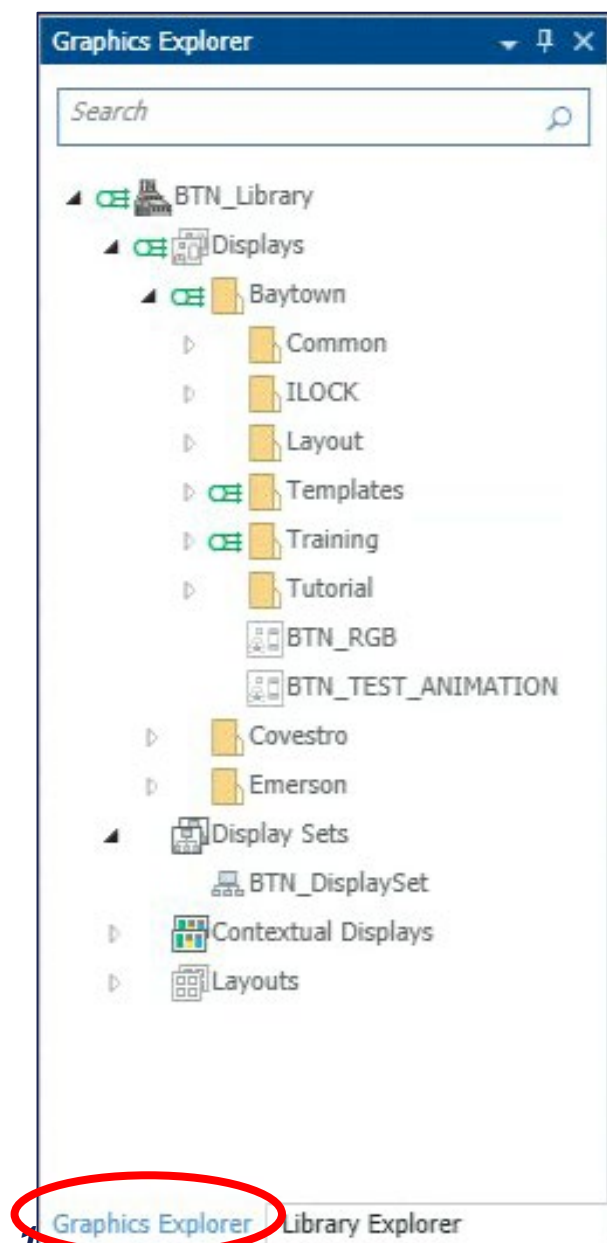
"If at first you don't succeed, try two more times so that your failure is statistically significant."

- (attributed to) David Hand

Tabs at the Bottom of Pane

(Graphics Explorer vs Library Explorer)

Unlike most programs that incorporate tabs, the Graphics and Library Explorer menus are in tabs across the bottom of the pane.

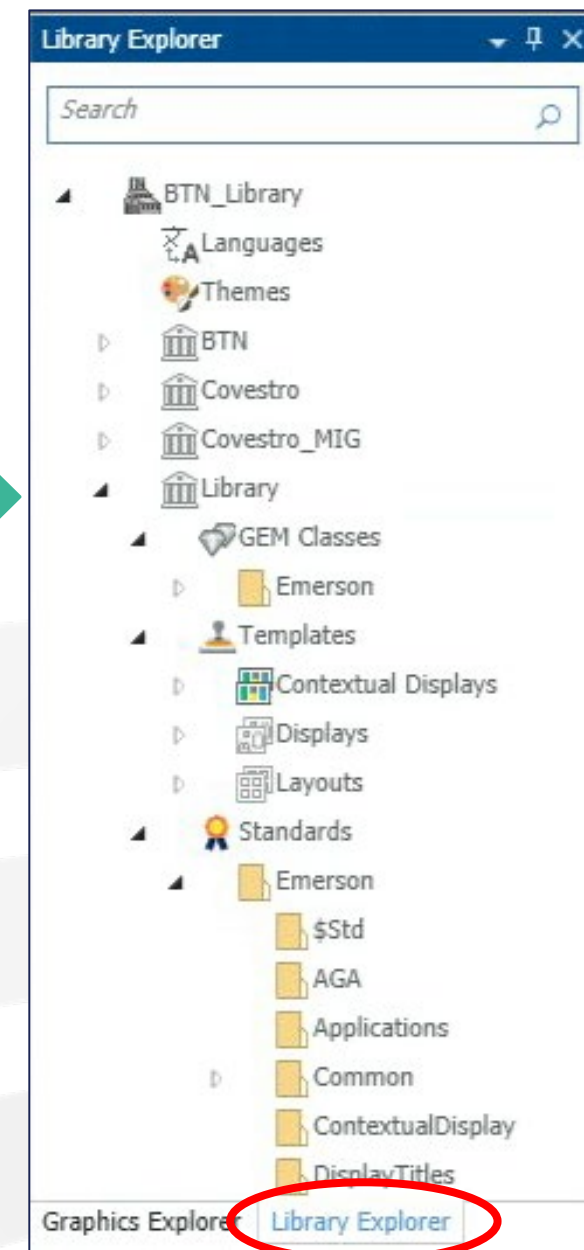


Graphics Explorer

- Contains the displays, display sets, contextual displays, and layouts
- Can be divided into separate folders within each type.

Library Explorer

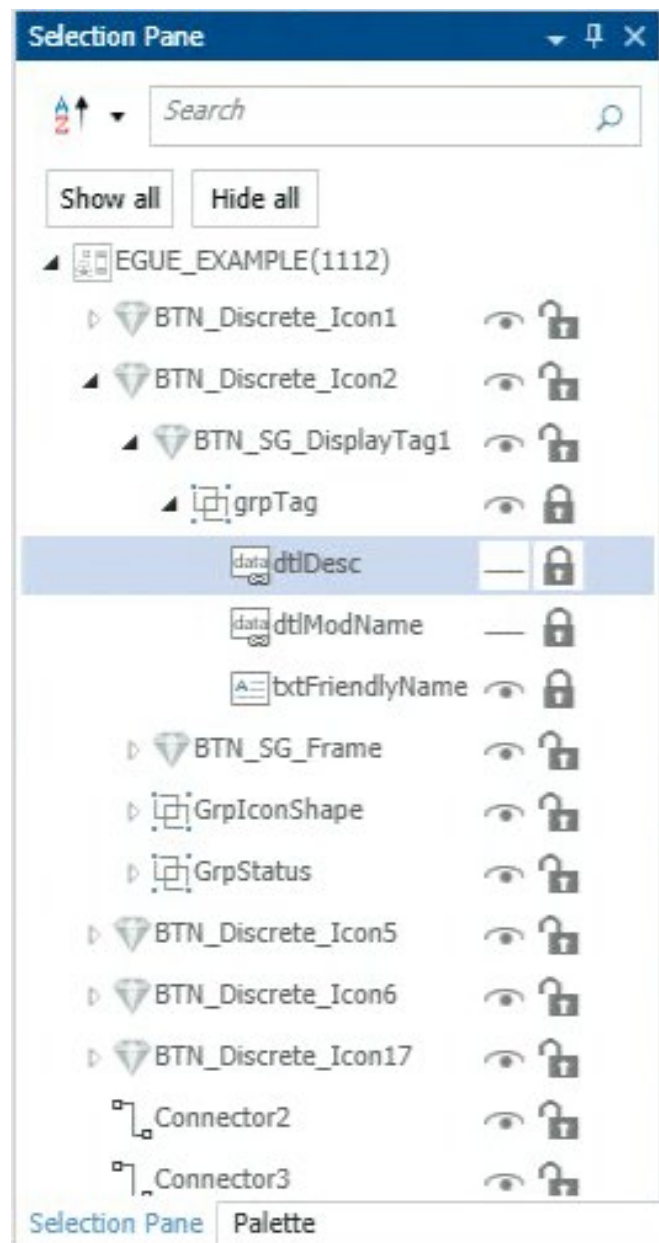
- Contains all library objects (GEM classes, templates, standards, functions)
- Can be divided into separate libraries
- Can also include separate folders within each type inside the library



Tabs at the Bottom of Pane

(Selection Pane vs Palette)

With a display open in the editor, the Selection/Palette Pane becomes available.

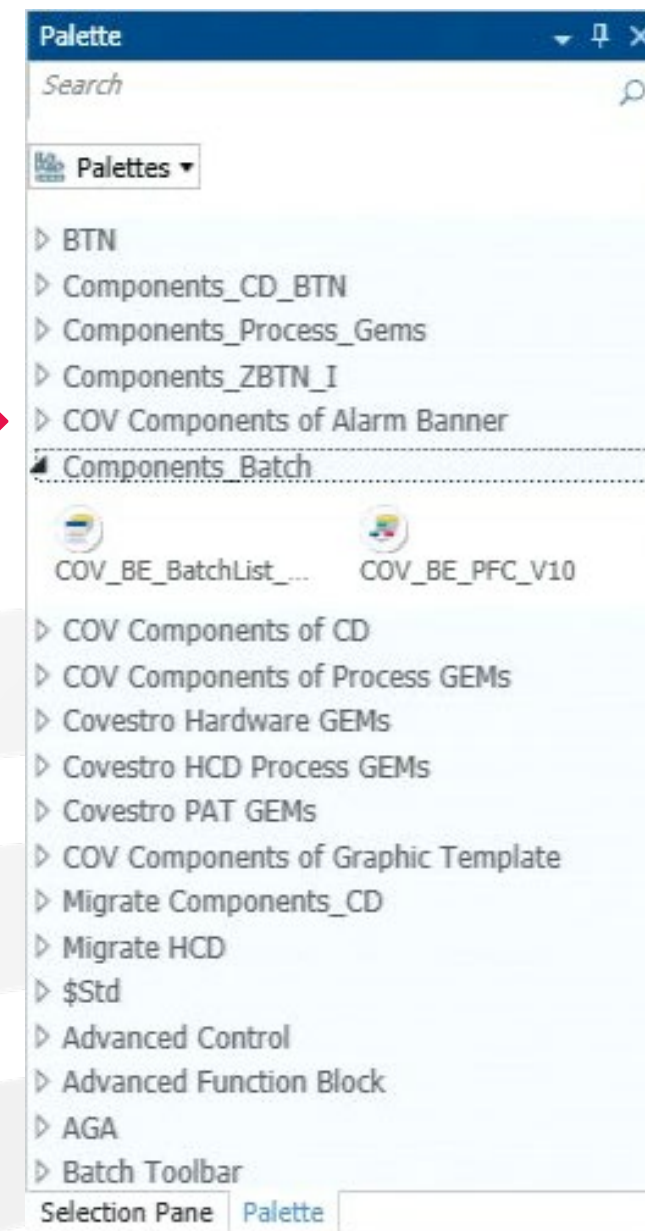


Selection Pane

- Shows all objects on the active display. Allows user to drill down into GEMs and groups to be able to select and edit sub-items.

Palette

- Contains all available GEMs that can be added to the page.



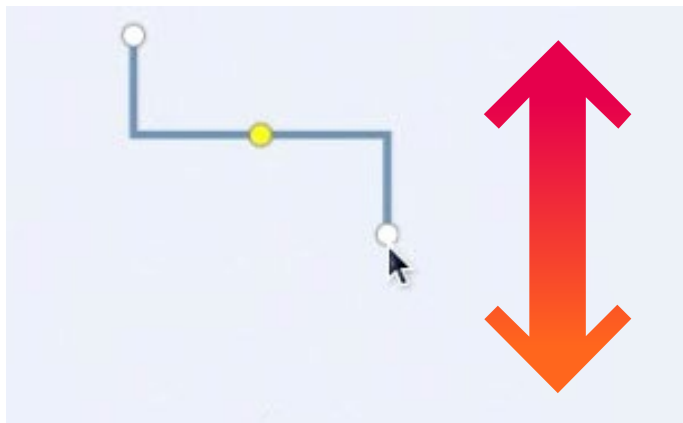
Selecting from Left vs Right

- In multiple programs, one can select several objects at once by drawing a box around what you wish to select. This functionality is also included in DeltaV Graphics Studio. But it has a few differences:
 - Selecting using a box from the left side of the objects
 - Only selects objects that are completely encompassed by the box area
 - Selecting using a box from the right side of the objects
 - Selects all objects that are completely or partially included in the box area

