



Welcome to System 1

Version 19.2



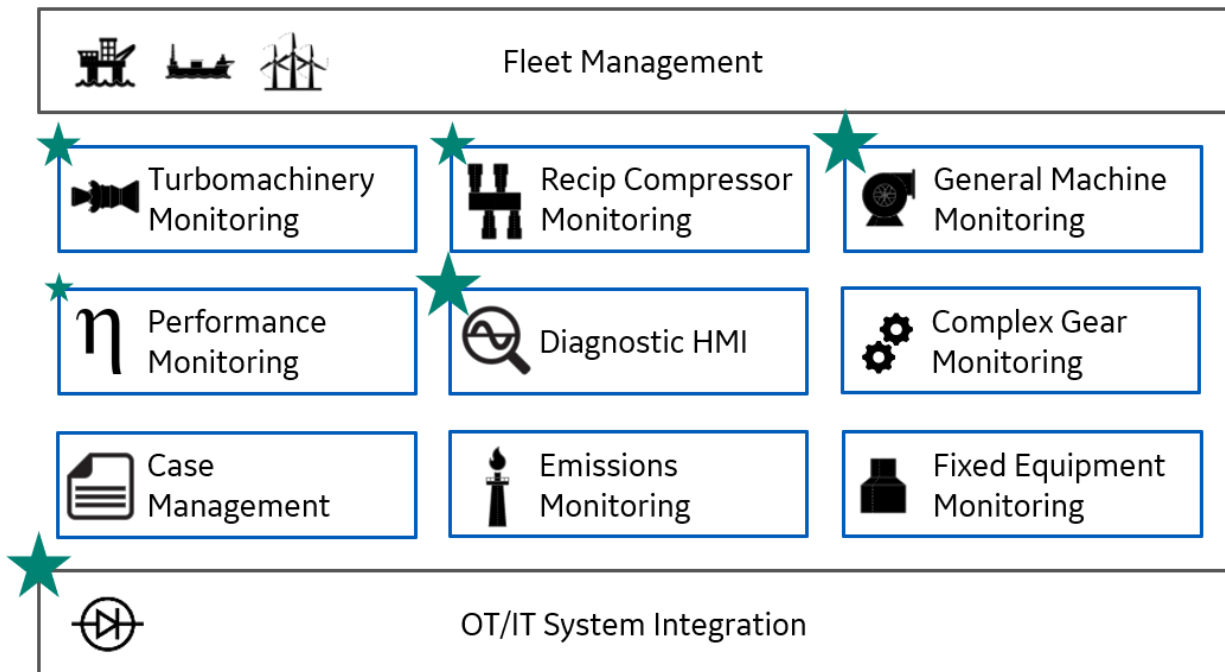
System 1
Machinery Management

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Welcome

Bently Nevada is pleased to present System 1 v19.2. This release delivers major new capabilities to the OT/IT System Integration, Diagnostic HMI, and General Machinery Monitoring use cases provided by System 1. In addition, several customer-requested diagnostic and productivity enhancements have been added to other key use cases as outlined below. For an overview of the System 1 platform please refer to the latest Orbit article ([Link](#)).



OT/IT System Integration



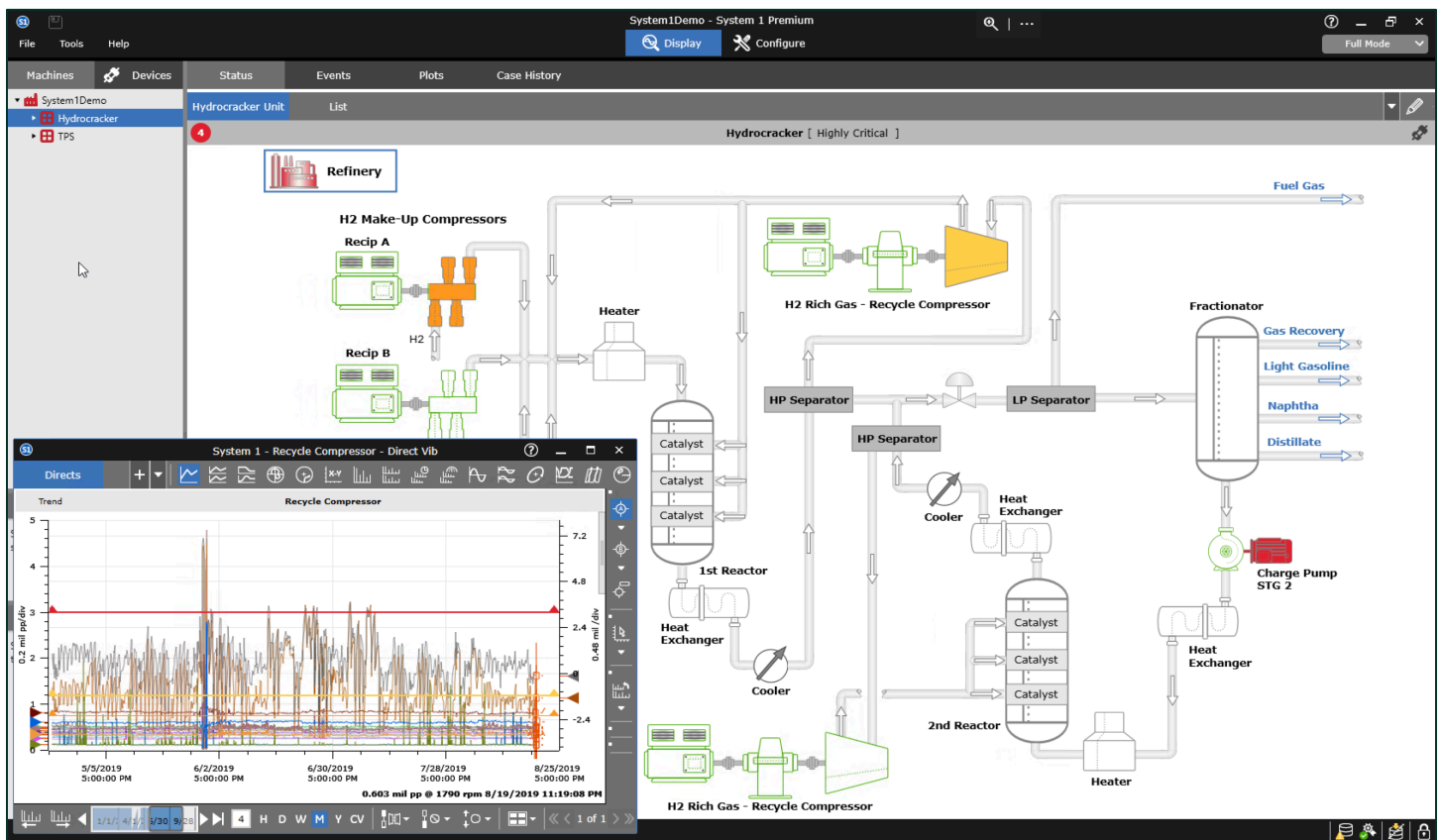
Export - For the first time ever, organizations can export waveform (dynamic) data from System 1 to external systems. This is accomplished through the modern and secure OPC UA protocol. Enterprise customers looking to improve productivity with machine learning AI platforms are showing strong interest in this new capability.

OPC UA requires the purchase of a new entitlement (3071/15-BB), is sold on a per OPC UA Server basis (one OPC UA Server per SI Tx, or one OPC UA Server per SI Rx), and is commonly paired with replication (3071/16) for enterprise-level deployment. [Contact Jeff Sipek with questions.](#)

Diagnostic HMI

Advanced HMI Builder – The HMI builder has been enhanced to improve deployment productivity and user-based navigational flows. The system can now be configured to provide seamless navigation between all display screens. Advanced users may elect to jump from HMI-based screens right into diagnostic plots, while higher level users elect to jump to sub HMI views or trends.

The HMI building capability is included with all System 1 licensing and existing customers will benefit from these improvements with an Active M&S agreement.



OPC DA Enhancements – The supported OPC DA 1-second tag import count is 12,000 per server (as of v19.1), allowing customers adopting System 1 as a diagnostic HMI to add all process, first-out, and permissive data to enhance their condition monitoring programs.

In addition, with v19.2 users can now configure OPC import tags representing setpoints (**48,000 tag limit per server!**) to update with the source (DCS/PLC) automatically. This ensures that users leveraging System 1 for machinery monitoring are always seeing the same setpoints as operations.

OPC import requires an import license (3071/14-AA). Existing users with this entitlement receive these two major upgrades for free with an Active M&S Agreement

General Machinery Monitoring



Trendmaster SPA Import – Customers can now directly connect Trendmaster SPA installations to System 1 v19.2. The Trendmaster SPA platform is Bentley Nevada’s most prolific plant-wide product with large installations throughout the world. See datasheet for supported ProTIM & FlexiTIM models.

Trendmaster SPA import requires a device import license for new customers (3071/13-DD) and is licensed per TIM. Existing System 1 Classic customers with an Active M&S Agreement can upgrade free of charge per standard procedure (3071/65).

Bentley Nevada remains laser-focused on delivering the world’s premier plant-wide machinery management application with bi-annual product releases.

Thank you,



Ryan Roaldson

Bentley Nevada Software Product Line Leader

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1 System 1 v19.2 Feature Overview

Connectivity

Bently Devices

- Trendmaster – SPA Card
- Limited ProTIMs and FlexiTIMs

Interfaces

- OPC UA – Waveform Export
- OPC DA – Alarm Sync (Source to S1)
- OPC DA – 12,000 + 48,000 setpoint tags!

