High Performance Graphics

Quick video tutorial (no audio)

Overview

High Performance is a design approach that turns traditional displays into intuitive information with actionable intelligence. It displays information in a simple color style to help make it easier to understand the project status.

The High Performance approach achieves this by following several fundamental characteristics, which are listed below.

- Human Centric Design
- Careful Color Selection
- Layered Graphical Hierarchy

Human Centric Design

The main objective of this design is to increase the effectiveness of data handling and data analysis.

Humans can only handle so much information at a time. According to the *ISA SP 18.2 Standard,* project operators should only face about 10 alarms per hour in order to accurately respond to each alarm. However, the alarm rate is usually higher in the real world.

Human Centric Design allows users to create smart designs with color configurations that help the operator's eyes easily focus on the situations that require the most attention.

Detailed below are several proven operator performance results from the *High Performance HMI Handbook*

	Traditional HMI	**High Performance HMI**	**Results**
Detecting abnormal situations before alarms occur	1 in 10 occurrences	5 in 10 occurrences	5x improvement
Success rate handling abnormal situations	70%	96%	37% improvement
Time to complete abnormal situation tasks	18.1 minutes	10.6 minutes	41% improvement

Careful Color Selection

Even though the HMI application is a visual/graphic interface, you should not choose colors or shapes simply to have a stylish display. The focus should be on facilitating project comprehension.

Below is a set of color conventions that is recommended for HMI projects.

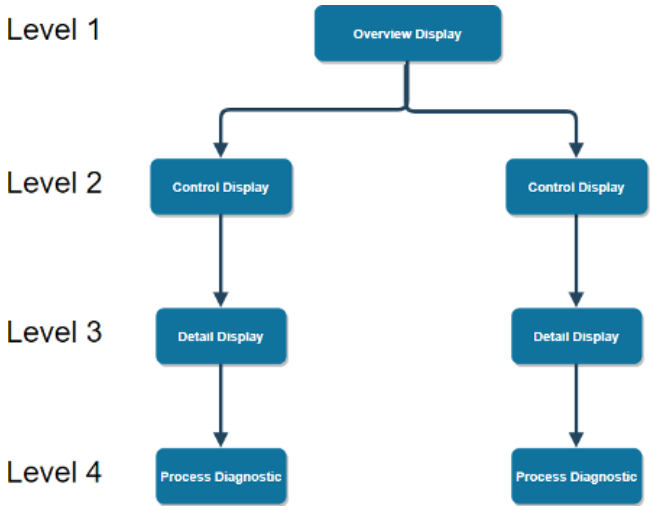
- **Alarms**: Use bright, intense colors that are not used in any other part of the display.
- **Background**: Use non-saturated colors (e.g.: Light Gray) that have minimum interference with other colors.
- **Static Equipment**: Use Dark Gray or Black for process lines.
- **Equipment State**: The equipment state's color selection must depend on additional appearance features, such as Fill, Shape, or Text.
- **Live Data**: Use less intense, cool colors (e.g. dark blue and dark green). These colors should be easily distinguished from static information so they do not distract the operator

The table below illustrates the recommended color palette for a High Performance HMI Project.