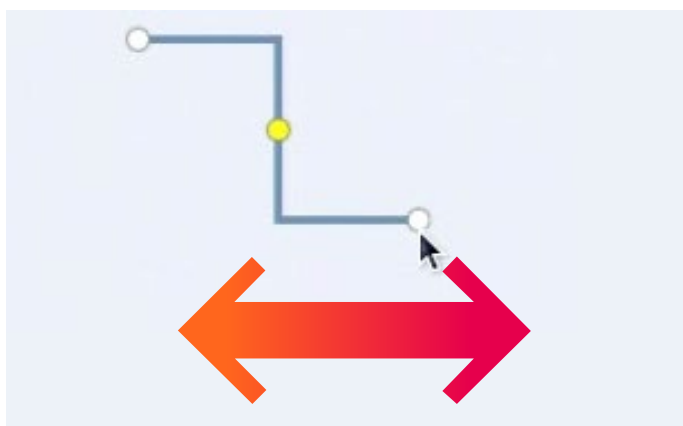


Routing Connector Lines

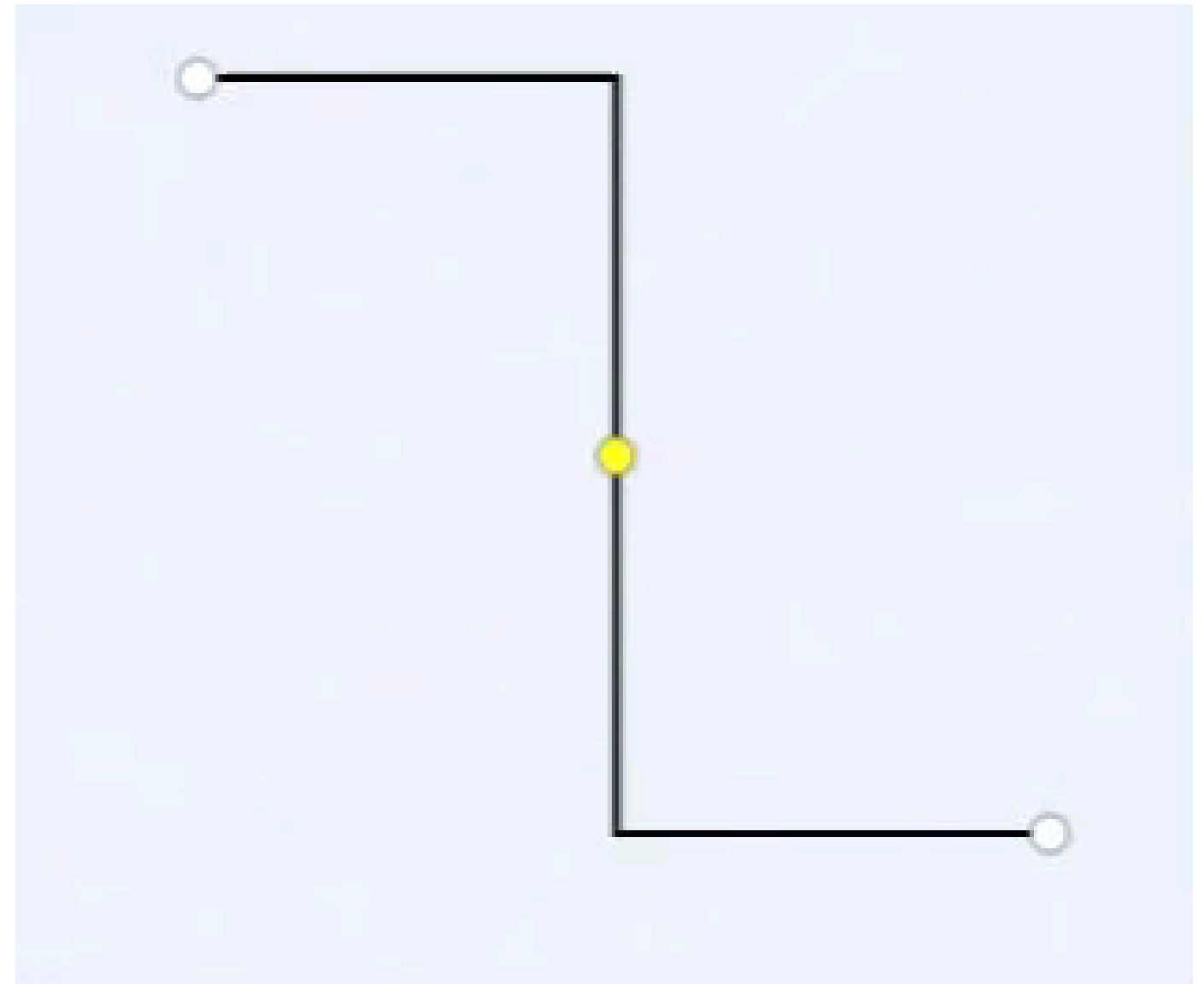
- Connector line orientation changes based on which direction the cursor is moving. Also note any changes to the line will reset as soon as an endpoint changes.



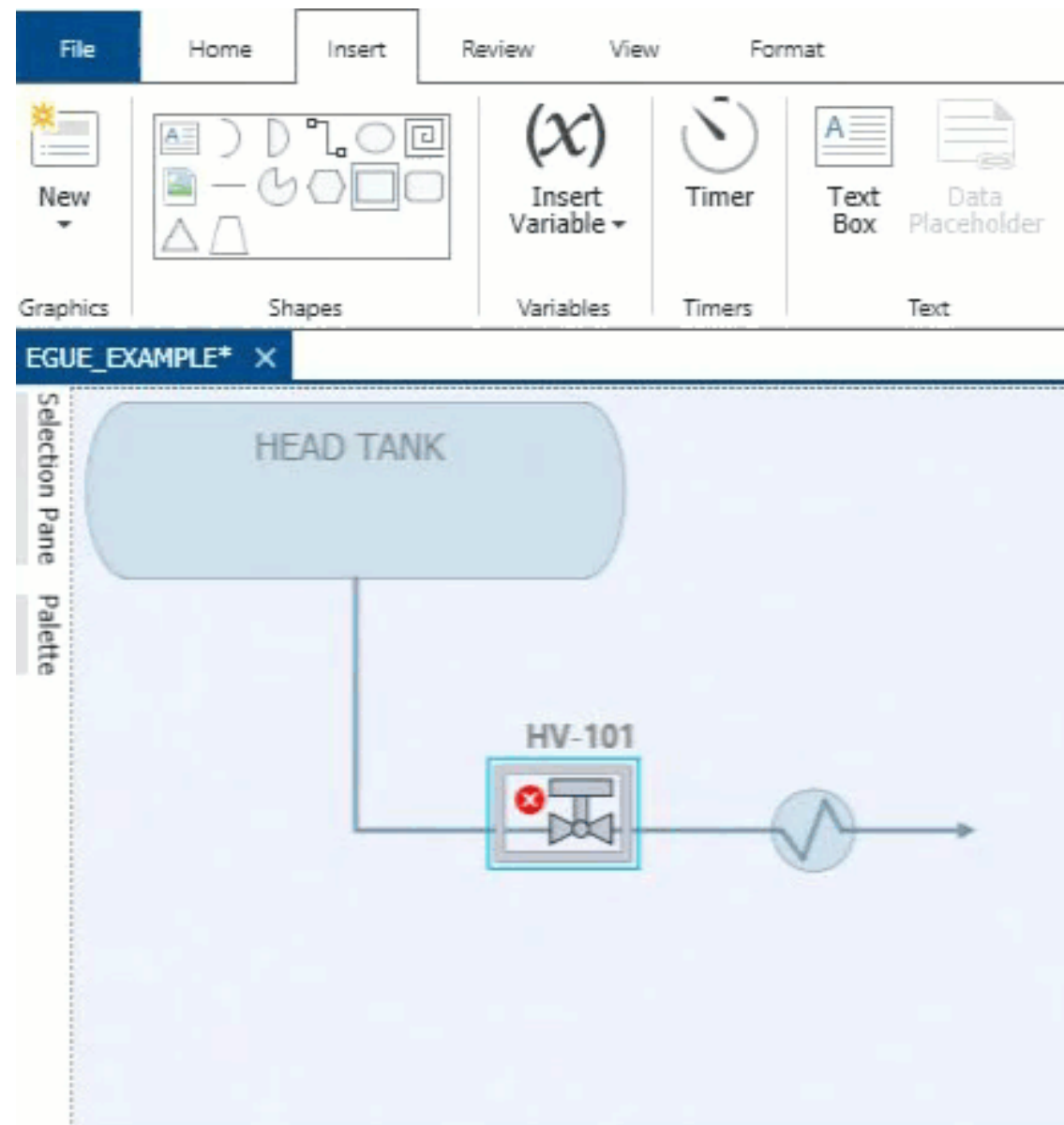
- Up/Down = horizontal segment



- Right/Left = vertical segment



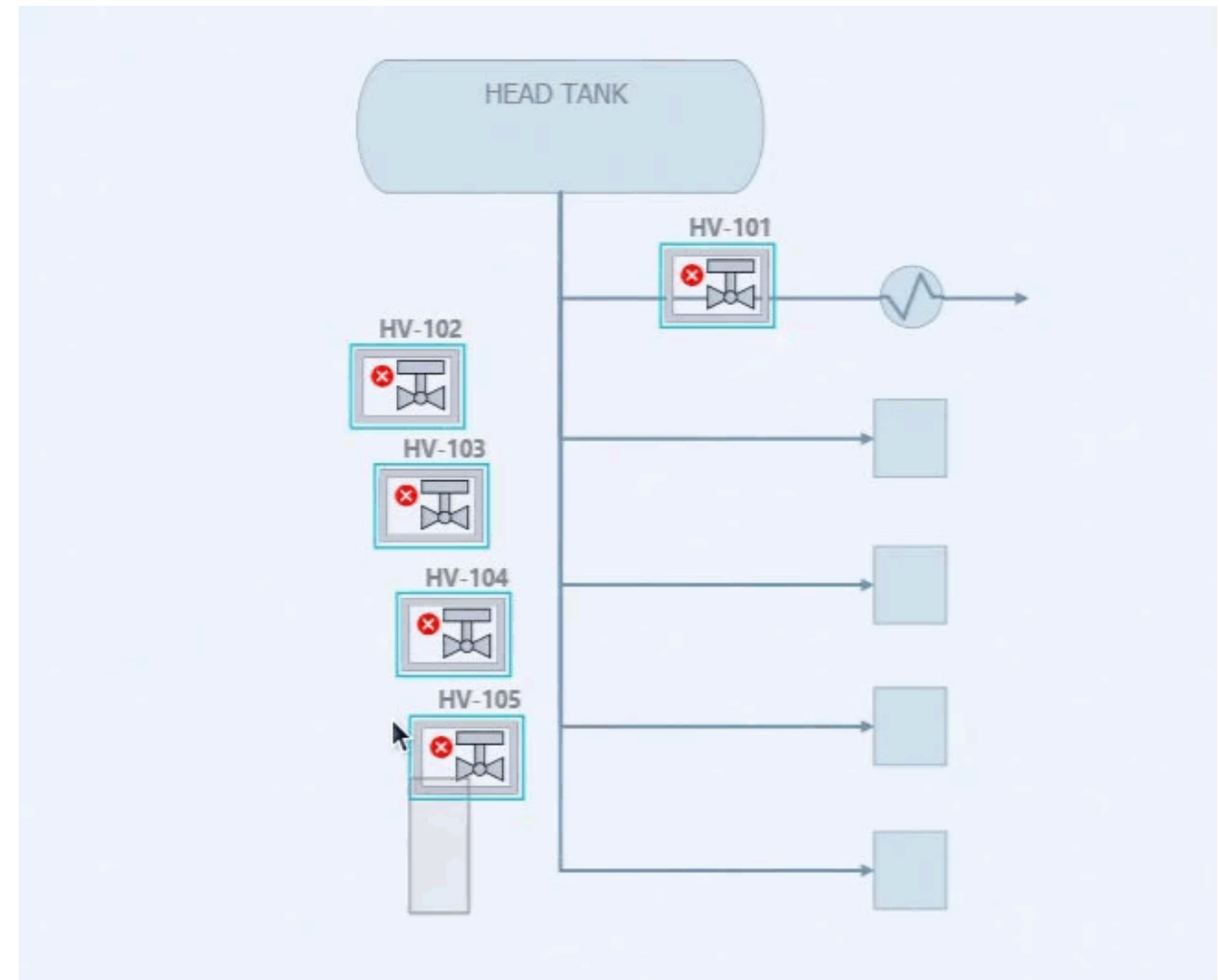
Copy Formats with Format Painter



- Use the Format Painter to copy formatting from one object to another similar object.
 - Select the object with properties you wish to copy
 - Home > Format Painter
 - Select the second object with the paintbrush icon
 - Note: This can be tricky to get it to select the correct object if multiple objects nearby. One hint is to make sure the object being painted is in its own space.
 - Note 2: Format Painter doesn't work with groups. You must drill down in the group to an object with compatible properties to copy them.