Database Management

- PostgreSQL as Historian
- Full DB Backup/Restore
- Multi-Mapping
- Bulk Device Config Sync & IP Address Import
- Application Performance

Analytics

Core Alarming

- Alarm Latching

Decision Support

- ALPHA with limited functionality for early feedback from select Customers
- Decision Support Release 1 – **August 2020**

Bentley Performance

- Bentley Manual Input
- Hardened Bentley Performance/System 1 Integration
- Rx Database compatible

Visualization

HMI Builder

- Navigation Between Display Views
- Point Swapping
- Measurement Table Flexibility
- Extended Symbol Library
- View Support in Devices Hierarchy

Plots

- State Data Filtering
- User-Defined Plot Set Enhancements
 - Plot Set Save As
 - Plot Set Delete
 - Time Range Management

Table 1: System 1 v19.2 – Connectivity Capabilities

Connectivity		
Bentley Devices		
Trendmaster DSM	Native SPA line integration with System 1. Phase 1 limited to specific ProTIM and FlexiTIM models. Refer to the datasheet for more details.	3.1.1
Interfaces		
OPC UA Waveform Export	Export waveform data from S1 to other OPC UA compliant systems. Phase 2 (20.1) will include Alarm & Event Export and Static Data.	3.2.1
OPC DA Alarm Sync	Synchronize setpoints between the Control System and S1 via OPC DA.	3.2.2
OPC DA Import Scalability	Add more process and control system data into System 1, creating a high-res historian – 12,000 tags + 48,000 setpoint tags	3.2.3
Data Management		
PostgreSQL as Historian	New installations will default to PostgreSQL. NOTE: Certain features, like state data filtering, will only be compatible with PostgreSQL.	3.3.1
Multi-Mapping	Multi-map channels from Devices Hierarchy to the Machines Hierarchy.	3.3.2
Full DB Backup/Restore	Backup and Restore functionality has been extended to online databases! <u>Only available with PostgreSQL.</u>	3.3.3
Bulk Device Sync & IP Address Import	Bulk synchronize online device configurations & import IP addresses for multiple devices simultaneously. Great for large installations.	3.3.4, 3.3.5
App Performance	~40% improvement in navigation performance in Configuration and Plots	-

Table 2: System 1 v19.2 – Analytics Capabilities

Analytics		
Core Alarming		
SW Latching	Control alarm insights with latching for all software measurements.	4.1.1
Decision Support		
Decision Support ALPHA	Alpha with limited functionality for targeted customers. Release 1 of Decision Support planned for August 2020.	-
Performance Monitoring		
Hardened S1 Integration	Hardening of the Bentley Performance/System 1 integration, enhancing reliability and user experience.	4.2.1
Bentley Manual Input	Manually enter data samples using an intuitive spreadsheet with copy/paste. A key capability for Bentley Performance integration.	4.2.2

Table 3: System 1 v19.2 – Visualization Capabilities

Visualization		
HMI Builder		
Navigation	Navigate from the HMI to any other workspace within System 1.	5.1.1
Point Swapping	When copy/pasting HMI views between machines or databases, easily update measurement points with "Replace Point" capability.	5.1.2
Measurement Table Flexibility	Modify the display of measurement tables in the HMI workspace, including Point Name, Measurement Name, or Value only.	5.1.3
New Symbols	Additions include General Industry, Networking, and Device symbols.	5.1.4
Device Views	Create and Save HMI views at the Database, Device Group, and Device Levels of the Devices Hierarchy.	5.1.5
Plots		
State Filtering	Filter plot data by operating state. <u>Only available with PostgreSQL.</u>	5.2.1
Plot Set Save As	Make modifications to existing Defined Plot Sets.	5.2.2
Plot Set Delete	Delete User Defined Plot Sets that are no longer needed.	5.2.3
Time Ranges	Manage time range of Defined Plot Sets with extended options.	5.2.4

2 Version Support & Operating System Compatibility

Release Cadence & Version Support

System 1 follows a semi-annual release cadence with targeted releases in April/May and October/November of each year. Versions are fully supported for a minimum of two years from the published date of availability.

New Versions of System 1 Benefit from:

- Compatibility with the latest Microsoft Client & Server Operating Systems
- Client backwards compatibility to previous versions under support (19.2 Client to 18.1 Server DB)
- Database upgrade from previous versions released within last 3 years (17.2→19.2)
- Security patch & update testing for the latest available version
- Bug fixes included in the latest available version
- Standard technical support with escalation to engineering as required

Versions no longer supported:

- Standard support is provided for common FAQ type questions, but users are encouraged to update software to latest version to benefit from new features, OS compatibility, and bug fixes.

Table 4: System 1 Version Support & OS Compatibility Matrix

System 1 Versions & Support			Windows Server OS					Windows Client OS (64bit)		
Version	Date of	End of	2019	2016	2012 R2	2012	2008 R2	10**	8.1 UI	7 SP1
20.1	Q2 2020	Q2 2022	✓	✓	✓	✓		✓	✓	
19.2	Nov 2019	Nov 2021	✓	✓	✓	✓	✓	✓	✓	✓
19.1	May 2019	May 2021	✓	✓	✓	✓	✓	✓	✓	✓
18.2	Dec 2018	Dec 2020		✓	✓	✓	✓	✓	✓	✓
18.1	Jul 2018	Jul 2020		✓	✓	✓	✓	✓	✓	✓
17.2	Nov 2017	Nov 2019		✓	✓	✓	✓	✓	✓	✓

**Windows 10 version compatibility will track Microsoft’s published release and support model. The latest version of System 1 will be tested and supported on all versions of Windows 10 under support as published on their website based on the System 1 version’s published date of availability.

System 1 v19.2 (Windows 10 v1903, 1809, 1803)

System 1 v18.2 (Windows 10 v1803, 1709)

System 1 v19.1 (Windows 10 v1809, 1803)

System 1 v18.1 (Windows 10 v1803, 1709, 1703)

3 Connectivity

3.1 Bently Devices

Trendmaster DSM video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

3.1.1 Trendmaster DSM



Figure 1: Trendmaster DSM. And TIM

Prior to the System 1 19.2 release, users could collect and store data from Trendmaster Dynamic Scanning Module (DSM) devices through a S1 Classic 6.x connection. With 19.2, users can now natively connect to Trendmaster DSM devices (Figure 1). Phase 1 adds support for the Signal Processing Adapter (SPA) card and select ProTIM and FlexiTIM channel types (Table 5). Phase 2 will extend support to additional channel types, targeted for the v20.1 release. **NOTE: Migration of Trendmaster data, both configuration and historical data, from System 1 Classic to System 1 Evo will not be supported until 20.1.**

Online or offline Trendmaster DSM devices can be added to System 1. Configuration of supported DSM hardware and channels can be managed in the Configuration workspace and downloaded to the hardware on database save. System 1 will fetch static and waveform data from DSM channels based on configured scan rates and store it in the historian based on the defined storage rate. In addition to the data provided by the DSM, users can configure additional software variables within System 1 to get more insight into machine condition. Software variables include spectral bands, Crest Factor, Waveform p-p, and Bearing Fault Bands.

Alarming for DSM channels is managed by System 1, with standard and state-based alarm setpoints supported. Like other devices within System 1, an alarm on a DSM point triggers high-res alarm data captures for all other points mapped to a machine train.

In the Display workspace, all System 1 capability is supported, including Status List View, Alarm & System Health Events, and the rich plotting workspace (Figure 2, Figure 3).

The DSM Initialization tool is shipped along with System 1 19.2 installs, which includes utilities to assist with DSM Device setup, as well as troubleshoot problems with the DSM, Transducers, ProTIMs, and SPA Line.

Table 5: Supported Trendmaster Channel Types (see Data Sheet for HW P/N)

TIM	19.2	20.1 (Planning – Subject to Change)
ProTIM	Accel to Velocity Point Low Frequency Accel to Velocity Point Rack Buffer Output ProTIM Temperature Point: 2-3 wire Platinum RTD Temperature Point: TC K Type Speed Input: Keyphasor	Displacement Point Pressure Point Process Point
FlexiTIM	Accel to Velocity FlexiTIM 100 Ohm Platinum RTD FlexiTIM J Type TC FlexiTIM K Type TC FlexiTIM	
TIM		Displacement Keyphasor Process Rack Buffer Output Temperature: J Type TC Temperature: K Type TC Velocity TIM: Accel to Velocity Point
1900 Monitors		1900/25 Velocity Monitor 1900/55 Fan Monitor