Display Color Use	Theme Color Name		RGB	HEX
Mouse Over Or Selected	ObjectMouseIsOverOrSelectedFill		(79,111,147)	#4F6F93
Mouse Over Or Selected	ObjectMouseIsOverOrSelectedStroke		(47,70,106)	#2E466A
Mouse Not Over	ObjectMouseIsNotOverFill		(62,87,117)	#3E5775
Mouse Not Over	ObjectMouseIsNotOverStroke		(46,70,106)	#2E466A
Static/Text Color Use	Theme Color Name		RGB	HEX
Foreground	TextForeground			#000000
Foreground	DashboardTitleForeground		(228,233,239)	#E4E9EF
Background	DisplayBackground		(255,255,255)	#FFFFFF
Background	HeaderBackground		(48,86,128)	#305680
Background	DashboardItemBackground		(245,245,245)	#00F5F5F5
Background	DashboardTitleBackground		(79,111,179)	#4F6F93
Border	DashboardItemBorder		(62,87,117)	#263E5775
Notification Color Use	Theme Color Name		RGB	HEX
Low Priority Alarm	Not from theme configuration		(255,140,0)	#FF8C00
Medium Priority Alarm	Not from theme configuration		(245,255,0)	#F5E100
High Priority Alarm	Not from theme configuration		(255,0,0)	#FF0000
Element State Color	Theme Color Name		RGB	HEX
Off/De-energized/Idle/Stopped/Closed	HPOffFill		(158,158,158)	#9E9E9E
Off/De-energized/Idle/Stopped/Closed	HPOffStroke		(145,145,145)	#919191
On/Energized/Running/Open	HPOnFill		(252,252,252)	#FCFCFC
On/Energized/Running/Open	HPOnStroke		(238,238,238)	#EEEEEE
Disabled/Out of Service	HPDisableFill		(210,210,210)	#D2D2D2
Disabled/Out of Service	HPDisableStroke		(197,197,197)	#C5C5C5
Navigation Button	Theme Color Name		RGB	HEX
Fill	ObjectsHeaderFill		228,233,239	#E4E9EF

Layered Graphical Hierarchy

Layered Graphical Hierarchy refers to the way in which data is structured across displays throughout the project. The recommended organization method is a series of levels and sublevels in which each level is more detailed than the previous one.



- **Level 1**: High-Level information such as an indication of performance or events that require immediate attention.
- **Level 2**: The display used by operators to perform their tasks.
- **Level 3**: Displays the controls for individual equipment as well as the information and status of the equipment.
- **Level 4**: The most detailed display that provides information on individual components and equipment.

Symbol Library

Symbols are graphical objects that contain a series of built-in dynamics. They can be added to a display as a representation of tags.

HPG are accessed through the **Draw Editor** under the Symbol Library button (located in the toolbar).

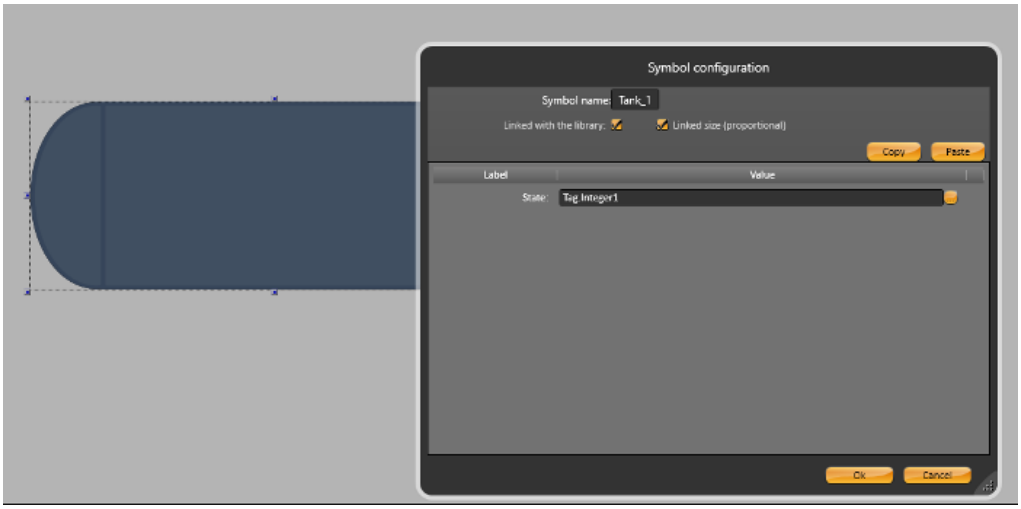
List of Symbols

Symbols are separated into 3 main categories (Default, HighPerformance and Standard). Each HighPerformance subcategory component is detailed below.