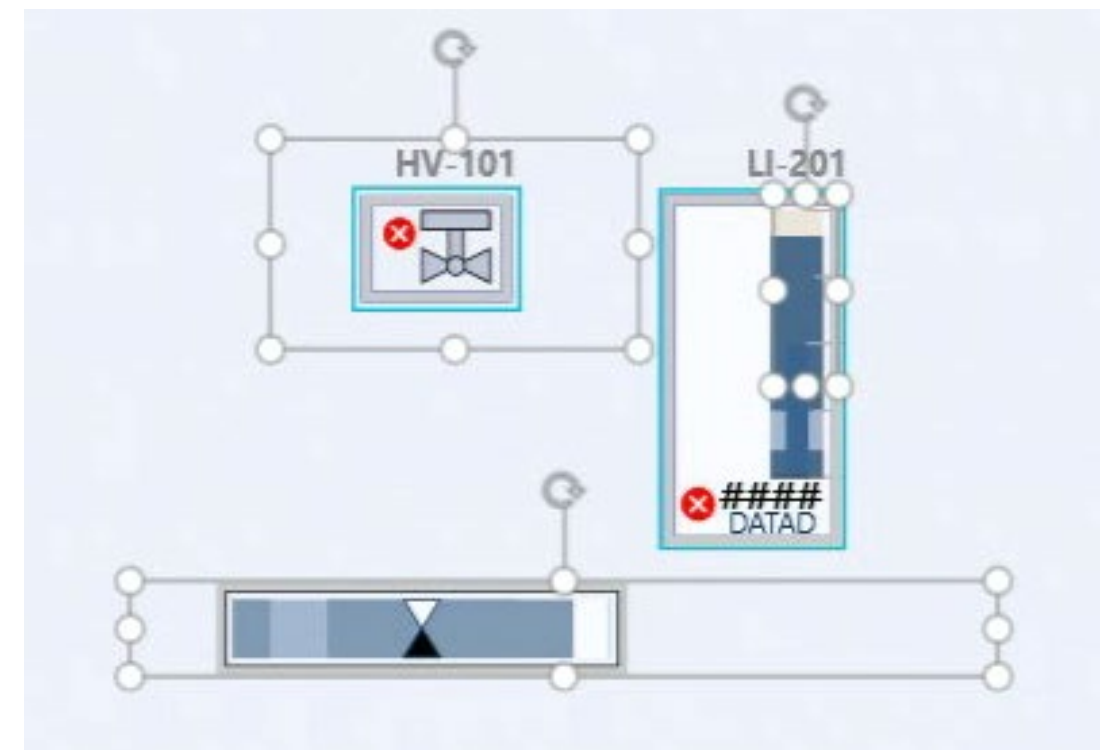
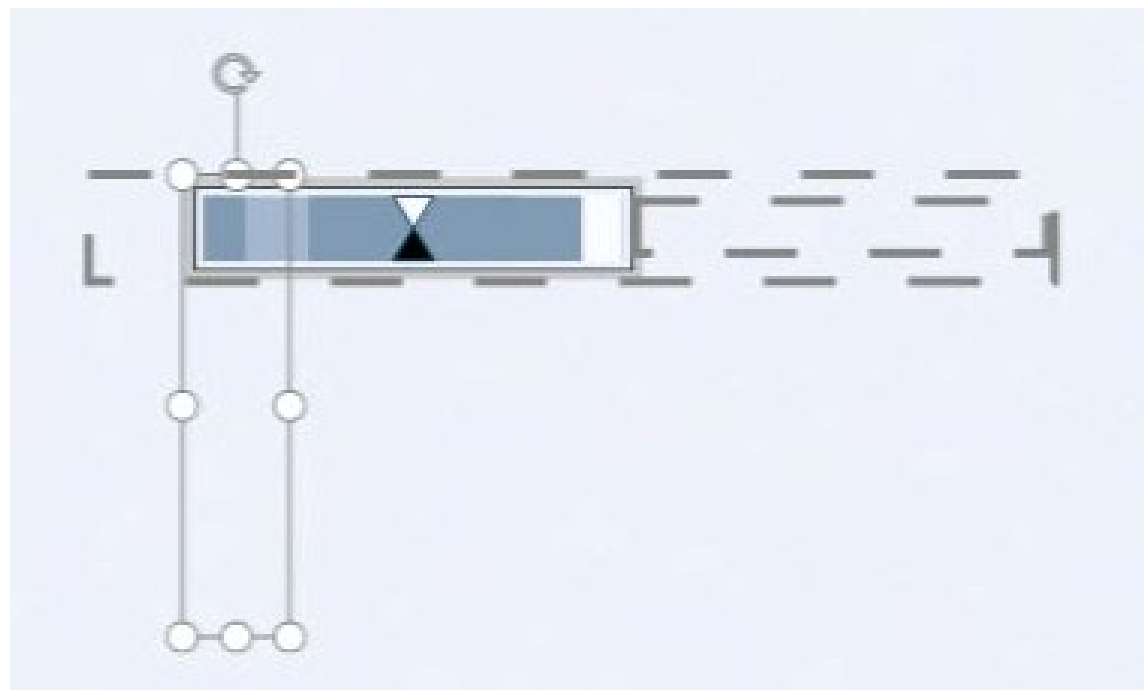
Align and Space Objects Off Each Other

- As with select other programs, you are able to select multiple (2 or more) objects and align them (left, right, top, bottom, middle, center) by right clicking > Align
- You can also distribute 3 or more objects evenly vertically or horizontally.
 - Note 1: It is highly recommended that the objects being aligned or distributed are similar in size and shape. Be aware an edge alignment aligns off the edge of an object/GEM constraints and not the displayed shape.
 - Note 2: If only one object is selected, you may align it with respect to the display. Very useful for placing the object in the middle of the graphic.
 - Note 3: The Distribute functionality will distribute the selected objects evenly between the two objects at each end.



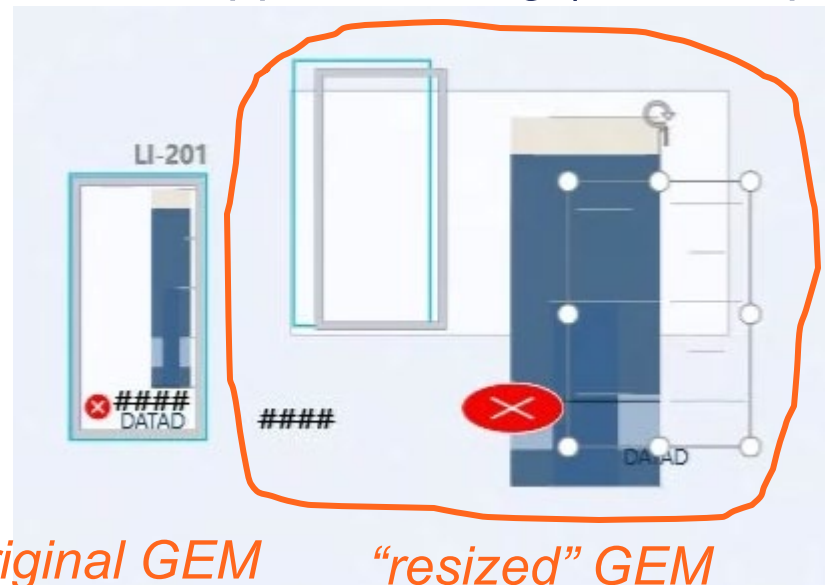
Things to Know about GEMs and Groups

- In DeltaV Live, it is very easy to accidentally select an element in a group or GEM instead of the full object. Once you get used to what that looks and feels like, configuration will become easier.
- Also, be aware that because GEM class sizes need not include the extent of the objects contained within the GEM, the actual GEM size might be different (bigger or smaller) than the visible object size.



Things Not to Do

- Resize GEMs that don't support resizing (this is in part due to some properties in a GEM have set dimensions while others do not)



Original GEM *“resized” GEM*

- Make major changes to set connectors or objects the connectors are connected to. Connectors are fickle and re-route themselves

Using Standards Every Chance You Get

*"Standards are like toothbrushes. Everybody wants one,
but nobody wants to use anybody else's."*

- Anonymous

What Are Standards

- Per Graphic Studio Help:
 - Standards provide a means to ensure a consistent graphics appearance within a DeltaV system by providing the standard values to be used system-wide. They are created and managed in configuration libraries and can be referenced by properties in displays, layouts, GEM classes, or graphic elements.
- Types of standards: colors, fonts, Booleans, images, strings, measurements, and numbers.
- It is recommended by the presenter to use a set of standards as often and wherever feasible. This will help give graphics and GEMs the same look and feel system-wide and will help ease transition of displays, GEMs, and objects to other DeltaV systems.
- Standard colors also make it much simpler and easier to support multiple color themes.
- Standards allow for simpler system-wide changes as situations warrant.
 - Real-World Example: Operations agreed that the Advisory-level alarm color (purple) wasn't visible enough against the dark background of the Dark Blue theme, thereby making them easy to miss. It took a total of about 5 minutes to apply a slightly lighter shade of purple to the dark blue theme Advisory Alarm color standard and the change was then propagated system-wide.
 - More examples of innovative use of standards will be discussed in later slides.

Where Do You Find Standards?

- All standards are located in the Library Explorer > [Library name] > Standards
 - Within this structure, standards can be anywhere you choose to put them.
 - Out-of-the-box standards begin with the name “S_” but they can basically be named almost anything. I recommend keeping the “S_” naming convention.

The screenshot shows the Library Explorer window with the 'Standards' folder selected under the 'Common' library. The main pane displays a table of standard definitions:

NAME	VALUE	TITLE	DESCRIPTION	TYPE
S_PrimDisp		S_PrimDisp	Primary Display	Image
S_PVBackColor		S_PVBackColor	Process Value Background Color	Color
AB S_PVFont	Segoe UI Semibold 16	S_PVFont	Process Value Font	Font
S_PVForeColor		S_PVForeColor	Process Value Foreground Color	Color
[] S_PVTxt	PV:	S_PVTxt	PV Text	MultiLanguageString
S_ResetBtn		S_ResetBtn	Button Color	Color
S_ResetButtonWidth	39.600 pt	S_ResetButtonWidth	Reset Button Width	Measurement
S_SimulationIcon		S_SimulationIcon	Simulation Icon	Image
S_SISDispBackColor		S_SISDispBackColor	SIS Display Background Color	Color
S_SPFillColor		S_SPFillColor	Set Point Fill Color	Color
S_SPLineColor		S_SPLineColor	Set Point Line Color	Color
[] S_SPTxt	SP:	S_SPTxt	SP Text	MultiLanguageString

The screenshot shows the Library Explorer window with a tree view of libraries. Red arrows point to the 'Standards' folder within the 'BTN', 'Covestro', and 'Library' folders, illustrating the path to find standards.

- Library Explorer > [Library name] > Standards

Standardizing Your Functions

- Per Graphic Studio Help:
 - Functions provide a means to create logic that converts values of one type into values of a different type. They are created and managed in configuration libraries and can be referenced by properties in display, layouts, or GEM classes, or graphic elements.
- Types of functions: colors, fonts, Booleans, images, strings, measurements, and numbers
- It is also recommended by the presenter to maintain a set of standardized functions. Functions should be named starting with “F_” and the name should be meaningful (i.e. the name should give a brief description of what it does or what it is for).

Help with Scripting

*"If debugging is the process of removing software bugs,
then programming must be the process of putting them
in."*

- Edsger W. Dijkstra

About Scripting

- Like DeltaV Operate which uses scripting for non-standard behavior and animation, DeltaV Live uses scripting as well.
 - DeltaV Operate uses Visual Basic
 - DeltaV Live uses TypeScript
- TypeScript is a strongly typed programming language that builds on JavaScript.
- Before delving into a script-based solution, make sure that you can't accomplish what you wish to do with an animation, function, object interaction property (like click), or library object. It can be much easier to use standard objects and functions than re-creating from scratch.

TypeScript Resources

- DeltaV Books Online / Graphics Studio Help
 - DeltaV documentation for Graphics Studio and TypeScript is actually pretty good.
- Online Resources
 - All sites below include detailed documentation and resources for learning and testing TypeScript
 - www.typescriptlang.org
 - www.tutorialsteacher.com/typescript
 - www.w3schools.com/typescript/
- Reverse Engineering existing code

DLSYS object

CondRead function

DLSYS.CondRead() attempts to read a DeltaV parameter path, returning either the parameter value or a specified fallback value (if the path fails the Exists() test). This function immediately returns a value; if the read attempt was unsuccessful, the function continues to be called until the parameter is successfully read.

CondRead() immediately returns a value without blocking the execution of the script, and therefore may likely return the fallback value on the initial function call, even though it is likely to return the parameter value once the parameter is successfully read.

Emerson recommends using CondRead() for scripts that run periodically and can therefore delay the visibility of display elements until the value is successfully read in a subsequent update cycle. For example, visibility animations or timer scripts are appropriate situations in which to use CondRead(). The CondRead() can be useful for allowing display elements to open while waiting for data to download, or for providing known fallback values that allow graphics to better adapt to optional parameters in control modules.

For scripts that run only once and where a choice must be made based on available information in the DeltaV system, Emerson recommends using the DLSYS.CondReadAsync().

Arguments

1-2, Optional arguments are indicated by a ? following the argument name.

Argument	Description
<i>path string</i>	A literal or graphics expression that resolves to a DeltaV parameter path.
<i>fallback value?</i>	The primitive string or number literal to return if <i>path string</i> fails the Exists() test (does not produce a good or uncertain value).

Return values (string)

- The value of the parameter path, if Exists() returns True (the parameter path can be resolved and produces a good or uncertain status).
- The specified fallback value, if Exists() returns False (the path string does not produce a good or uncertain value).

Syntax

```
DLSYS.CondRead(path string, fallback value?)
```

Examples

The examples in this table demonstrate how to use CondRead() to replace data that cannot be read (has 'bad' data quality) with a designated fallback value.

Example	Result
DLSYS.condRead("MOD1/PID1/SP", DLSYS["MOD1/PID2/SP"])	The set point of MOD1's PID2 block.
DLSYS.condRead("MOD1/PARAM1", DLSYS["MOD1/PARAM2"])	MOD2's PARAM2

This example demonstrates how to use CondRead() to extract bit-level data from data values that hold bit-packed information.