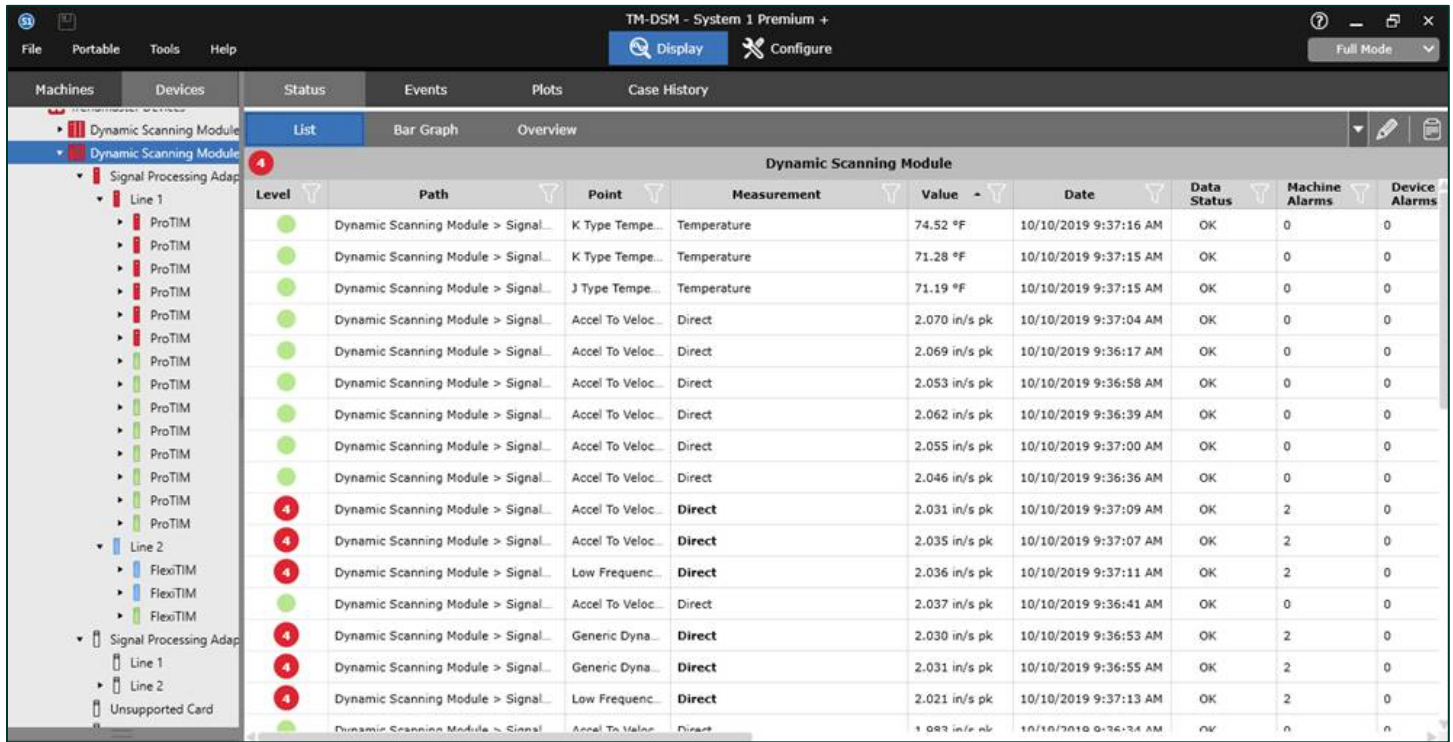


Figure 2. Trendmaster data in Status List View

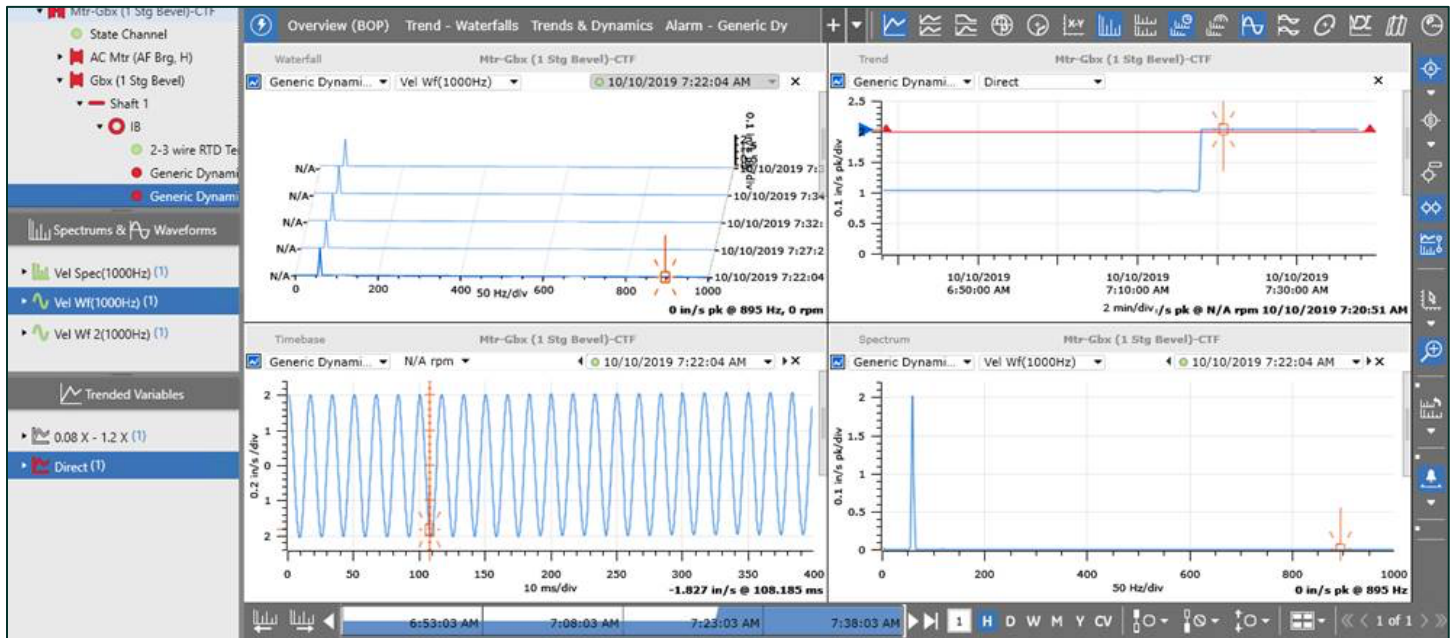


Figure 3. Trendmaster data in the Plots workspace

3.2 Interfaces

3.2.1 OPC UA Waveform Export

OPC UA Waveform Export video located in Bentley Nevada Tech Support Training Library
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With the release of System 1 v19.2, waveforms and spectrums (device-calculated) can be exported via the OPC UA protocol. This functionality enables IIoT integration between Edge devices and data lakes, allowing customers to advance in their digital journey.

To configure the System 1 OPC UA server, launch the System 1 OPC UA Server Management application (Figure 4), and configure the following properties:

- End Points: Port, Server Name, Server Mode, and Server Policy
- User Authentication: Select the type of user authentication required by the third-party clients, if any
- Certificates: If required, a third-party UA client displays a certificate. To accept the certificate, right-click the certificate and select Trust.

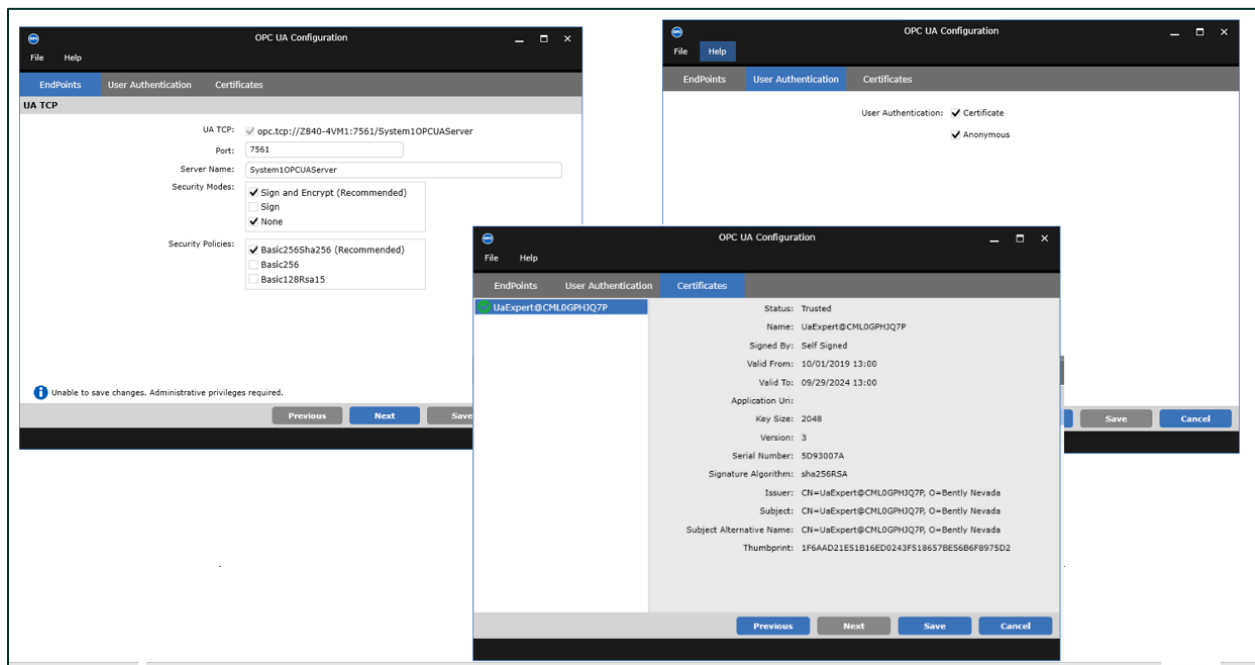


Figure 4: OPC UA Configuration Tool

Once the OPC UA server configuration is complete, System 1 will start exporting waveforms and/or spectrums at 10 min intervals, or the device storage rate interval (**NOTE:** Each OPC UA Client can further throttle the dynamic data subscription rate). The data is exported with a set of data properties, including Unit, Data Status, Node Status, and RPM (Table 6, Figure 5), that can be utilized to define the dynamic sample in external systems (Figure 6). Supported dynamic measurements are captured in Table 7.