Alarms	**Crushers**	**Motors**
Blowers	**Cyclones**	**Pumps**
Compressors	**Furnaces**	**Tanks**
Conveyors	**Heating**	**Valves**
Cooling	**Mills**	

Mapping Symbols to Runtime Objects

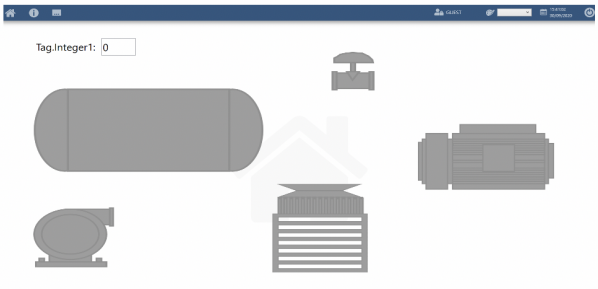
To map an added symbol to a runtime object, double-click on the symbol to display its supported properties.



Even though symbols have different runtime properties, they all can have similar appearances (such as color) according to the state they are in. In the example below, every symbol that is On, Open, Running, or Energized appears white to indicate that the item is in a "running" state. Since they are all in a similar state, they would each be mapped to the Value "1".

```
Value = 0 // Off/De-energized/Idle/Stopped/Closed
Value = 1 // On/Energized/Running/Open
Value = 2 // Disabled/Out of Service
```

The values listed above follow the color convention pattern for HMI displays, and the different colors a symbol can display are illustrated in the image below.



Symbol in 'Stopped' state.

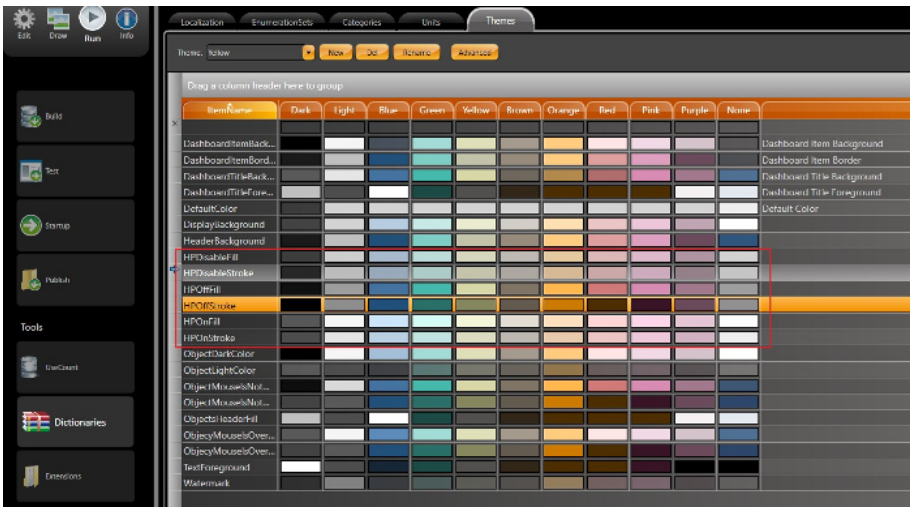
Symbol in 'Running' state.

Symbol in 'Out of Service' state.

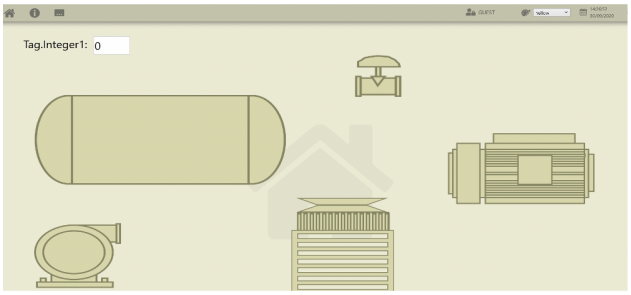
Symbol Themes and Colors

A symbol's appearance can be customized by changing the theme for the object. In *Run-Dictionaries-Themes,* you will find theme palettes that are predefined and are built into the NewProject Templates.