Making Colors and Objects more User-Friendly

Standardizing Colors

Dynamically-Ranged Spark Line

Multi-Point Normalization

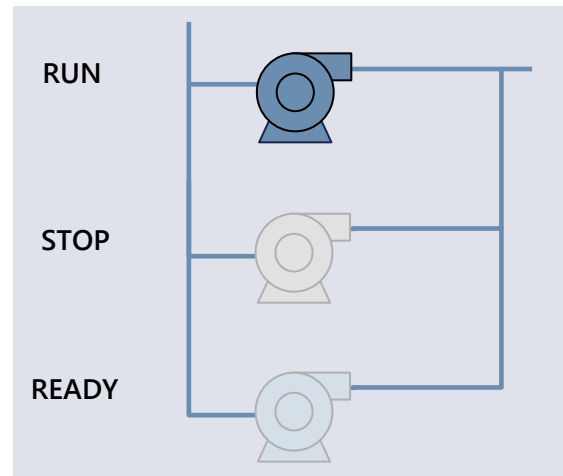
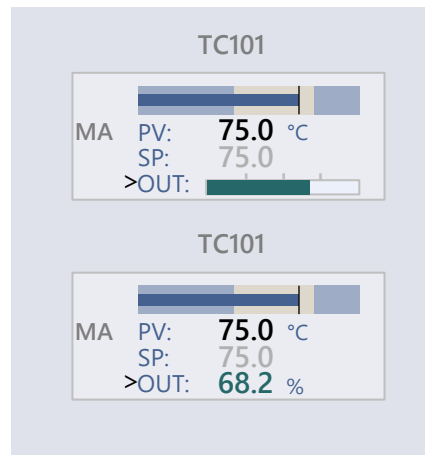
GEM Resizing

*"A user interface is like a joke. If you have
to explain it, it's not that good."*

- Martin LeBlanc

Standardizing Colors

- SP, PV, OUT Colors
- Pump/Valve Active/Passive Colors
- Piping and Vessel Colors



Graphics Studio

BTNSIM.DELTAV.COV.LOCAL\EMERSON

File Home Insert Review View

Cut Copy Paste Format Painter New Verify Publish Verify

Arial 12 B I U abc A A

Align text

Bring Forward Send Backward

Align Shape Fill Shape Outline Shape Background

Rot

Editing Ap... Help

Library Explorer

ProcessGEM

NAME	VALUE	TITLE	DESCRIPTION	TYPE
(Standards)				
S_BTN_Color_OUT	[Color swatch]	S_BTN_TextColor_OUT	Output Foreground Color	Color
S_BTN_Color_OUT1	[Color swatch]	S_BTN_TextColor_OUT	Output Foreground Color	Color
S_BTN_Color_OUT2	[Color swatch]	S_BTN_TextColor_OUT	Output Foreground Color	Color
S_BTN_DCFill_Active1	[Color swatch]	S_BTN_DCFill_Active1	DC Fill Active 1	Color
S_BTN_DCFill_Active2	[Color swatch]	S_BTN_DCFill_Active2	DC Fill Active 2	Color
S_BTN_DCFill_Passive	[Color swatch]	S_BTN_DCFill_Passive	DC Fill Passive	Color
S_BTN_DCFill_PassiveNotReady	[Color swatch]	S_BTN_DCFill_PassiveNotReady	DC Fill Passive Not Ready	Color
S_BTN_DCFillEise	[Color swatch]	S_BTN_DCFillEise	DC Fill Else Color	Color
S_BTN_DCText_Active1	[Color swatch]	S_BTN_DCText_Active1	DC Text Active 1	Color
S_BTN_DCText_Active2	[Color swatch]	S_BTN_DCText_Active2	DC Text Active 2	Color
S_BTN_DCText_Passive	[Color swatch]	S_BTN_DCText_Passive	DC Text Passive	Color
S_BTN_DCText_PassiveNotReady	[Color swatch]	S_BTN_DCText_PassiveNotReady	DC Text Passive Not Ready	Color
S_BTN_DCTextEise	[Color swatch]	S_BTN_DCTextEise	DC Text Else Color	Color
S_BTN_OpRange	[Color swatch]	Operator Range Color	Operator Range Color	Color
S_BTN_TextColor_OUT	[Color swatch]	S_BTN_TextColor_OUT	Output Foreground Color	Color
S_BTN_TextColor_PV	[Color swatch]	S_InfoTextColor	Information Text Color(Normal)	Color
S_BTN_TextColor_SP	[Color swatch]	S_InfoLightColor	Information Text Color(Light)	Color
S_BTN_ValveFailPosLineColor	[Color swatch]	S_BTN_ValveFailPosLineColor	Valve Fail Position Line Color	Color

Graphics Configuration

S_BTN_TextColor_OUT

Basics

Information

Title: S_BTN_TextColor_OUT

Description: Output Foreground Color

Value: Library.S_OUTForeColor

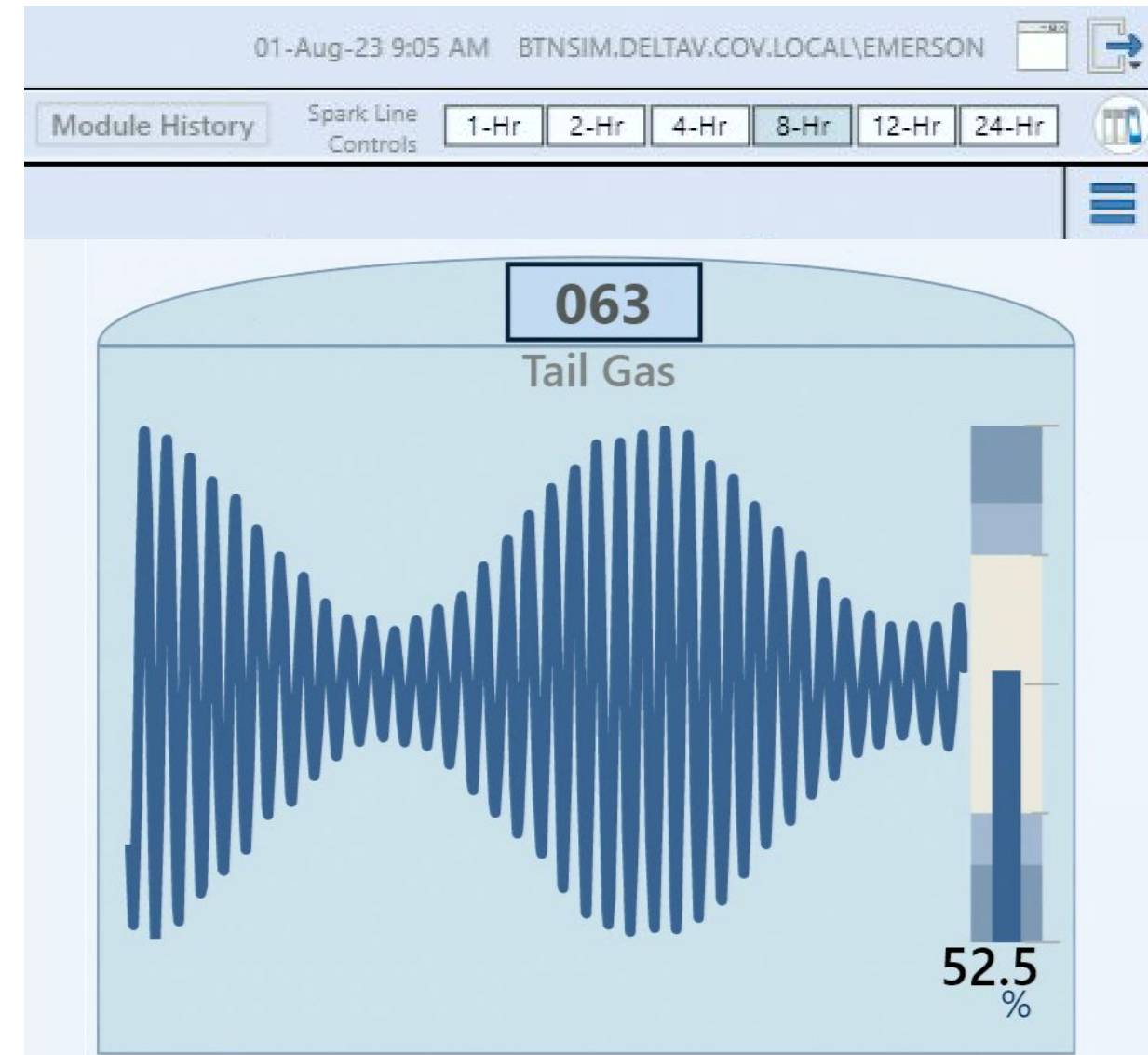
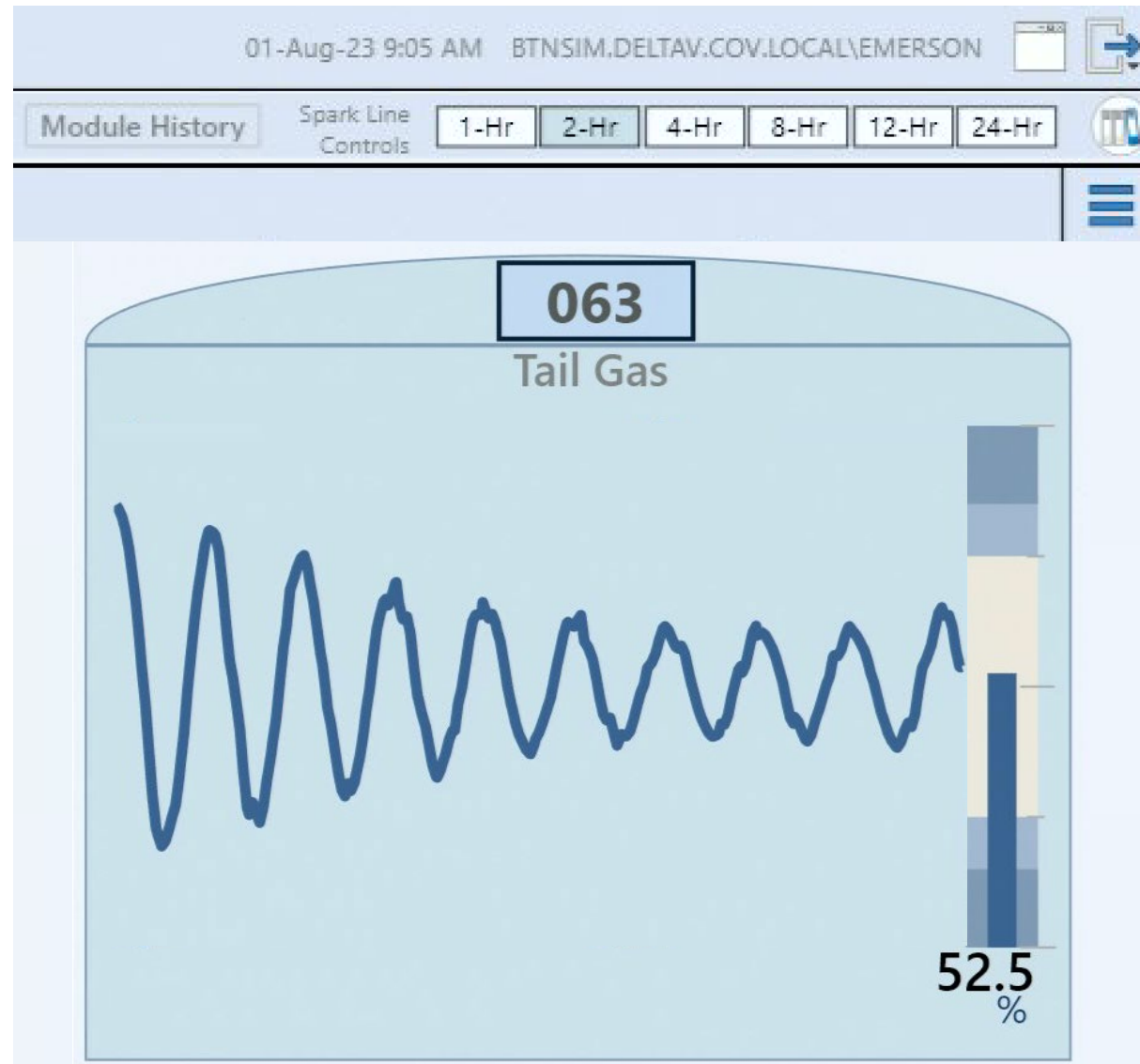
Theme Values

NAME	TITLE	VALUE
DB	DB	[Color swatch]
DG	DG	[Color swatch]
LB	LB	[Color swatch]
TAN	TAN	[Color swatch]

Standardizing Colors

<u>Color Standard Description</u>	<u>Default RGB</u>	<u>Dark Blue RGB</u>
Display/Contextual Display Background Color	(224, 226, 235)	(41, 65, 99)
Vessel Color	(193, 210, 221)	(83, 106, 134)
Pipe Color	(107, 141, 175)	(123, 146, 173)
GEM Tag Text Color	(127, 127, 127)	(166, 166, 166)
PV Text Color	(0, 0, 0)	(255, 255, 255)
SP Text Color	(166, 166, 166)	(166, 166, 166)
OUT Text/Bar Color	(20, 105, 106)	(66, 80, 187)
OUT1 Text/Bar Color (Split Range)	(131, 180, 172)	(131, 180, 172)
OUT2 Text/Bar Color (Split Range)	(48, 160, 167)	(75, 142, 139)
DC Passive Color	(212, 223, 232)	(47, 75, 115)
DC Passive Not Ready Color	(255, 255, 255)	(25, 40, 62)
DC Active Color	(107, 141, 175)	(107, 141, 175)
PV Color (bars and spark lines)	(60, 98, 145)	(223, 215, 204)

Dynamically-Ranged Spark Line



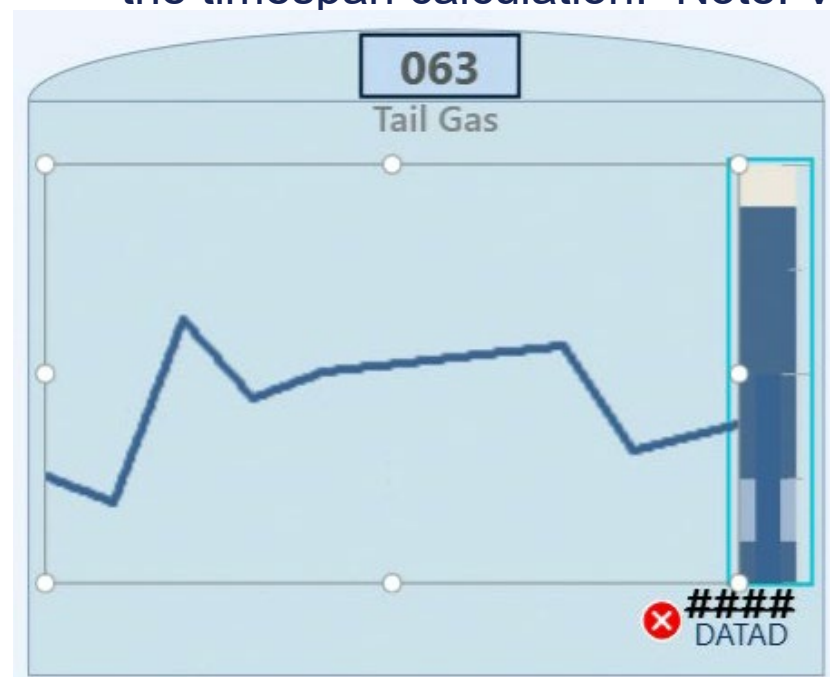
Dynamically-Ranged Spark Line

1. Created a layout variable (located in the layout file)

The screenshot shows the 'BTN_Single' layout editor with the 'Variables' tab selected. A table lists the variable 'SparkTime' with type 'Number' and value '8'.