Table 6: OPC UA Data Properties

Property	Description
Measurement ID	Unique ID for the measurement (System 1 GUID)
UTC Timestamp	Spectrum/waveform time stamp in UTC format
Number of Samples	Total number of waveform samples (e.g., 1024, 2048)
Sample Type	Synchronous or Asynchronous
Unit name	Name of the spectrum/waveform Unit (e.g., mil, um)
Unit	OPC UA code for the Unit (OPC Foundation code)
Subunit Name	Name of the spectrum Subunit (pk, rms, pp)
Subunit	OPC UA code for Subunit (OPC Foundation code)
Data Status	OPC UA code for the Data Status (OPC Foundation code)
Node Status	OPC UA code for the Node Status (OPC Foundation code)
FMax	FMax for the spectrum or waveform
RPM	Speed for the spectrum or waveform
Sampling Period	Delta time between two data values in a waveform
AC Coupled	Waveform AC Coupled (True or False)
DC Offset	DC Offset value
Algorithm Type	[Future] Applied algorithm type (e.g., Enveloping, Averaging)
KPH Indices	Sample on which KPH hits occurred
Revolution speed	Speed in rpm for each revolution
Piston Angle	Piston angle for reciprocating compressor waveforms
Paired Measurement ID	Paired channel ID -X or Y (System 1 GUID)

Name	Value	Name	Value
DynamicDataType	DynamicDataType	DynamicDataType	DynamicDataType
MeasurementId	{4c7f000c-1e85-47b5-a970-856394eddafb}	MeasurementId	{4c7f000c-1e85-47b5-a970-856394eddafb}
UTCTimestamp	2019-09-27T06:54:00.453Z	UTCTimestamp	2019-09-27T06:54:00.453Z
SampleTypeID	1	SampleTypeID	1
Data	Float Array[2048]	Data	Float Array[2048]
NumberOfSa...	2048	[0]	25.0845
UnitName	µm	[1]	27.7006
Unit	13384	[2]	30.123
SubunitName		[3]	32.1577
Subunit	0	[4]	33.9018
DataStatus	0	[5]	35.7913
NodeStatus	0	[6]	37.5353
RPM	2131	[7]	39.0856
		[8]	40.4905

Figure 5: Spectrum data in OPC UA client (Sample Data Expanded in right image)

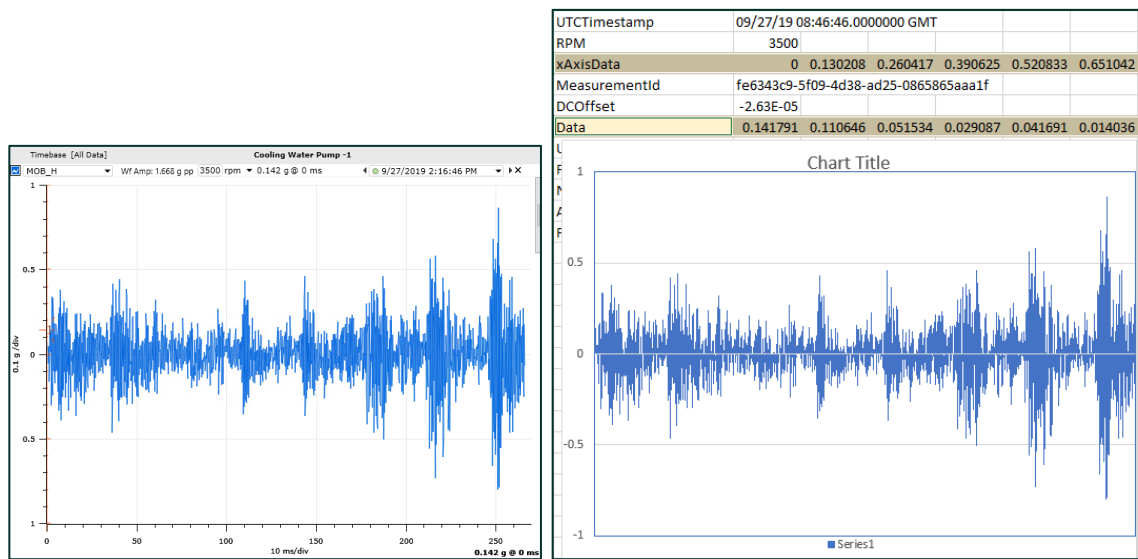


Figure 6: Waveform recreated in external system using OPC UA data properties

Table 7: Supported Dynamic Measurements by Device Type

Device Type	Sync Waveform	Async Waveform	Sync Spectrum	Async Spectrum
3500	✓	✓		
3701	✓	✓	✓	✓
2300		✓		
Ranger Pro		✓		✓
Trendmaster	✓	✓		✓
vbOnline Pro	✓	✓		
Portable	✓	✓	✓	✓

In addition to waveforms and spectrums, System 1 also exports the machine hierarchy, which can be viewed within the OPC UA Client (Figure 7).

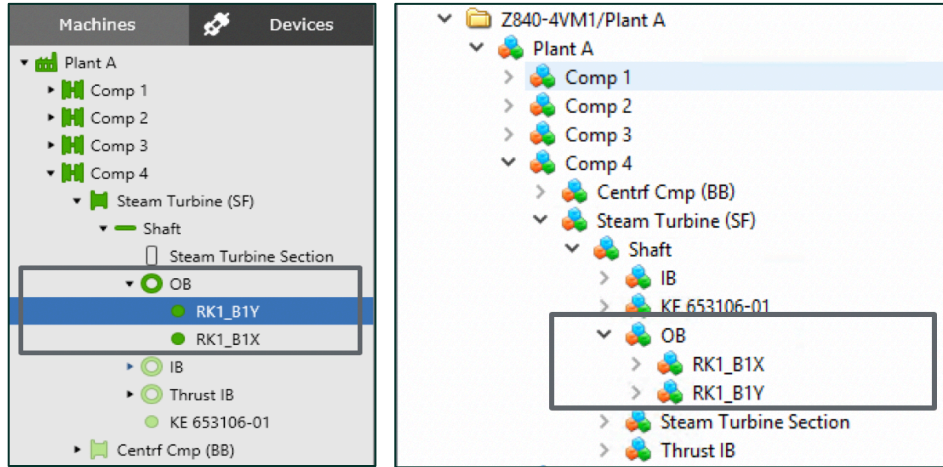


Figure 7: System 1 Hierarchy & OPC UA Client Hierarchy

3.2.2 OPC DA Alarm Synchronization

OPC DA Alarm Synchronization video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

Prior to 19.2, customers had to manually update setpoint values within System 1 every time that they were altered in external systems. Inherently, this led to the external system and System 1 becoming out of sync and inconsistent alarm generation. With the release of 19.2, externally configured setpoints for process data can now be dynamically synchronized with System 1 via OPC DA Import.

Within the OPC Items CSV file, users can now enter the item path of the setpoint tag under the desired setpoint severity column (Figure 8). On importing the .csv file, System 1 adds a setpoint group under the OPC Server and creates a corresponding setpoint tag under that group. In addition, this setpoint tag is associated to the setpoint level of its parent process point (Figure 9).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Action	Type	Point Name	Tag Name	Item Path	Min Scale	Max Scale	Unit	Data Type	New Item Path	Enum	Alarm Type	Level 4 Under	Level 4 Over	Level 3 Under	Level 3 Over
2	Add	Temp1	Temp1	Channel1.Device1.Temp1		0	400	°C				Over	Channel1.Device1.Temp1_HH	Channel1.Device1.Temp1_H		Channel1.Device1.Temp1_H
3	Add	Temp2	Temp2	Channel1.Device1.Temp2		0	400	°C				Under	Channel1.Device1.Temp2_LL			
4	Add	Pressure1	Pressure1	Channel1.Device1.Pressure		0	200	bar (a)				outofband	Channel1.Device1.Pressure1_HH_Under	Channel1.Device1.Pressure1_HH_Over	Channel1.Device1.Pressure1_H_Under	Channel1.Device1.Pressure1_H_Over

Figure 8: OPC Items Template CSV File, with Item Paths entered for setpoint levels

Machines		Devices		General		Data Collection		Measurements					
				Points		Spectrums & Waveforms		Trended Variables		Setpoints			
				Name	Measurement	Alarm Source	Alarm Type	State	Level 4...	Level 4 Under	Level 4 Over	Level 4...	Level 4...
DSM		Trendmaster Devices		Temp1	Temperature	Condition Monitoring	Over	Standard	✓	-	Channel1.Device1.Temp1_HH	°C	0 s
OPC Servers		OPC Server		Temp2	Temperature	Condition Monitoring	Under	Standard	✓	Channel1.Device1.Temp2_LL	°C	-	0 s
		Process Group		Pressure1	Pressure - Absolute	Condition Monitoring	Out of Band	Standard	✓	Channel1.Device1.Pressure1_HH_Under bar (a)	Channel1.Device1.Pressure1_HH_Over bar (a)	bar (a)	0 s

Figure 9: OPC Item ID Path within Setpoints grid of Configure workspace

All areas of the application that display setpoint values are dynamically updated to reflect setpoint changes in the external system. In addition, alarms are generated when the parent OPC process point exceeds this setpoint value (Figure 10).

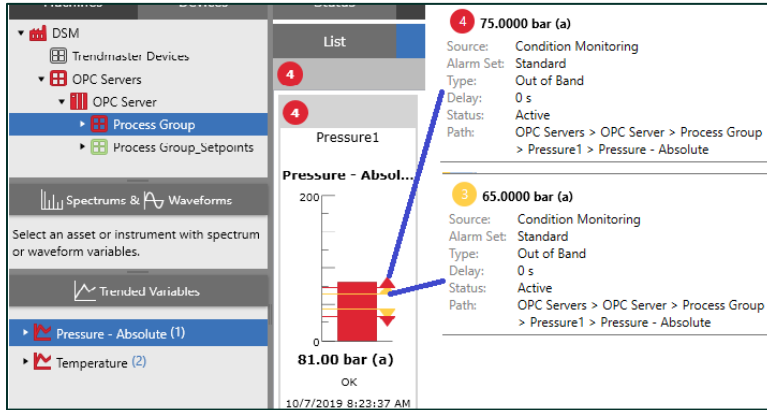


Figure 10: OPC Setpoint values shown as setpoints on parent process point

PRO TIP 1: OPC points and their properties can be managed external to System 1. Right-click on an OPC Group and select Export > OPC Items Template (Figure 11). All configured properties, including Item Path and Setpoint values are included in the .csv file. Simply update and re-import into System 1.