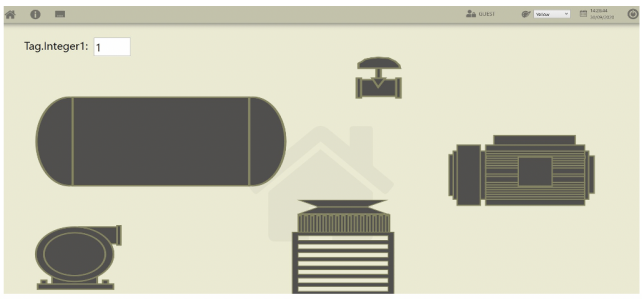
The *ItemName* property that is related to the HPG symbols are highlighted in the image below.



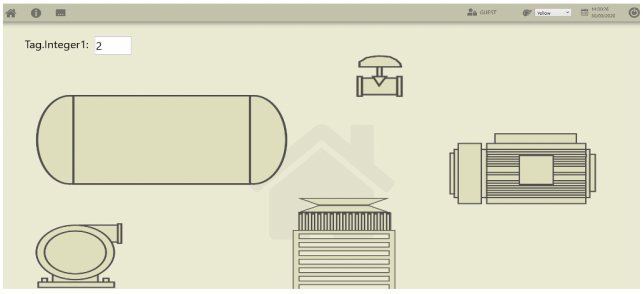
The user can use this page to easily create new themes or edit pre-existing ones. The following images show some examples using different themes.



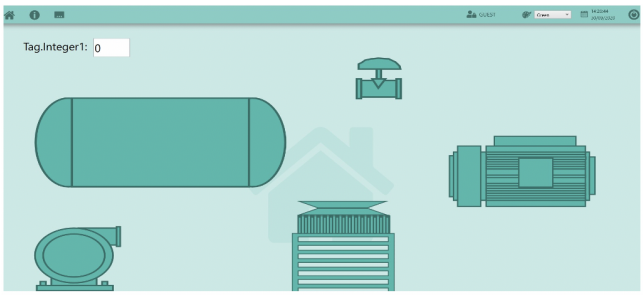
Yellow Theme and Symbol in 'Stopped' state.



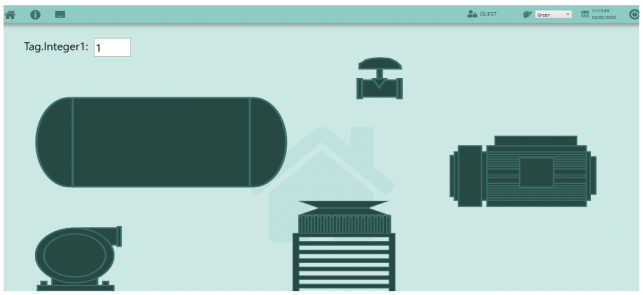
Yellow Theme and Symbol in 'Running' state.



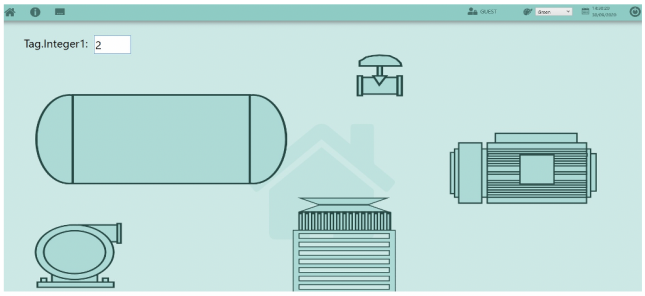
Yellow Theme and Symbol in 'Out of Service' state.



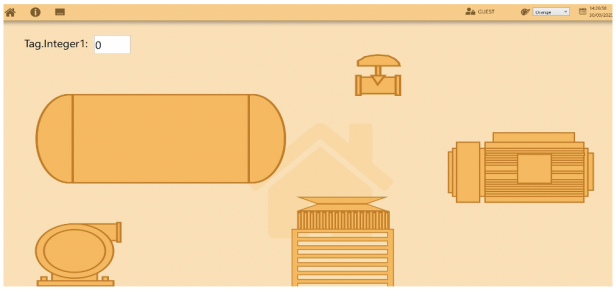
Green Theme and Symbol in 'Stopped' state.