NAME	TYPE	VALUE
SparkTime	Number	8

2. Edited the Sparkline object as shown, linking the layout variable in the timespan calculation. Note: Value is in milliseconds



- Also note the custom standard value for Historian Server. Helps with moving graphics from a simulate system to the production system and back.

The screenshot shows the 'Sparkline1' configuration panel. The 'Time Span' section is expanded, and the 'Value' field is circled in red. The value is set to 'Lyt.SparkTime * 3600000'.

Other visible settings include:

- History Server Preference: SIM-APP1\BTN.S\BTN_HistorianServer
- Parameter Expression: DLSYS["LI1/PV.CV"]
- Scale: DLSYS["LI1/PV_SCALE"]
- Default Scale: 0% (0) to 100% (100)
- Units: no units
- Decimals: No decimals
- Format: M/d/yyyy h:mm:ss tt
- Time Zone: (UTC-06:00) Central Time (US & Canada)
- Pen Color: Library.S_PVForeColor
- Pen Thickness: 2.160 pt

Dynamically-Ranged Spark Line

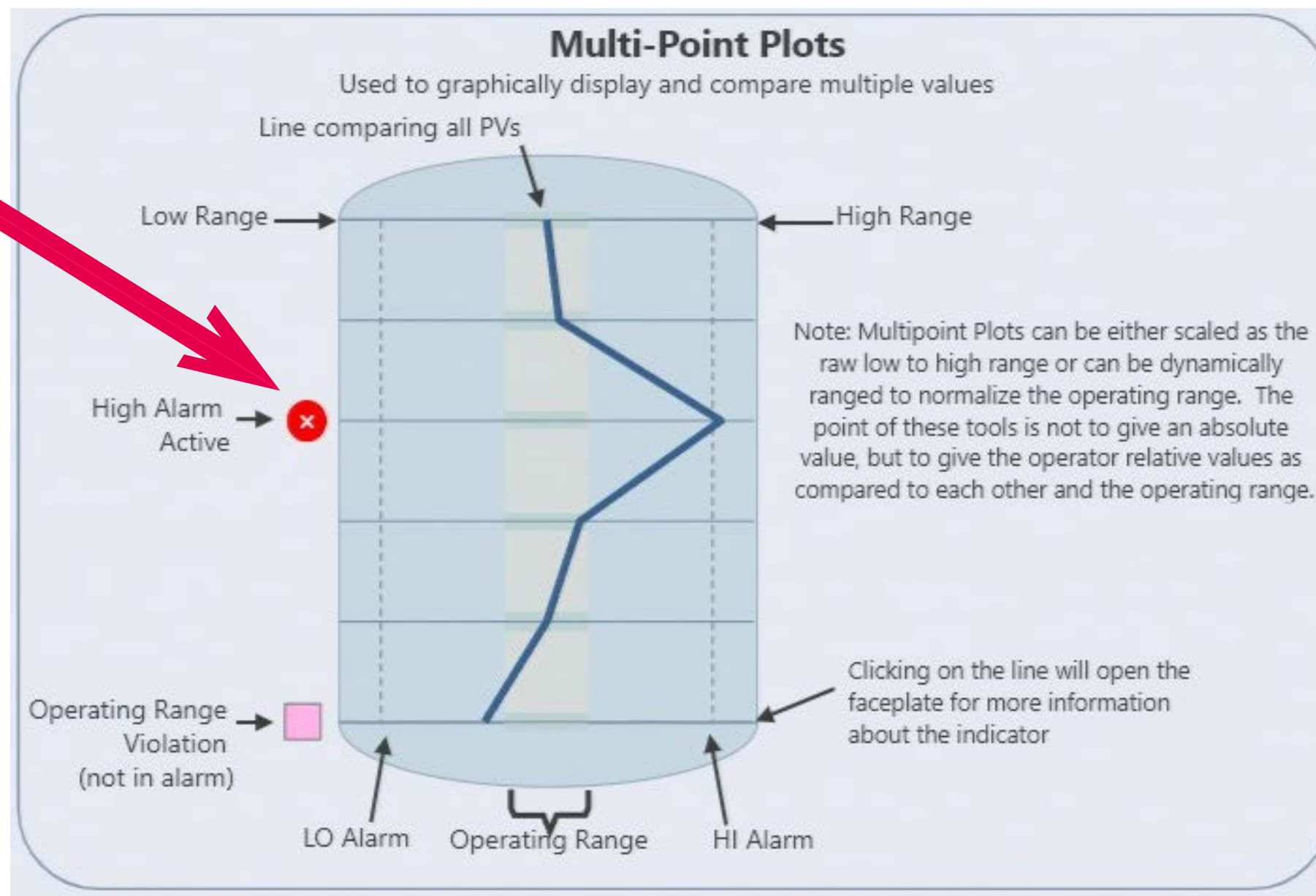
- Created a control in the PCSD Toolbar with buttons that write to the layout variable

The screenshot shows the PCSD Graphics Configuration interface. On the left, a 'Spark Line Controls' panel contains buttons for '1-Hr', '2-Hr', '4-Hr', '8-Hr', and '12-Hr'. The '4-Hr' button is selected. On the right, the 'Graphics Configuration' window for 'Spark_Btn_4hr' is open, showing the 'Interaction' tab. The 'Click1' action is set to 'Write Value to Destination'. The 'Value' field is set to 'Grp.ThisNumber' and the 'Destination' field is set to 'Lyt.SparkTime'. A red arrow points to the 'Value' field with the text '(Optional: Added a variable in each button for ease in configuration)'. Below this, another 'Graphics Configuration' window shows the 'Variables' tab for 'Spark_Btn_4hr', where a variable named 'ThisNumber' of type 'Number' is defined with a value of '4'. A second red arrow points to this variable table.

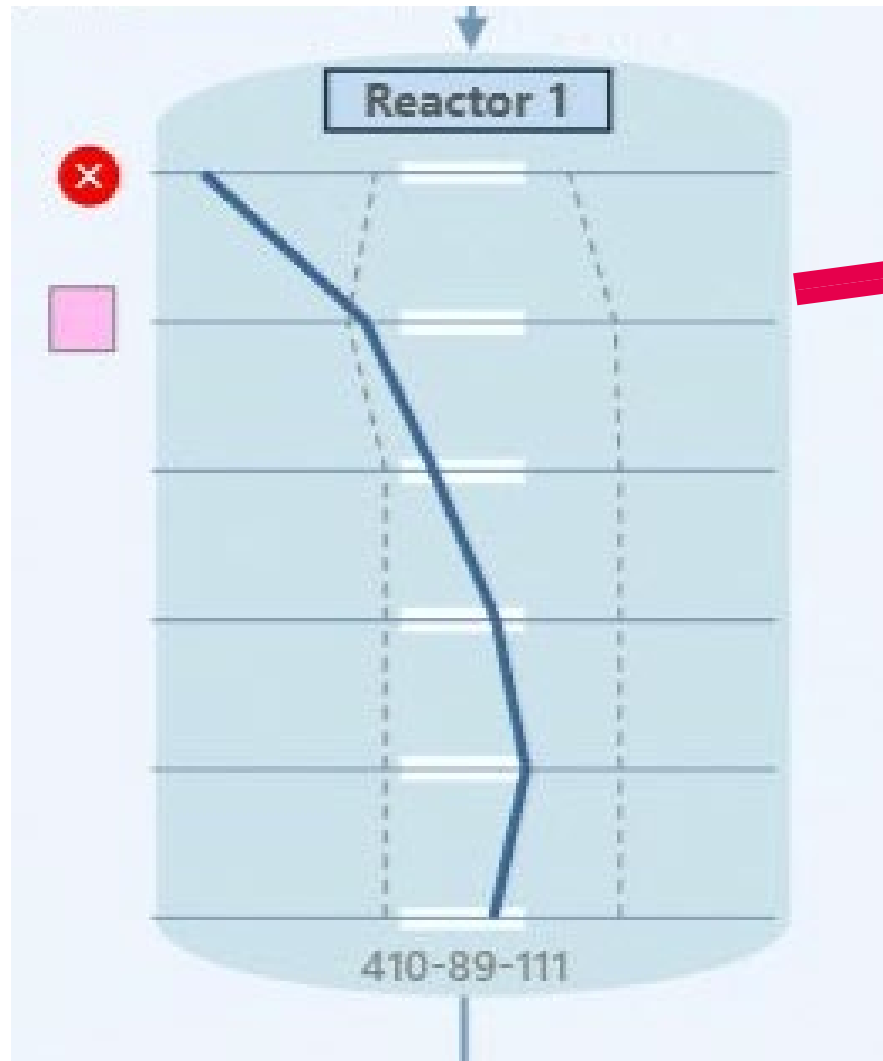
NAME	TYPE	VALUE
ThisNumber	Number	4

Multi-Point Normalization

Added Alarm Object to supplement the Multipoint Plot



Multi-Point Normalization



Configuration for Parameter 1 Settings:

Parameter 1 Settings

Scale ...

Default Scale 0% 0 100% 100

no units No decimals

Operating Range

Show Upper Limit ...

Show Lower Limit ...

Inside the BTN_OP_LIMITS Composite Block:

SCALE	0 to 100°C	
HI_LIM	55	46 to 61 °C RANGE
LO_LIM	52	

ACT

ACT1

IN_D

#1

NORMALIZE

NORM_FACTOR

L2_LIMITS Module:

L2_LIMITS Module:

SCALE1	0 to 100°C	
TI1/PV_SCALE	0 to 100°C	
HI_LIM1	55	55
TI1/TP09		52
LO_LIM1	52	1
TI1/TP10		20

BTN_OP_LIMITS

TI1

SCALE	RANGE
HI_LIM	
LO_LIM	
IN_D	
NORMALIZE	
NORM_FACTOR	

#1

ACT1 Expression

```

Expression:
1 NORMALIZE := '^/NORMALIZE.CV';
2 N_FACTOR := '^/NORM_FACTOR.CV';
3 OP_HI := '^/HI_LIM.CV';
4 OP_LO := '^/LO_LIM.CV';
5
6 IF NORMALIZE THEN
7     FACTOR := 100/N_FACTOR;
8     OP_SPAN := (OP_HI - OP_LO);
9     MIDDLE := OP_LO + (OP_SPAN/2);
10    HI_SCALE := MIDDLE + (OP_SPAN/2) * FACTOR;
11    LO_SCALE := MIDDLE - (OP_SPAN/2) * FACTOR;
12    '^/RANGE.EU100' := HI_SCALE;
13    '^/RANGE.EU0' := LO_SCALE;
14    '^/RANGE.UNITS' := '^/SCALE.UNITS';
15 ELSE
16    '^/RANGE.EU100' := '^/SCALE.EU100';
17    '^/RANGE.EU0' := '^/SCALE.EU0';
18    '^/RANGE.UNITS' := '^/SCALE.UNITS';
19 END_IF
    
```

GEM Resizing

- Since resizing GEMs is difficult in DeltaV LIVE, I created some GEMs that have custom height and width properties.



Graphics Configuration

BTN_Analog_Bar_Horiz_L11 LINKED GEM ?