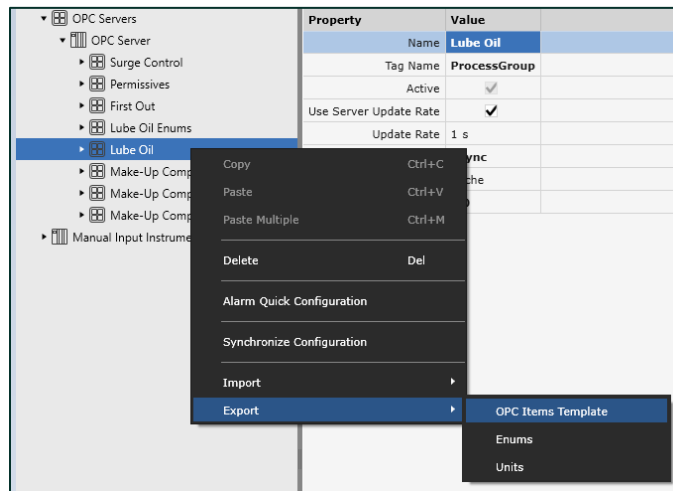


Figure 11: OPC Items Template Export option

3.2.3 OPC DA Import Scalability

Prior to System 1 19.1, the maximum number of OPC points within a database was **6,000**. With the 19.1 release, this number was increased to **12,000**. All points can have data storage at once-per-second.

In addition, System 1 can now support **48,000** asynchronous OPC tags, which update only on data change. With the ability to synchronize setpoints between external systems and System 1, this allows customers to configure up to 4 setpoint tags per process tag.

3.3 Data Management

3.3.1 PostgreSQL as Historian

PostgreSQL video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

In v19.2, PostgreSQL is offered as an alternative historian technology. For new System 1 installations, Proficy will not be installed and customers will only be required to license System 1. For existing System 1 installations, upgrades will retain Proficy as the Historian (Figure 12). **In v20.1, customers with existing System 1 databases leveraging Proficy will be provided with a tool to migrate the data to PostgreSQL.**

Those customers that wish to continue leveraging Proficy as their data historian for new databases will require a Proficy Add-On to be installed, post the System 1 installation (Figure 13).

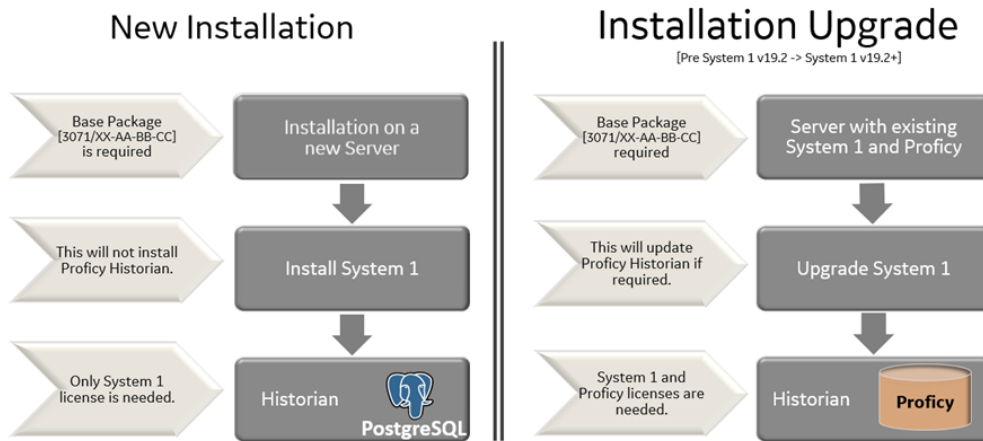


Figure 12: Installation process for new databases vs. database upgrades

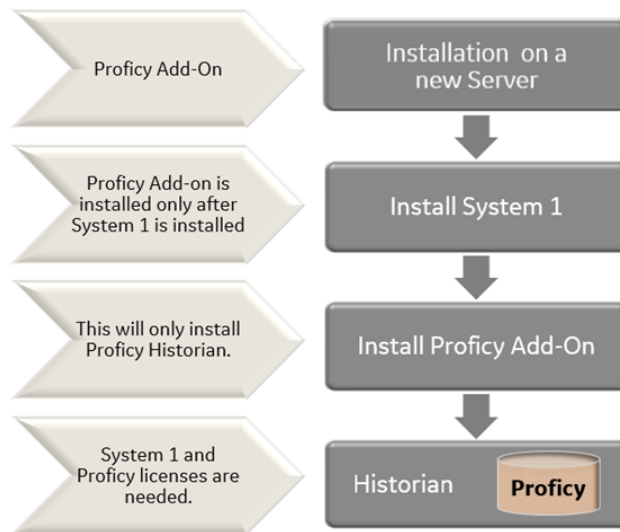


Figure 13: Installation process for new databases with Proficy As Historian

With the 19.2 release, two new features have been added to System 1 that are only supported with PostgreSQL as the data historian: State-Based Filtering and Full Database Backup and Restore. Going forward, new database features may also only be supported with PostgreSQL. A full list of capabilities and improvements with the new historian technology are captured in Table 8.

Table 8: PostgreSQL Historian – Benefits

System 1 Capabilities	Performance (Compared to Proficiency as Historian)	Database Management
<ul style="list-style-type: none"> State-based filtering Create Audit File for multiple machines/trains [FUTURE] 	<ul style="list-style-type: none"> 50% reduction in RAM utilization 10% improvement in plotting performance 15% improvement in Audit File creation time 	<ul style="list-style-type: none"> Full database backup/restore Data flexibility Cloud-friendly database technology [FUTURE]

3.3.2 Multi-Mapping Channels

In System 1 v19.2, Device channels can be mapped to multiple points across the Machines Hierarchy. NOTE: Multi-mapping is limited to Process and Speed Channels. Multi-mapping acceleration channels within a machine train was added in a prior release.

PRO TIP 2: In Mapping Mode, channels are displayed in three different colors: light blue represents channels that are mappable to the machine and have not yet been mapped, while dark blue represents channels that are mappable and have already been mapped to another machine location. Finally, grey represents channels that are not compatible for mapping to the selected machine location (Figure 14).

Available Device Points					
Map	Point Name	Unit Group	Transducer Orientation	Transducer Orientation Angle	Path
←	Working Oil Temp	Temp	-	-	OPC Server->Lube Oil
←	Lube Oil Temp B	Temp	-	-	OPC Server->Lube Oil
←	Lube Oil Temp A	Temp	-	-	OPC Server->Lube Oil
←	Lube Oil Reservoir Temp	Temp	-	-	OPC Server->Lube Oil
←	Working Oil Press	Pressure (G...	-	-	OPC Server->Lube Oil
←	Pump B Disch Press	Pressure (G...	-	-	OPC Server->Lube Oil
←	Pump A Disch Press	Pressure (G...	-	-	OPC Server->Lube Oil
←	Lube Oil Reservoir Level	Percent	-	-	OPC Server->Lube Oil
←	Lube Oil Press C	Pressure (G...	-	-	OPC Server->Lube Oil
←	Lube Oil Press B	Pressure (G...	-	-	OPC Server->Lube Oil
←	Lube Oil Press A	Pressure (G...	-	-	OPC Server->Lube Oil
←	Disch Header Press	Pressure (G...	-	-	OPC Server->Lube Oil

Figure 14: Mapping mode with three states of mapping buttons

3.3.3 Full Database Backup/Restore

With System 1 v19.2, Backup and Restore functionality has been extended to online databases, a capability that has been heavily requested for many releases. Users no longer need to utilize Windows Backup or 3rd party tools (e.g., Acronis). **NOTE: This is only supported for databases with PostgreSQL as the data historian.**

To back up an online database,

1. Select Tools > Database Manager. The Database Manager is displayed.
2. Select Back Up and Restore > Back Up (Figure 15).
3. Select the database to back up. By default, the current open database is selected.
4. In the Database pane, select a Destination for the DB Back Up. The local file system is displayed. You can also navigate to a remote location to back up to that destination.
5. When backup is complete, a message is displayed.

To restore a database:

1. Select Tools > Database Manager. The Database Manager is displayed.
2. Select Back Up and Restore > Restore (Figure 15).
3. In the Restore tab, select Browse and choose a database to restore.
4. Browse to a .SIBKP. Select Open.
5. Select Restore.
6. When the restore process is complete, a message is displayed.

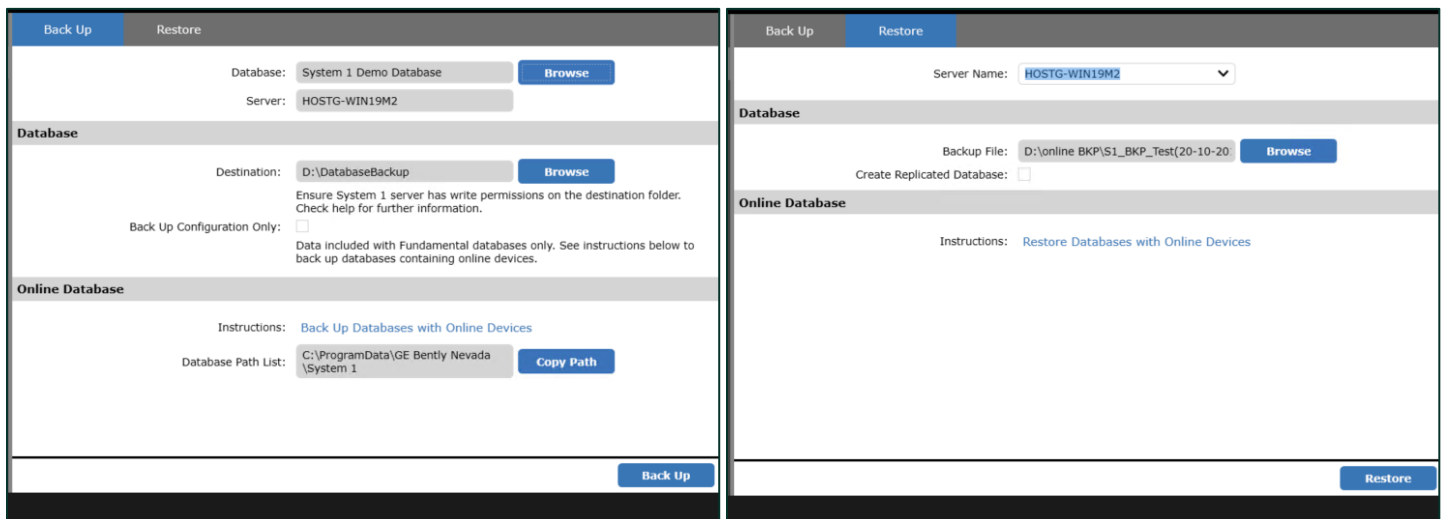


Figure 15: Database Manager Back Up & Restore Dialogs

PRO TIP 3: You can back up and restore from both local and network locations.