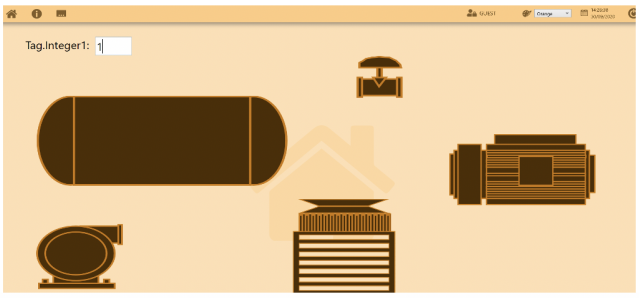
Green Theme and Symbol in 'Running' state.



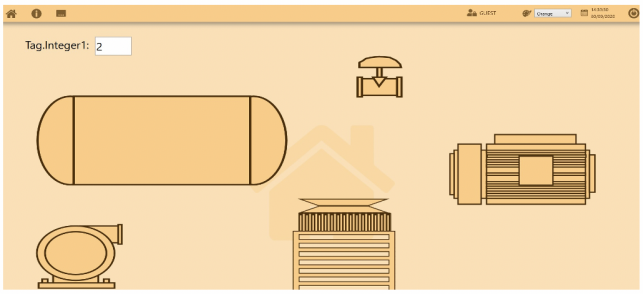
Green Theme and Symbol in 'Out of Service' state.



Orange Theme and Symbol in 'Stopped' state.



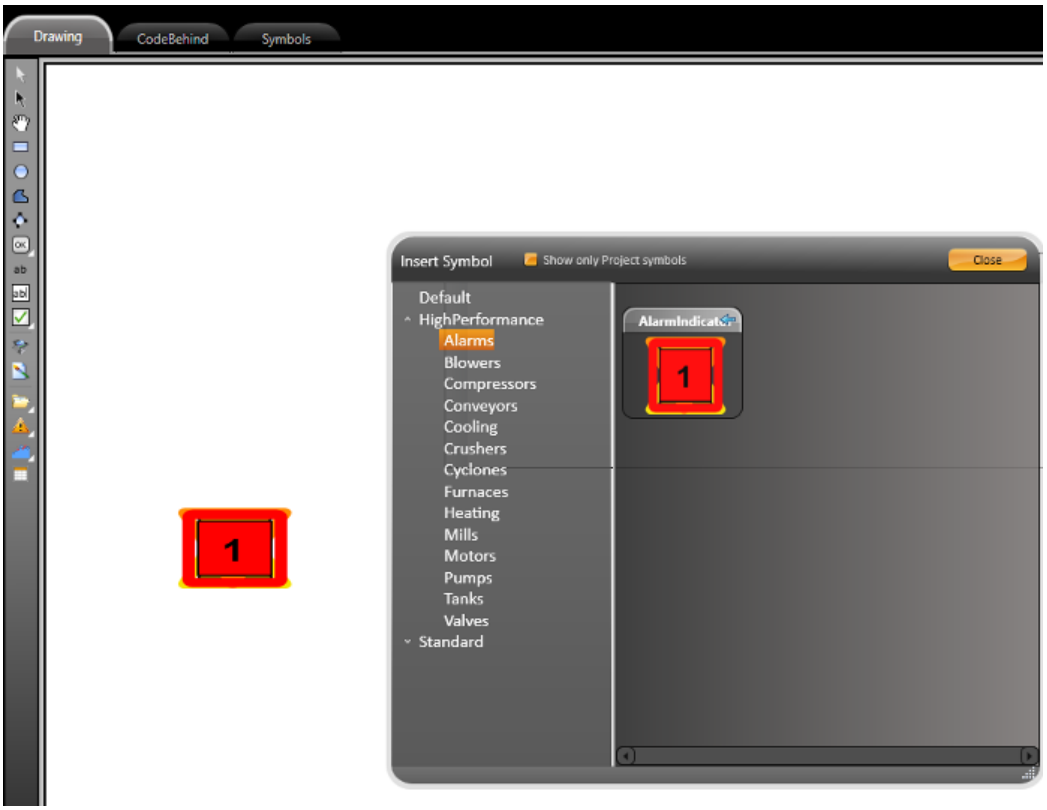
Orange Theme and Symbol in 'Running' state.