Basics Variables

Information

Title

Description

Linked to [BTN.BTN Analog Bar Horiz L2](#)

Version 2.0.0

Basic Configuration

Module Name *LI_101*

Friendly Name LI101

Function Block Selection AI

Function Block Number 1

Scale Default Scale

Show Tag False

Extended Configuration

Bargraph Wide

BarThickness **Thick**

Show Value

Alarm Limits

Show Background

Show Alarm Box Show Alarm

Show Tick Marks True

Operating Range Enable False

New Displays: Template, Tutorial, Toolbar

*"Innovation is 1% inspiration, 98% perspiration,
and 1% explaining why the budget went over."*

- Thomas Edison

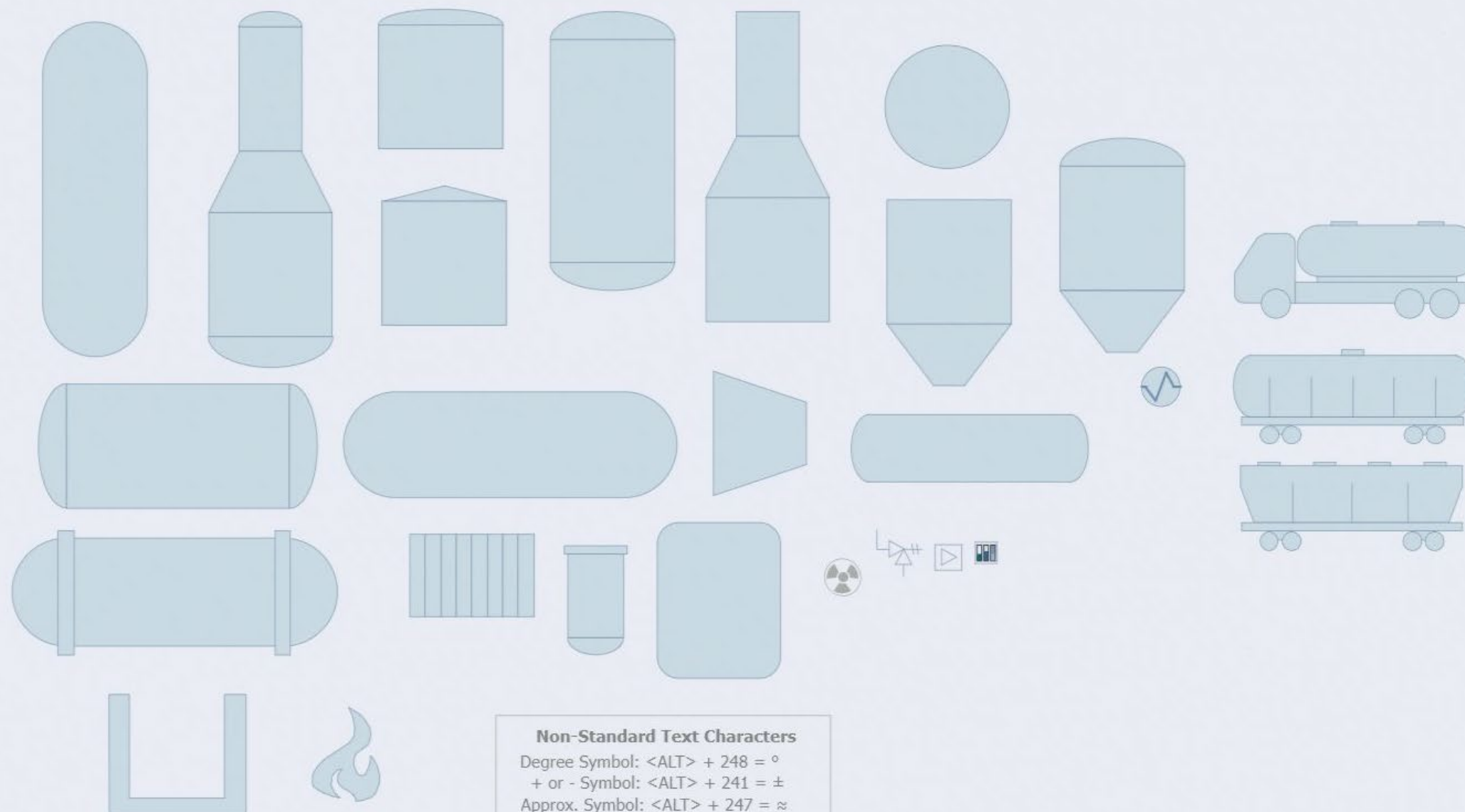
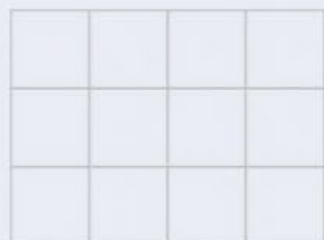
Static Object Display

BTNXXXX A000 AB00

Static Objects



TEXT ON BACKGROUND
TEXT ON BACKGROUND



Non-Standard Text Characters

- Degree Symbol: <ALT> + 248 = °
- + or - Symbol: <ALT> + 241 = ±
- Approx. Symbol: <ALT> + 247 = ≈
- Other Symbols: ≠ ≤ ≥ Δ θ τ μ Σ ζ

Tutorial Displays

DeltaV LIVE Tutorial - Home

DeltaV LIVE Tutorial

An online tutorial and explanation of DeltaV LIVE features and controls.



Toolbar Overview

Overview of Toolbar Icons and what they do

Zoom and Customization

How to zoom in and out, reset zoom settings, and customize user interface

Hierarchy & Navigation

HPG Display Hierarchy (Level 1 - Level 4) and Navigation toolbars

Faceplates

Basic controls and indications for AI and PID faceplates

Colors & Animations

A brief overview of analog bars (including alarm and limit thresholds), motor and valve states, spark lines, and multi-point plots.

Status Icons and Alarms

Description of status icons and alarm priorities



Tutorial Displays - Toolbars

DeltaV LIVE Tutorial - Toolbars

The image shows a screenshot of the DeltaV LIVE interface with two toolbars: the DeltaV LIVE Toolbar and the PCSD Toolbar. The DeltaV LIVE Toolbar is at the top and contains icons for Search, Errors, Refresh Configuration, Suppressed Alarms, Alarm List, Alarm Area Filtering, Process History View, Display Tag Settings, Background Programs, DeltaV Utilities, and Launch DeltaV Login. The PCSD Toolbar is below it and contains icons for Watch Area, Bypassed List, Ignored PV List, Simulate List, SIS Bypassed List, Interlock List, Modelock Override List, Prompt List, Module History, Spark Line Controls, and Books Online. The interface also displays the current date and time (21-May-24 4:30 PM) and the user's login information (BTNSIM.DELTAV.COV.LOCAL\EMERSON).

DeltaV LIVE Toolbar:

- Refresh Configuration:** When highlighted with an asterisk (*), this means a graphic change is pending. Click this to refresh graphics. Takes about 10 seconds.
- Suppressed Alarms:** Link to the Suppressed Alarms page (if any)
- Alarm List:** Link to the Alarm List page
- Alarm Area Filtering:** Link to the Alarm Area Filtering Page. This page allows the user to filter alarms by area.
- Process History View:** Launch the DeltaV Process History View, which is the DeltaV Historian. Also displays alarms and events.
- Display Tag Settings:** Changes display tag settings and number font size
- Background Programs:** Displays the icons of background programs and minimized faceplates and windows. Allows for click access to bring the window back to the front.
- DeltaV Utilities:** Opens DeltaV Engineering tools
- Launch DeltaV Login:** Displays the current user logged in. Click to open the login window that allows a user to log in or out.
- Exit DeltaV Live:** Exits DeltaV Live.
- Current Date/Time:** Displays the current date and time.
- Home:** Home button with Prev and Next navigation.

PCSD Toolbar:

- Watch Area:** Opens the Watch Area, a space that displays current value, a brief trends, alarm info, and faceplate controls of selected modules. User drags a selected values from the operator screen onto the space to display it.
- Bypassed List:** Opens a report of Process bypass Alarms
- Ignored PV List:** Opens a report of Ignore PV Alarms
- Simulate List:** Opens a report of Simulate Alarms
- SIS Bypassed List:** Opens a report of SIS bypass Alarms
- Interlock List:** Opens a report of Interlock Alarms
- Modelock Override List:** Opens a report of Modelock Override Alarms
- Prompt List:** Opens a report of active Operator Prompts
- Module History:** Opens a popup displaying the last 10 faceplates that were opened, allowing the user easy access to open these faceplates again.
- Spark Line Controls:** Controls all "Spark Line" trend time scales on this machine. Buttons are hard-coded to 1 hour up to 24 hour spans.
- Books Online:** Opens the DeltaV Documentation Help File

Tutorial Displays – Navigation & Hierarchy

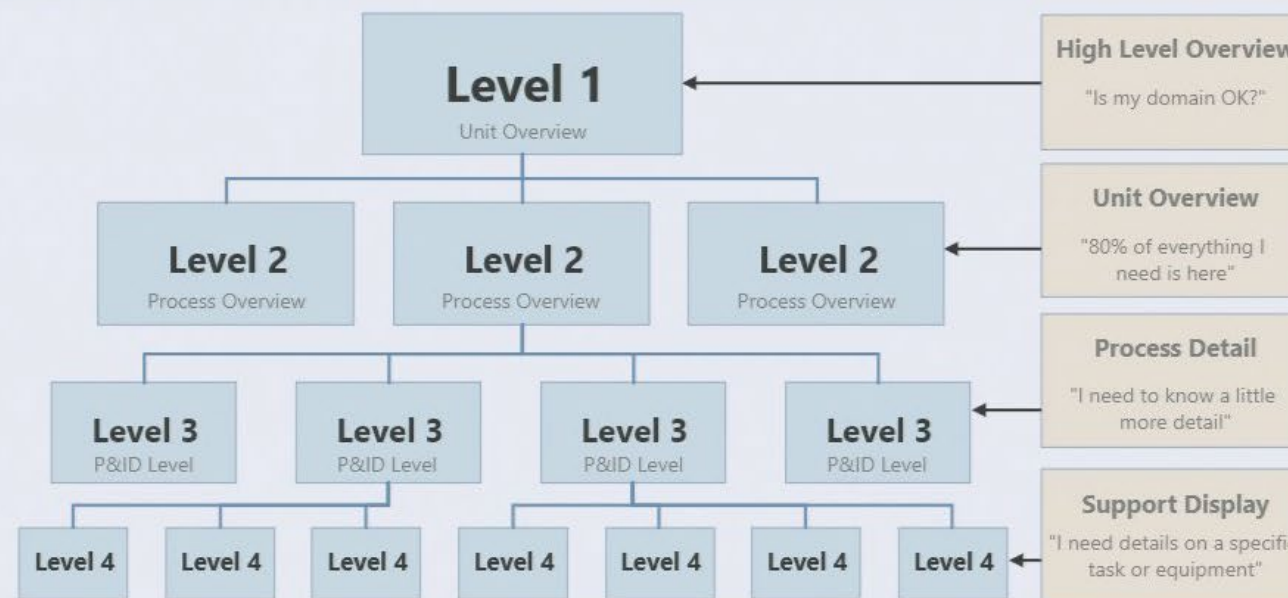
DeltaV LIVE Tutorial - Navigation & Hierarchy

Display Hierarchy

Per ISA-101, a display hierarchy is recommended to provide the operator with a structured view of their entire scope of responsibility while providing the ability to drill down to greater levels of detail and control functionality.

Information content will convey increasing levels of detail and focus.

A maximum of four levels is recommended, with level 1 having the broadcast scope and level 4 having the most focused scope.



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Prev Next

Navigation

DeltaV LIVE includes a navigation toolbar across the top of the operating screen. The Level 2 screens are placed in tabs across this bar with dropdowns that link to the level 3 and 4 graphics that reside below the level 2.

This allows the operator to access any screen in just a few clicks of the mouse.

Navigation Buttons:

- Back Button:** Navigates to the previous display. Long click or right click to pull up a page history.
- Forward Button:** Appears after clicking the back button.
- Up Button:** Navigates to the current display's parent display.
- Home Button:** Navigates to the configured home screen for this display.

Level 2 Display Links: BRINE TREATMENT, CELL ROOM, COOLING / DRYING, CL2 COMPRESS & LIQ, CL2 DISTRIBUTION, UTILITIES, REGEN EFFLUENT.

Alarm Roll-up Indicator: Displays the total number of alarms for modules configured* for this Level 2 display and all children L3 and L4 displays. The color is the priority of the highest active alarm.

Display Relocation Control: Provides options to copy the current display to another screen, swap the current display with that of another screen, or open a new window as a copy of the current display.

*Note: Modules may be configured for a given display and may or may not be actually on the display.

Tutorial Displays – Colors & Animations

DeltaV LIVE Tutorial - Colors & Animations

Analog Bar Overview (Interactive Demo)

Scale High →

← HIIHI Alarm
← HIIH Alarm
← HI Alarm

← OP_HI Alarm

← Process Variable (PV)
← Setpoint (SP)

← OP_LO Alarm

← LO Alarm
← LOLO Alarm
← LOLOLO Alarm

Scale Low →

Operator Range Violation Indicator →

Horizontal Bar

Show Limits

- HIIHI Alarm
- HIIH Alarm
- HI Alarm
- OP_HI Alarm
- Operating Range
- OP_LO Alarm
- LO Alarm
- LOLO Alarm
- LOLOLO Alarm

Motor/Valve States

Process Variable (PV)

	Stop	Ready / Enabled	Run
Setpoint (SP) Stop			
Setpoint (SP) Ready / Enabled			
Setpoint (SP) Run			

Process Variable (PV)

	Close	Open	Undefined
Setpoint (SP) Close			
Setpoint (SP) Open			

	Close (0%)	Open (25%)	Open (75%)	Open (100%)

Spark Lines

A simple single-point trend. Typically used for levels

Storage Tank

Note: A global control is added in the right-hand side of the PCSD toolbar which allows the operator to adjust the time scale for ALL spark lines on this machine.

Spark Line Trend controls from the toolbar

Spark Line Controls: 1-Hr 2-Hr 4-Hr 8-Hr 12-Hr 24-Hr

[Home](#)

[Prev](#) [Next](#)

Multi-Point Plots

Used to graphically display and compare multiple values

Line comparing all PVs

Low Range → High Range

High Alarm Active →

Operating Range Violation (not in alarm) →

LO Alarm Operating Range HI Alarm

Note: Multipoint Plots can be either scaled as the raw low to high range or can be dynamically ranged to normalize the operating range. The point of these tools is not to give an absolute value, but to give the operator relative values as compared to each other and the operating range.