PRO TIP 4: Select *Create Replicated Database* to restore as a replicated database. The Rx database is restored with all historical data and linked to the source Tx database.

3.3.4 Bulk Device Config Synchronization

Bulk Device Config Sync video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

With System 1 v19.2, users can now synchronize the configuration for multiple online devices at once, further enhancing deployments of large System 1 databases. Multi-device synchronization can be initiated by right-clicking on the Database or Device Group nodes of the Devices Hierarchy and selecting "Synchronize Configuration" (Figure 16).

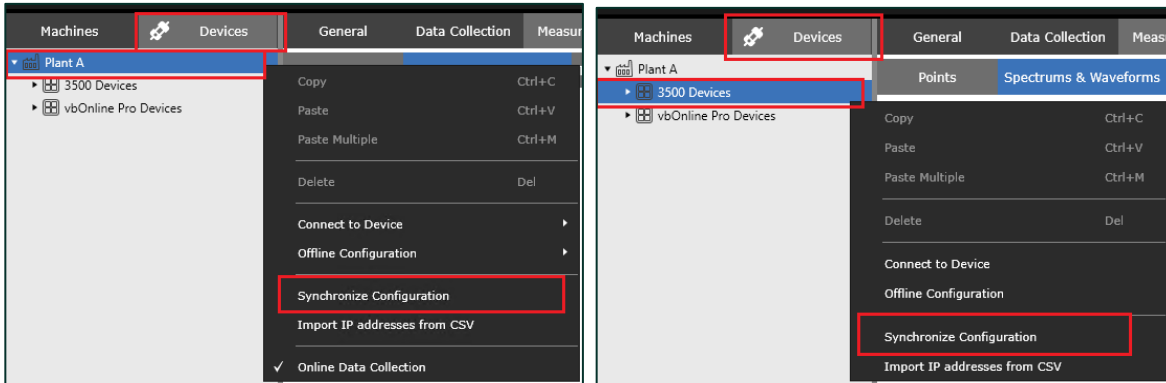


Figure 16: Synchronize Configuration option in right-click menu of Devices Hierarchy

Once config synchronization is initiated, each device is synchronized sequentially with the Progress Status displayed within the Configuration Synchronization Dialog (Figure 17).

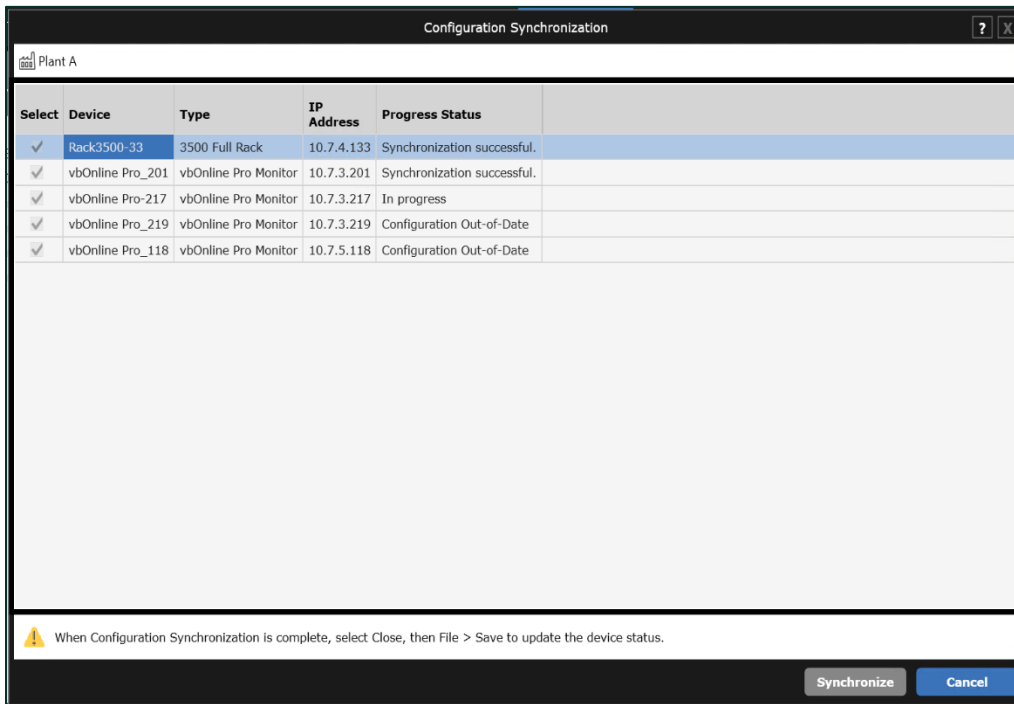


Figure 17: Configuration Synchronization Dialog

3.3.5 Bulk Device IP Address Import

Bulk Device IP Address Import video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

In System 1 v19.2, multiple device IP addresses can be imported via csv file:

- From System 1, copy & paste Device names from the General Tab of the Configure Workspace and enter into a .csv file
- Next, add IP Addresses for each Device (Figure 18)
- Save the *.csv file on the System 1 Server

	A	B	C
1	Rack3500-33	10.7.4.133	
2	Rack-Comp	10.7.0.170	
3	vbOnline Pro_201	10.7.3.201	
4	vbOnline Pro-217	10.7.3.217	
5	vbOnline Pro_219	10.7.3.219	
6	vbOnline Pro_118	10.7.5.118	

Figure 18: Example .csv (open in Excel) with Device column and IP Address column

To import the *.csv file into System 1, right-click on the Database node of the Devices Hierarchy and select "Import IP addresses from CSV" (Figure 19). Once the desired file is imported, the IP Addresses contained within the file will be auto-populated with their associated device (Figure 20).

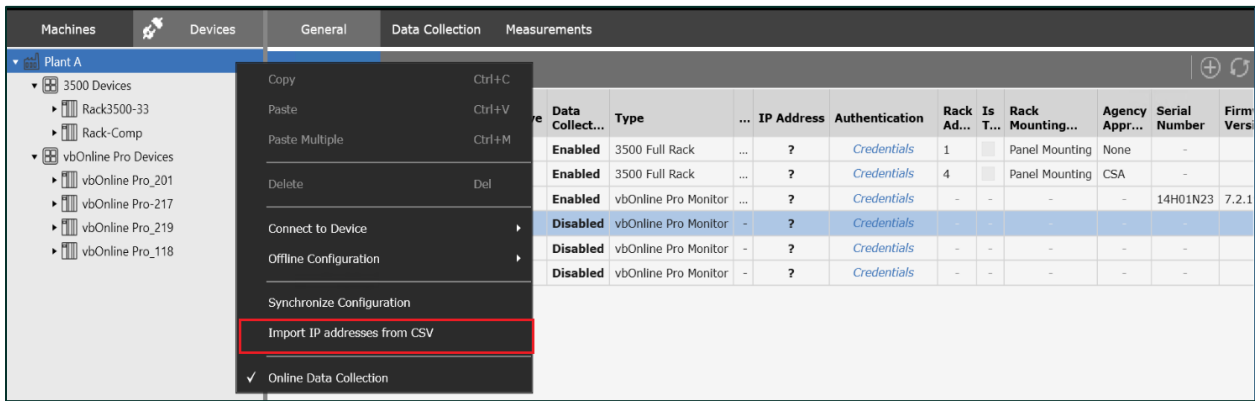


Figure 19: Import IP Addressed from CSV option in right-click menu of Devices Hierarchy

Name	Tag Name	Active	Data Collect...	Type	IP Address	Authentication	Rack Ad...	Is T...	Rack Mounting...	Agency S
Rack3500-33	FullRack3500	✓	Enabled	3500 Full Rack	10.7.4.133	Credentials	1		Panel Mounting	None
Rack-Comp	FullRack3500	✓	Enabled	3500 Full Rack	10.7.0.170	Credentials	4		Panel Mounting	CSA
vbOnline Pro_201	vbOnlinePro	✓	Enabled	vbOnline Pro Monitor	10.7.3.201	Credentials	-	-	-	-
vbOnline Pro-217	vbOnlinePro	✓	Disabled	vbOnline Pro Monitor	10.7.3.217	Credentials	-	-	-	-
vbOnline Pro_219	vbOnlinePro	✓	Disabled	vbOnline Pro Monitor	10.7.3.219	Credentials	-	-	-	-
vbOnline Pro_118	vbOnlinePro	✓	Disabled	vbOnline Pro Monitor	10.7.5.118	Credentials	-	-	-	-

Figure 20: Devices alongside imported IP addresses

4 Analytics

4.1 Core Alarming

4.1.1 Software Alarm Latching

Software Alarm Latching video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

The addition of Software Alarm Latching to measurement setpoints allows users to further manage the generation of alarms and reduce nuisance events. This property can be configured per Setpoint Level per Alarm Set per Measurement (Figure 21).