Orange Theme Symbol in 'Out of Service' state.

Alarm Indicator

This symbol acts as an indicator for the alarm state of a specific tag. It can display the alarm priority level (low, medium, or high), and it has 3 different possible color configurations depending on the status of the alarm state. See image below.



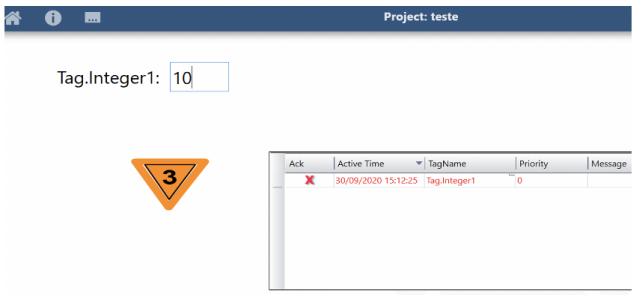
The *AlarmPriorityEnum* property is used for animating the Alarm Indicator symbol. The *Enum* property has the following settings:

```
Low Priority (Alarm Priority = 0 - value in the Alarm Items table)
1        - Acknowledged
2        - Normalized
3        - Active

Medium Priority (Alarm Priority = 1 - value in the Alarm Items table)
4        - Acknowledged 5- Normalized
6        - Active

High Priority (Alarm Priority = 2 - value in the Alarm Items table)
7        - Acknowledged
8        - Normalized
9        - Active
```

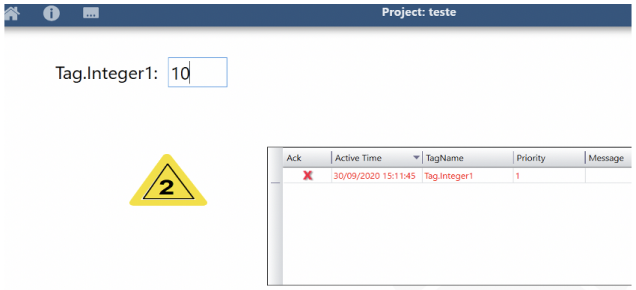
In Runtime, the Alarm Indicator can display the following behaviors:

```
Number in Symbol:
-        1: Priority High (2)
-        2: Priority Medium (1)
-        3: Priority Low (0)

Outer Border and inner element:
-        Border static and Element blinking: Alarm is active
-        Border static and Element static: Alarm is acked
-        No Border and Element blinking: Alarm is normalized
-        No Border and No Element: Alarm not active
```

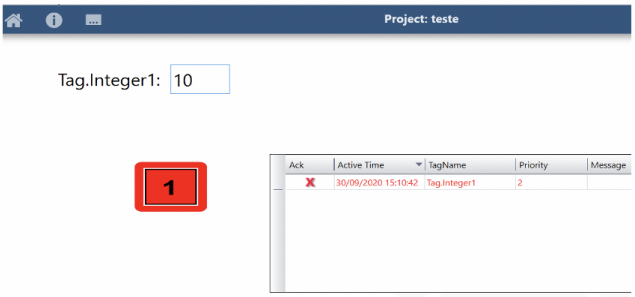
The following images demonstrate the display's appearance when an alarm is in an active state.



Low Priority Alarm is active



Medium Priority Alarm is active



High Priority Alarm is active