Clicking on the line will open the faceplate for more information about the indicator

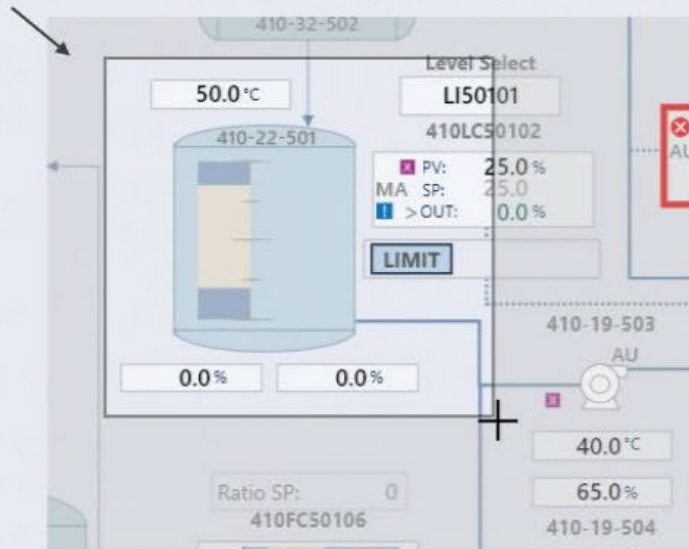
Tutorial Displays – Zoom and Global Variables

DeltaV LIVE Tutorial - Zoom and Configurable Parameters

Zoom and Resizing

As a feature of DeltaV LIVE, the user is able to zoom into displays and resize windows (i.e. faceplates and new displays)

- Zoom in: CTRL + mouse wheel up
- Zoom out: CTRL + mouse wheel down
- Zoom box: CTRL + draw a box with the mouse



- Resize a popup display: click on the edge or corner and drag the mouse
- Reset zoom: CTRL + double-click (also sets resized displays to default)

****IMPORTANT****

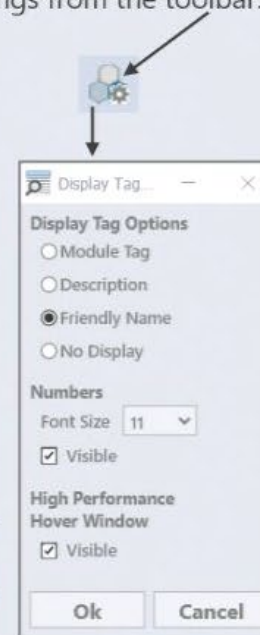
DeltaV LIVE remembers the zoom settings for displays and faceplates until reset. So the next time the display is opened, it will appear with the custom zoom settings intact.

Use CTRL + double-click to reset zoom settings

Display Tag Settings

To change the object description text or number font size, open the Display Tag Settings from the toolbar.

By default, the description is set to Friendly Name, but Module Tag is a viable option. Description or No Display are not recommended, but can be used. This affects all tags on this workstation.



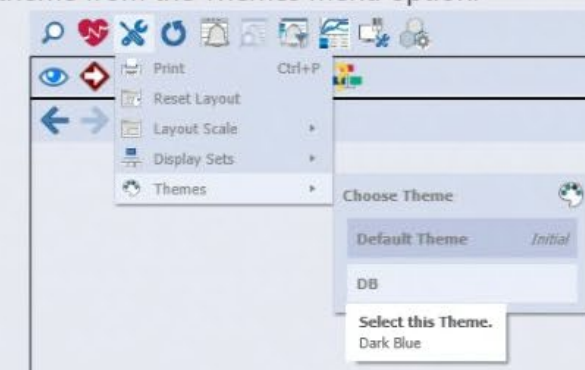
From this menu, the user can also adjust the font size of select text fields. This mostly affects PV, SP and, OUT numbers, along with text objects including selectors.



Note that at some font sizes, the text or number is too large to fit in the allotted space.

Color Theme

DeltaV LIVE comes with 2 supported color themes: A light blue/grey theme (default) and a dark blue (DB). These themes can be changed on a workstation-basis by a logged-in operator account. To change the theme, click the Tools icon and select the desired theme from the Themes menu option.



If the Themes menu option is not present, make sure the user is logged in as an operator, supervisor, or engineer account.

Display Sets

Certain workstations in some units allow for changing of display sets.

A display set is a group of displays that are accessible from the navigation toolbar. The selected display set governs what displays are shown in the tabs of the navigation toolbar.

To change the display set (if multiple sets exist), click the Tools icon and select the desired display set from the Display Sets menu option (similar to changing the theme in the section above).

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Tutorial Displays - Faceplates

DeltaV LIVE Tutorial - Faceplates

The image displays two main faceplates: 'Analog Input' and 'PID'. The 'Analog Input' faceplate shows a value of 64.6% with a scale from 0.0 to 100.0. The 'PID' faceplate shows a value of 45.3% with a scale from 0.0 to 100.0. A third, smaller 'PID' faceplate is shown to the right, displaying PV 68.1%, SP 69.3%, and OUT 44.6%.

Annotations for Analog Input:

- Module Tag: LI1
- Description: Sim Level
- Current Process Variable (PV): 64.6
- High EU Range: 100.0
- Low EU Range: 0.0
- Analog Bar: The vertical scale bar
- HIHI Alm Limit, HI Alm Limit, LO Alm Limit, LOLO Alm Limit: Alarm limits
- PV: Process Variable
- Owned by: Unit: (with trend graph)
- Ack Alarm, Help: Alarm controls
- Alarms/Limits, Diagnostics, I/O, Tuning, Variables: Bottom menu
- Link to Primary Control Screen, Open Logic in Control Studio: Navigation buttons
- Process History View, Acknowledge Alarms, Detail Display (pulls up a menu where the appropriate detail display can be selected): Detail view options

Annotations for PID:

- Module Tag: V400-DS10-L5011
- Description: 410LC50101 ML COLUMN LEVEL
- Current Process Variable (PV): 45.3
- SP Controls*: Setpoint controls (45.2)
- OUT Controls*: Output controls (77.4)
- Simple 20 minute trend: Trend graph for SP
- Alarm Box: Alarm indicator
- Interlock Detail: Interlock status
- Minimize to toolbar: Window control
- Open Mini Faceplate, Open Full Faceplate: Navigation buttons
- Simulate Active: Simulation status
- Current Mode: AUTO
- Mode Buttons (AUTO is Selected): Mode selection (ROUT, RCAS, CAS, AUTO, MAN)
- Modelock Override: Modelock status

Changing Values

There are 3 ways to change a controlled value on a PID faceplate, depending on the mode

- If Mode = AUTO, SP can be changed.
- If Mode = MAN, OUT can be changed.

- 1- Click the value text and type in the desired value in the popup window
- 2- Drag the flag to the desired location on the bar and release
- 3- Click the up/down slew button (details below)

PID Slew Buttons

SP Controls only in AUTO

OUT Controls only in MAN

45.2

*Note: Depending on the current mode, 3 up and 3 down arrows will appear next to the SP and OUT values. Clicking these arrows will raise/lower the SP/OUT by 0.1%, 1% and 10% of the full range. (Smaller arrows make smaller changes)










Tutorial Displays - Icons

DeltaV LIVE Tutorial - Icons

Status Icons

DeltaV LIVE uses status a set of standardized status icons to indicate specific conditions. These icons may appear in operating graphics or faceplates.






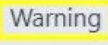



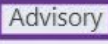




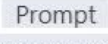

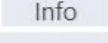
(Icons enlarged to show detail)

-  Abnormal Mode Indication. This icon indicates that the module mode is not in the configured "normal" mode. This is not necessarily a bad state.
-  Bad I/O Mode Indication. This icon indicates that the module has a bad input or output status. It can mean a failed transmitter, loss of power to a device, or any number of things.
-  Module Not Running indication. This icon indicates that the module is not currently running, so all logic associated with it is disabled.
-  Simulate Active indication. This icon indicates that an input to this module is ignoring an input value and is indicating a simulated value instead.
-  Interlock Indication. This icon indicates that there is an active interlock in this module. An interlock condition automatically sets the module output to a known state, typically its fail position.
-  Track Input Indication. This icon indicates that the module output is currently tracking to a set value. Track Input is equivalent to Interlock, but for analog modules (PID & control valves).
-  No Permissive to Run Indication. This icon indicates that there is an active condition that is preventing this module from transitioning to an active (i.e. open, run, etc.) state.
-  Bypass Indication. This icon indicates that there is an active bypass in this module. The bypass can be either on an interlock, a force, or a permissive.
-  Operating Range Violation. This icon indicates to the operator when the PV has strayed outside the operating range (when configured) but has not hit an alarm threshold.

Alarm Icons and Border Color

Standard DeltaV Alarm icons have been tri-coded with different colors, shapes, and letters to easily distinguish between the alarm priorities.

(Icons enlarged to show detail)

Alarm Priority	Active Unacknowledged	Active Acknowledged	Inactive Unacknowledged	Active Suppressed
 Critical				
 Warning				
 Advisory				
 Alert <small>(Unused in some systems)</small>	No icon for these priorities			
 Prompt <small>(Unused in some systems)</small>				
 Info				

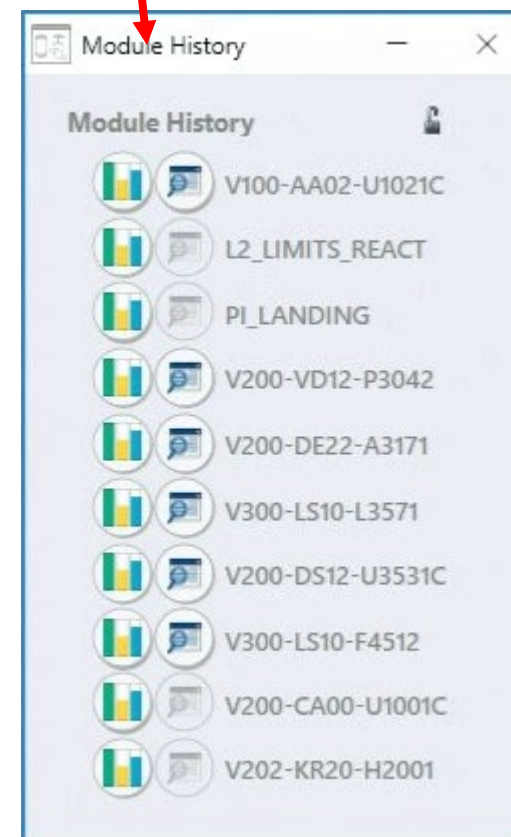
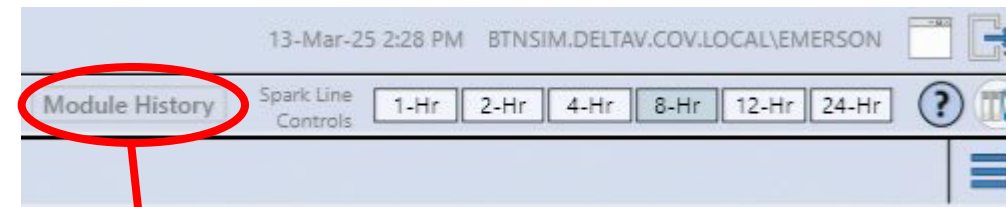
Some units use other priorities and colors for other types of alarms (i.e. operator alarms, simulate, bypass, SIS, etc.) but these are the levels and colors that are specifically outlined in the Covestro DeltaV Alarm Concept Standard (G-E-IN-2102). Other types of alarms will not be covered here.