Figure 21: Software Alarm Latching Configuration in Measurements > Setpoints

With software latching enabled:

- When an alarm is triggered, it is logged in the Event List with an Activity of "Active"
- When data goes below the setpoint trigger, the alarm Activity is updated to "Latched", indicating that the alarm has not cleared because latching is enabled (Figure 22)

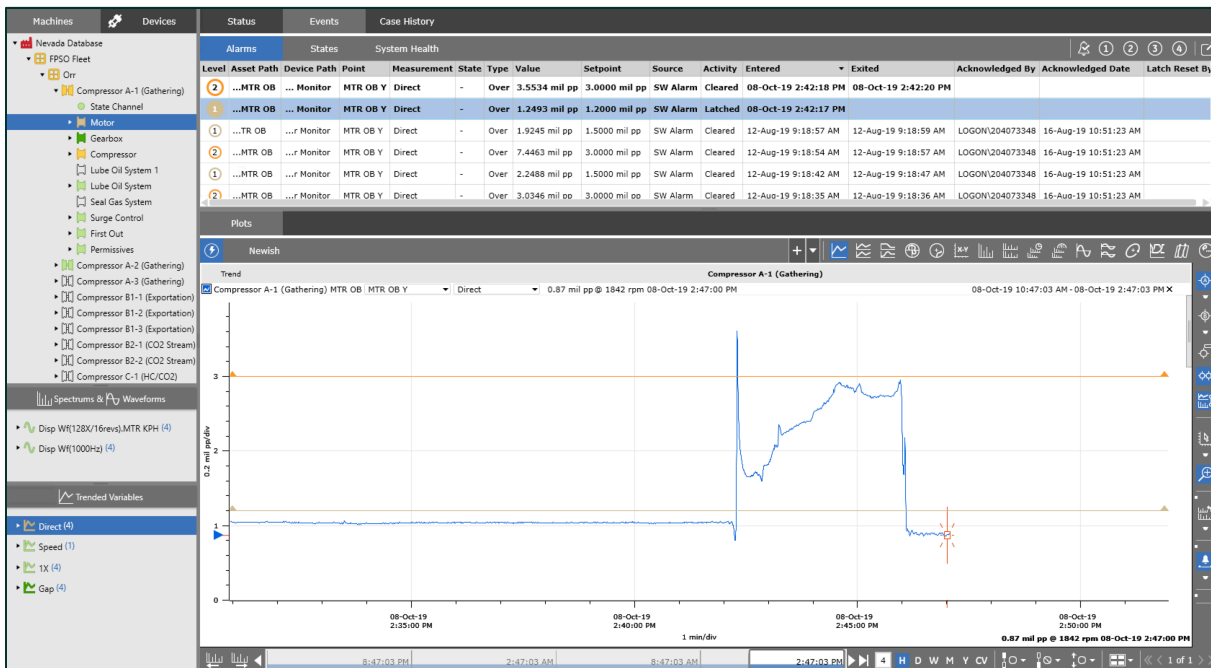


Figure 22: Latched Alarm in Event List, alongside Trend plot showing data below setpoint trigger

To change the alarm *Activity* from "Latched" to "Cleared", the user must reset latching on that measurement. To reset latching, the user can right-click on any level of the Machines or Devices hierarchy and select Event Management > Reset Latched Alarms (Figure 23). This will reset all latched alarm events at or below that hierarchy node (Figure 24).

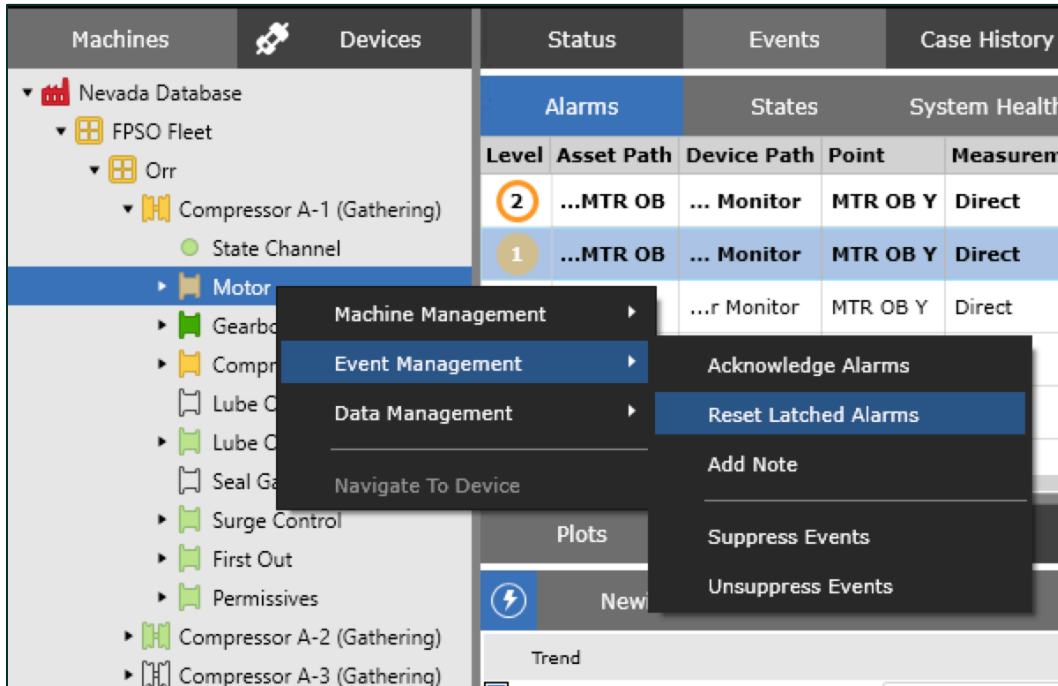


Figure 23: Reset Latched Alarms option in hierarchy right-click menu

Machines	Devices	Status	Events	Case History										
Nevada Database		Alarms	States	System Health										
FPSO Fleet		Level	Asset Path	Device Path	Point	Measurement	State	Type	Value	Setpoint	Source	Activity	Entered	Exited
Orr		2	...MTR OB	... Monitor	MTR OB Y	Direct	-	Over	3.5534 mil pp	3.0000 mil pp	SW Alarm	Cleared	08-Oct-19 2:42:18 PM	08-Oct-19 2:42:20 PM
Compressor A-1 (Gathering)		1	...MTR OB	... Monitor	MTR OB Y	Direct	-	Over	1.2493 mil pp	1.2000 mil pp	SW Alarm	Cleared	08-Oct-19 2:42:17 PM	08-Oct-19 2:48:12 PM
State Channel		1	...TR OB	...r Monitor	MTR OB Y	Direct	-	Over	1.9245 mil pp	1.5000 mil pp	SW Alarm	Cleared	12-Aug-19 9:18:57 AM	12-Aug-19 9:18:59 AM
Motor														
Gearbox														

Figure 24: Cleared alarm in Event List post reset of latching

4.2 Performance Monitoring

4.2.1 Bentley Performance Enhanced Reliability & User Experience

Bentley Performance video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

Many enhancements have been made to the System 1 Bentley Performance offering for 19.2 (Figure 25). Improvements include:

- Refreshed installation wizard
- Ability to run multiple Bentley Performance templates simultaneously on a System 1 Server
- Ability to deploy the Bentley Performance application on the Rx Server
- Support for Manual Input data natively in System 1. For Thermodynamic Monitoring, this capability is commonly leveraged in two ways:
 - When a data point is not available from the online source or a required transducer point does not exist, you can configure Bentley Manual Input to replace and simulate the missing data point. An example would be the gas composition analysis from a gas chromatography process.
 - When a data point has been established intentionally to capture manually-entered values that would not be available from any other source. An example would be the weekly price of fuel, that is used by Bentley Performance to calculate Return on Investment (ROI) for an electrical generating station.
- Support for multi-mapping device points (process, manual input) to multiple machine locations