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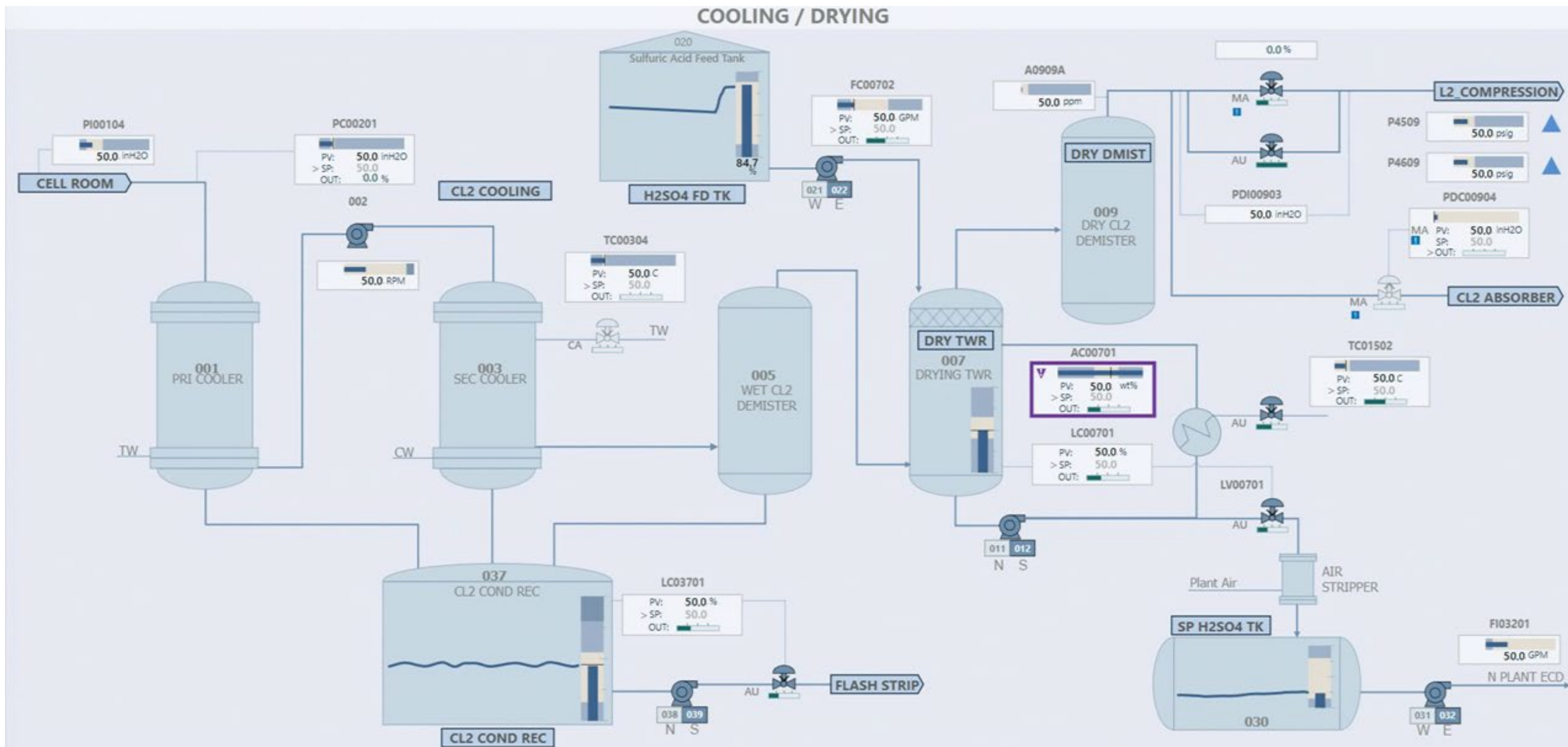
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Module History Button on Toolbar

- Like DeltaV Operate, DeltaV Live has a Module History contextual Display
- Very simple process to add a button to our “PCSD” toolbar that opens this contextual display



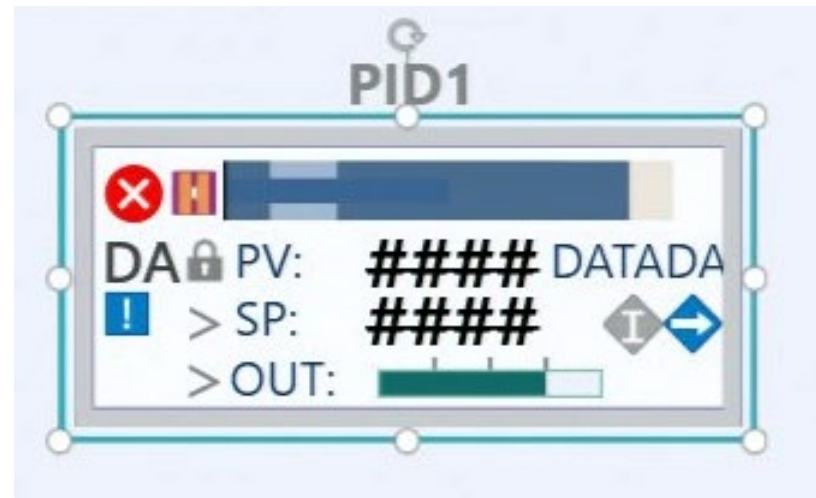
Example Display



New GEMs

*"If you think good design is expensive,
you should look at the cost of bad design."
- Ralf Speth*

The PID GEM



Improved on the existing PID GEM. Added configurable options to show various combinations of PV Bar, PV, SP, and OUT.

GEM background resizes accordingly.

Basics Variables

Basic Configuration

Module Name: *PID1*

Friendly Name: PID1

Function Block Selection: PID

Function Block Number: 1

Scale: Default Scale

Show Tag: True

Extended Configuration

Included Components: PVBar+PV+SP+OUT

Output: PVBar+PV+SP+OUT

Select Splitter Output: PVBar+PV+SP

Alarm Limits: PVBar+PV+OUT

ShowSPWrk: PV+SP+OUT

Show Tracking Info: PV+SP

Minimal Indications: PV+OUT

Show Background: PVBar+PV

Mode Indication: PV Only

Abnormal Mode Type: PVBar Only

Actual<>Normal: Actual<>Normal

Show Lock Info: True

Show Interlock Info: True

Show Hover Faceplate: False



DI Icon GEM

- Some situations warrant creation of GEMs with different options instead of many different GEMs.
- Example: Previously shown analog bar with different widths
- Shown on the right: DI GEM with 11 different icons to choose from, each with different orientations.
 - Also allows for different function blocks and color schemes
 - 42 different icon + orientation combinations
 - 6 different color schemes

The screenshot displays the 'Graphics Configuration' window for a 'BTN_Discrete_Icon2' GEM. The configuration is as follows:

- Information:** Title, Description, Linked to (BTN.BTN Discrete Icon), Version (2024-10-29).
- Basic Configuration:** Module Name (DI_SOFT), Friendly Name (Valve 1), Function Block (DI1), DI Icon Shape (Valve), Valve Type (Discrete), Invert (False), Show Text in inactive state (True).
- Analog Handling:** (Empty section).
- Geometry Configuration:** Orientation (Up).
- Extended Configuration:** Show Tag (True), Show Alarm/Status Box (Show), Fail Position Indicator (None), DI Color Scheme (Normal), GEM Visibility (Always Visible).

A red arrow highlights the 'Valve' option in the 'DI Icon Shape' dropdown, which is linked to the 'DI1' dropdown menu. The 'DI1' menu lists the following options: DI1, DO1, DC1, EDC1, AI1, AO1, PARAM, and Calculation. The 'Valve' option is currently selected in the 'DI Icon Shape' dropdown.

DI Icon GEM Shape Selection

BTNXXXX A000 AB00

DI ICON DEMO

Sim AUTO
 Sim DI State

	Valve 1	Valve 2	Valve 3	HI Level	LO Level	Shower	Light	Pump	Motor	Pump	Motor	Fan	Fan	Fan	Circle	Square	Diamond	Hexagon	Triangle
Orientation 2																			
Orientation 3																			
Orientation 4																			
Invert																			
No Alarm Box or Icons																			
Hide Inactive State																			
Info Color Scheme																			
Advisory Color Scheme																			
Warning Color Scheme																			
Critical Color Scheme																			
OpViolation Color Scheme																			
Hide Text																			
Invert Hide Text																			

New and Improved Faceplates

"If it ain't broke, engineer it until it is"
- Anonymous

Split Range Detail Faceplate

TRN_FIC2
Oven Gas Flow Control

I/O

Simulate	Field Value	EU0 - EU100	Sim Enable	Sim Value	Units
AI					
AI1	0.0	0.0 - 100.0	<input type="checkbox"/>	51.0	%
PID					
PID1	0.0	0.0 - 100.0	<input type="checkbox"/>	51.0	CFM

Split Range

OUT1	X	Y	OUT2	X	Y
	0	0		0	0
	50	100		100	100

PID/OUT= 51.0
OUT1= 100.0
OUT2= 51.0

TRN_FIC2
Oven Gas Flow Control

51.0 CFM
100.0
0.0

REQ. MODE RCAS
E-STOP
TROUBLE
E-Stop
RUN

FIC2
PV: 51.0 CFM
> SP: 51.0
OUT:

CA AIR

FF_ENABLE_REF [0] → **FF_ENABLE** #8 (False)

BKCAL_IN_1_REF [100] → **BKCAL_IN_1** #9 (100)

TRN_FY1/BKCAL_OUT → **BKCAL_IN_1** #9 (100)

BKCAL_IN_2_REF [51] → **BKCAL_IN_2** #9 (51)

TRN_FY2/BKCAL_OUT → **BKCAL_IN_2** #9 (51)

SPLTR
SPLTR1

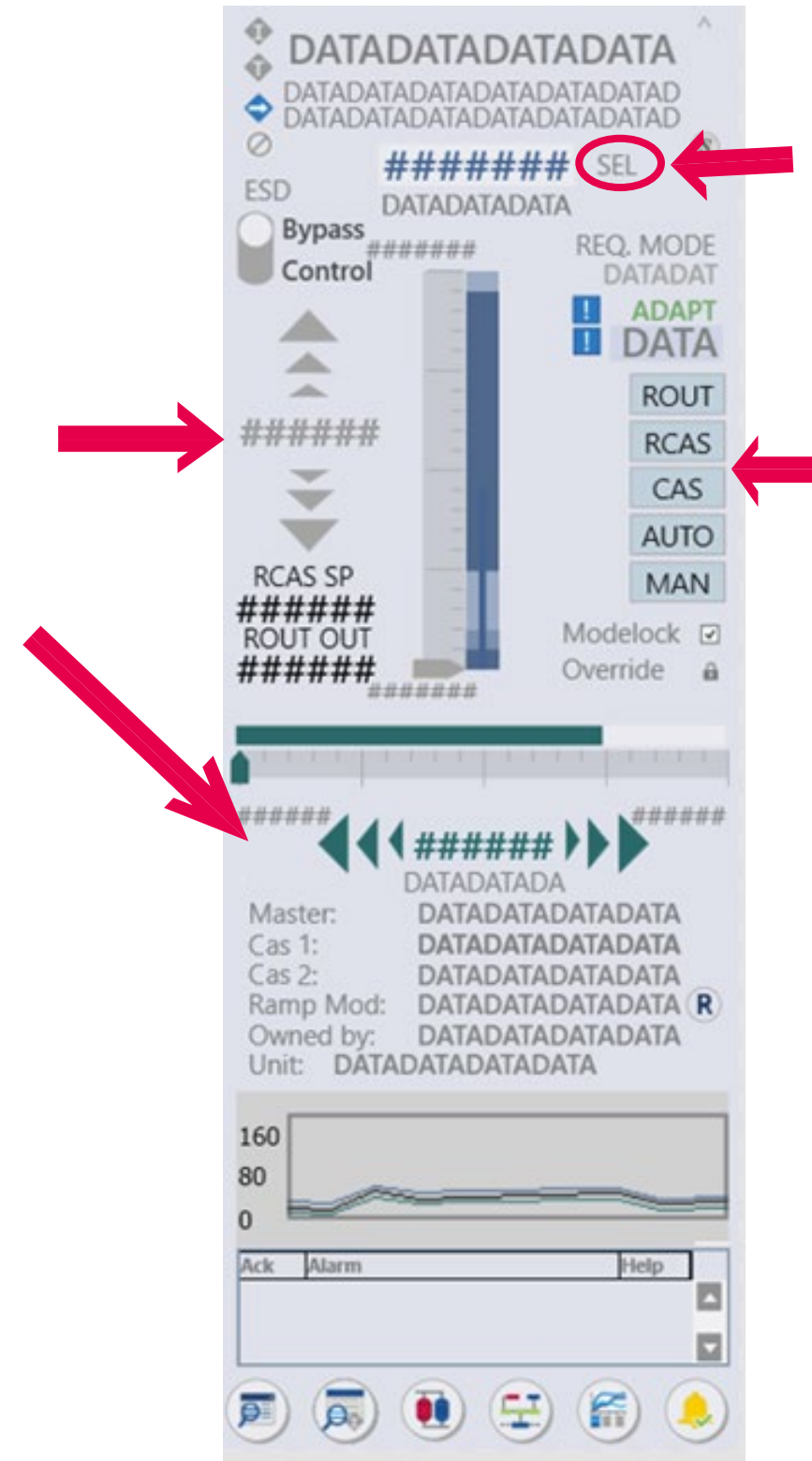
CAS_IN OUT_1 [100] → **OUT1**

BKCAL_IN_1 OUT_2 [51] → **OUT2**

BKCAL_IN_2 BKCAL_OUT [51]

Faceplate Customizations

- Added 6 “slew” buttons for SP and OUT
 - Small = 0.1% of scale
 - Medium = 1% of scale
 - Large = 10% of scale
- Added Mode buttons
- Added Input Selector (ISEL block) functionality.
 - (See next slide)



ISEL Contextual Display

The image displays a control system interface for a mixer, illustrating the ISEL (Input Selector) contextual display. The interface is divided into several key sections:

- MIXING Process Diagram:** Shows three input bins: FLOUR A (69.1%), FLOUR B (80.0%), and SUGAR (69.1%). These feed into a central mixer tank equipped with an agitator and a control valve (FV1). A Level Selector is positioned below the tank, showing Level A at 50.0% and Level B at 47.6%. The current process variable (PV) is 50.0%.
- TRN_LIC1 Mixer Level Control Window:** Displays the current setpoint (50.0%) and a manual selector (AUTO). It includes a vertical scale from 0.0 to 100.0% and a horizontal bar chart showing the current level at 39.9%.
- TRN_LIC1/ISEL1 Input Selector Window:** Shows the selected input level: LEVEL A (50.0) and LEVEL B (47.6).
- ISEL1 Configuration Panel:** A detailed view of the ISEL1 configuration, showing the mapping of input signals to the mixer's control logic.

Input	Value	Destination
AI1_IN (TRN_LI101/AI1/OUT)	50	ISEL1 IN_1
AI2_IN (TRN_LI102/AI1/OUT)	47.6373	ISEL1 IN_2
AI3_IN (TRN_LIC1/DUMMY)	50	ISEL1 IN_3
AI4_IN (TRN_LIC1/DUMMY)	47.6373	ISEL1 IN_4

Questions?

*"He who asks a question is a fool for five minutes;
he who does not ask a question remains a fool forever."
– Ancient Chinese Proverb*



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ACCELERATING
INNOVATION

Thank You