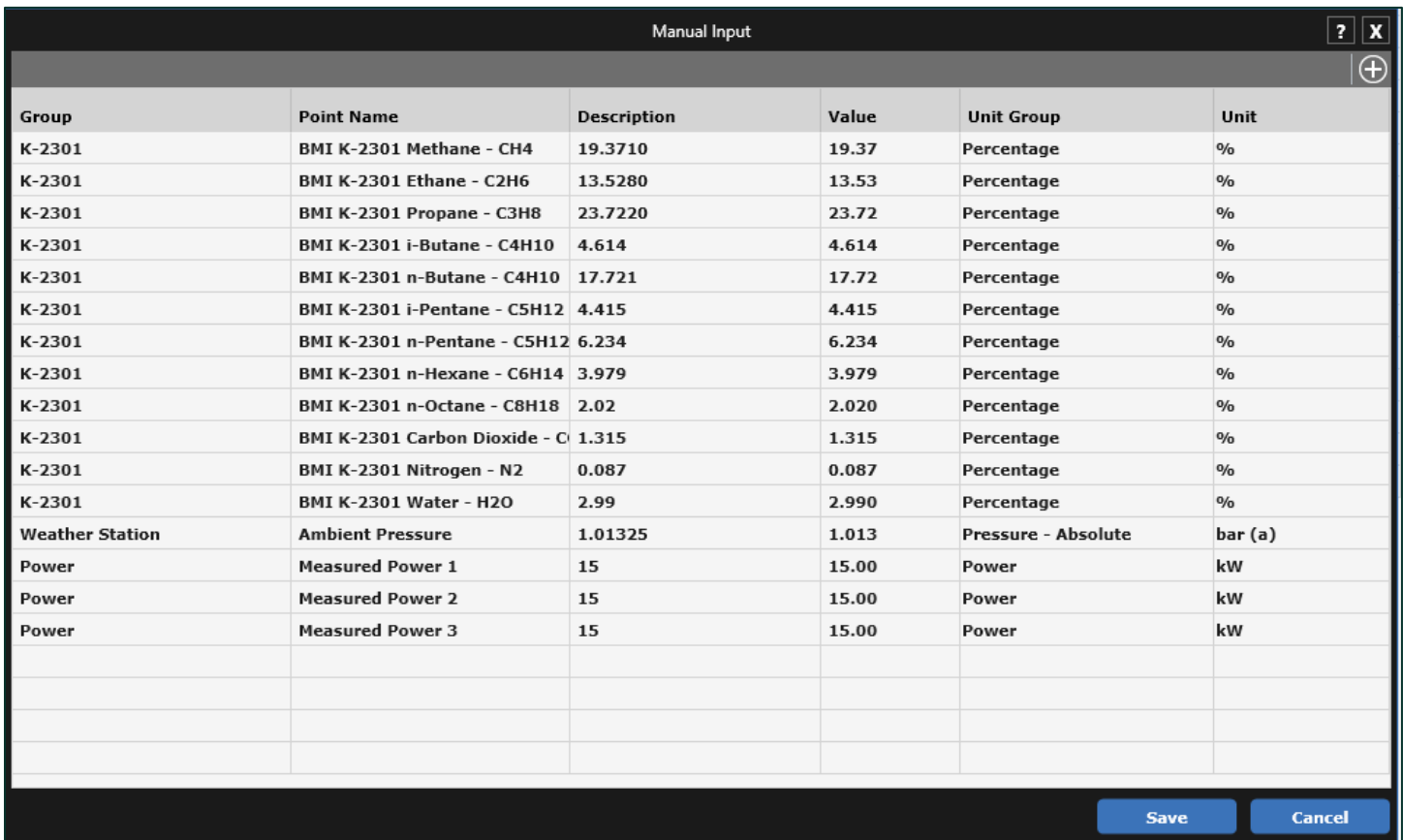


Figure 25: Bentley Performance Splash Screen

4.2.2 Bently Manual Input

[Bently Manual Input video located in Bently Nevada Tech Support Training Library](#)
[Valid M&S Agreement Required](#)

With v19.2, customers can now import data manually into System 1. To add Manual Input tags, navigate to the Configuration workspace and right-click on the Database node of the Devices Hierarchy. Selecting "Connect to Devices > Manual Input" will launch the Manual Input dialog (Figure 26). Within the dialog, users can define a Group for the tag, Point Name, Description, Value, Unit Group, and Unit.



Group	Point Name	Description	Value	Unit Group	Unit
K-2301	BMI K-2301 Methane - CH4	19.3710	19.37	Percentage	%
K-2301	BMI K-2301 Ethane - C2H6	13.5280	13.53	Percentage	%
K-2301	BMI K-2301 Propane - C3H8	23.7220	23.72	Percentage	%
K-2301	BMI K-2301 i-Butane - C4H10	4.614	4.614	Percentage	%
K-2301	BMI K-2301 n-Butane - C4H10	17.721	17.72	Percentage	%
K-2301	BMI K-2301 i-Pentane - C5H12	4.415	4.415	Percentage	%
K-2301	BMI K-2301 n-Pentane - C5H12	6.234	6.234	Percentage	%
K-2301	BMI K-2301 n-Hexane - C6H14	3.979	3.979	Percentage	%
K-2301	BMI K-2301 n-Octane - C8H18	2.02	2.020	Percentage	%
K-2301	BMI K-2301 Carbon Dioxide - C	1.315	1.315	Percentage	%
K-2301	BMI K-2301 Nitrogen - N2	0.087	0.087	Percentage	%
K-2301	BMI K-2301 Water - H2O	2.99	2.990	Percentage	%
Weather Station	Ambient Pressure	1.01325	1.013	Pressure - Absolute	bar (a)
Power	Measured Power 1	15	15.00	Power	kW
Power	Measured Power 2	15	15.00	Power	kW
Power	Measured Power 3	15	15.00	Power	kW

Figure 26: Manual Input Dialog

PRO TIP 5: The Manual Input dialog supports standard grid capability and shortcuts, including cut, copy, paste, and multi-select

PRO TIP 6: Copy/pasting a Unit into the Unit column will automatically update the associated Unit Group

Manual Input data values can be updated in two ways:

1. Right-click on a component in the hierarchy and select "Data Management > Manual Input" (Figure 27). This will launch the Manual Input dialog, filtered to the list of tags that reside at or below the selected component.

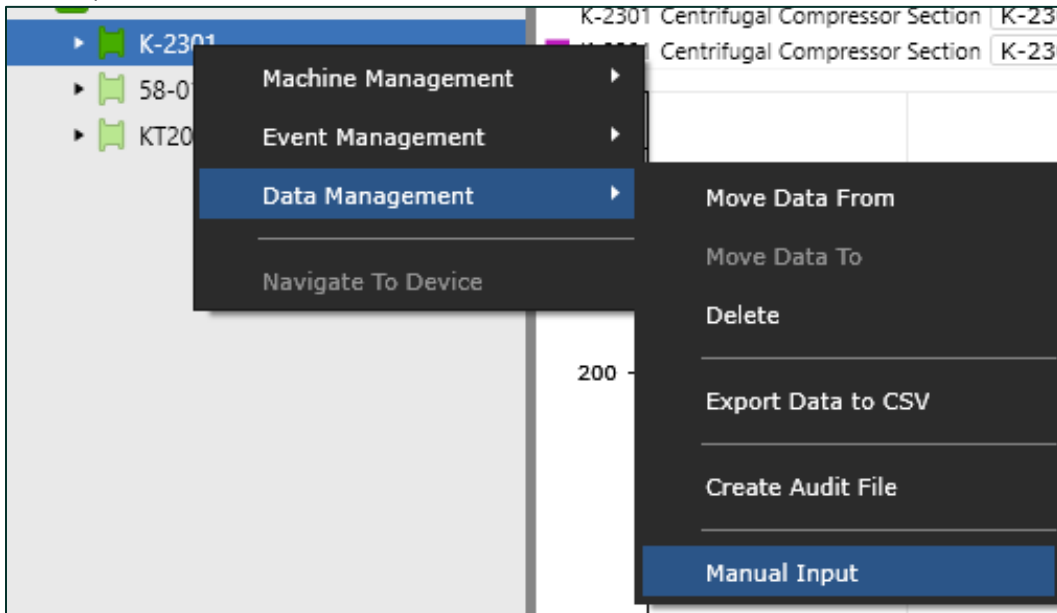


Figure 27: Launching Manual Input Dialog from Display Hierarchy

2. Launch the dialog from the Tools > Manual Input menu. This will load the Manual Input dialog with all manual tags within the database (Figure 28).

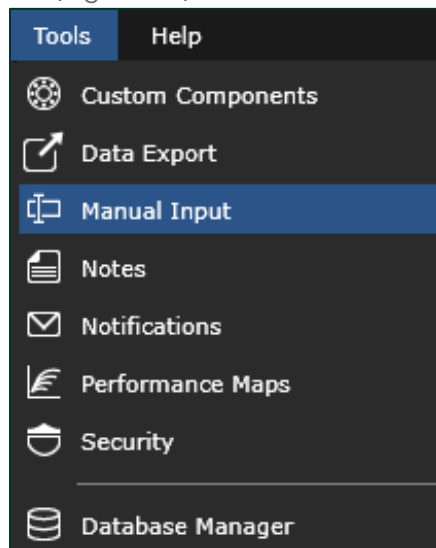


Figure 28: Launching Manual Input Dialog from Tools Menu

5 Visualization

5.1 Diagnostic HMI

Diagnostic HMI video located in Bently Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

5.1.1 Navigation

With the release of System 1 v19.2, users can define and customize their application workflow, enabling them to more efficiently leverage the mix of features that are important for machinery management.

Within the diagnostic HMI builder, the user can add "Navigate" buttons from the Basic Shapes component library (Figure 29). Right-clicking on the Navigate button and selecting "Set Navigation" (Figure 30) launches the "Navigate" dialog, where the user can define the navigational link for the button (Figure 31).

Within the "Navigate" dialog are two panes: 1) Hierarchy Selection: The component in the Machines or Devices hierarchy that should be selected when the button is clicked. 2) View selection: The Tab and Sub-tab that should be activated for the selected hierarchy component. In this manner, users can define navigational flows from HMI overview screens to supporting details. For example, from a Vibration measurement HMI view (Figure 32), the user can click a button and navigate directly to their Vibration plot set (Figure 33).

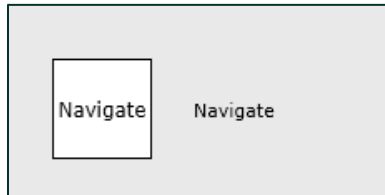


Figure 29: Navigate component within Basic Shapes grouping

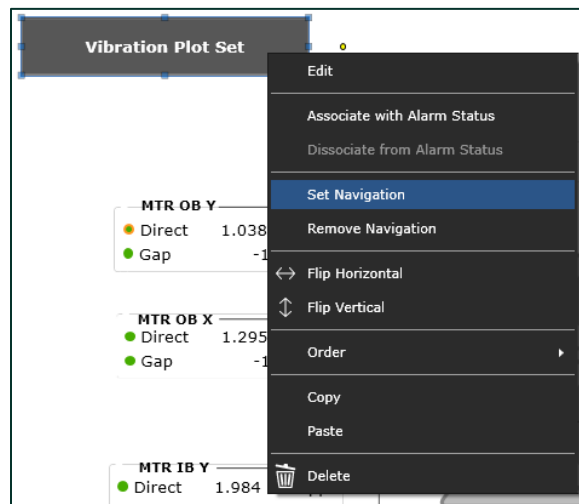


Figure 30: Set Navigation option

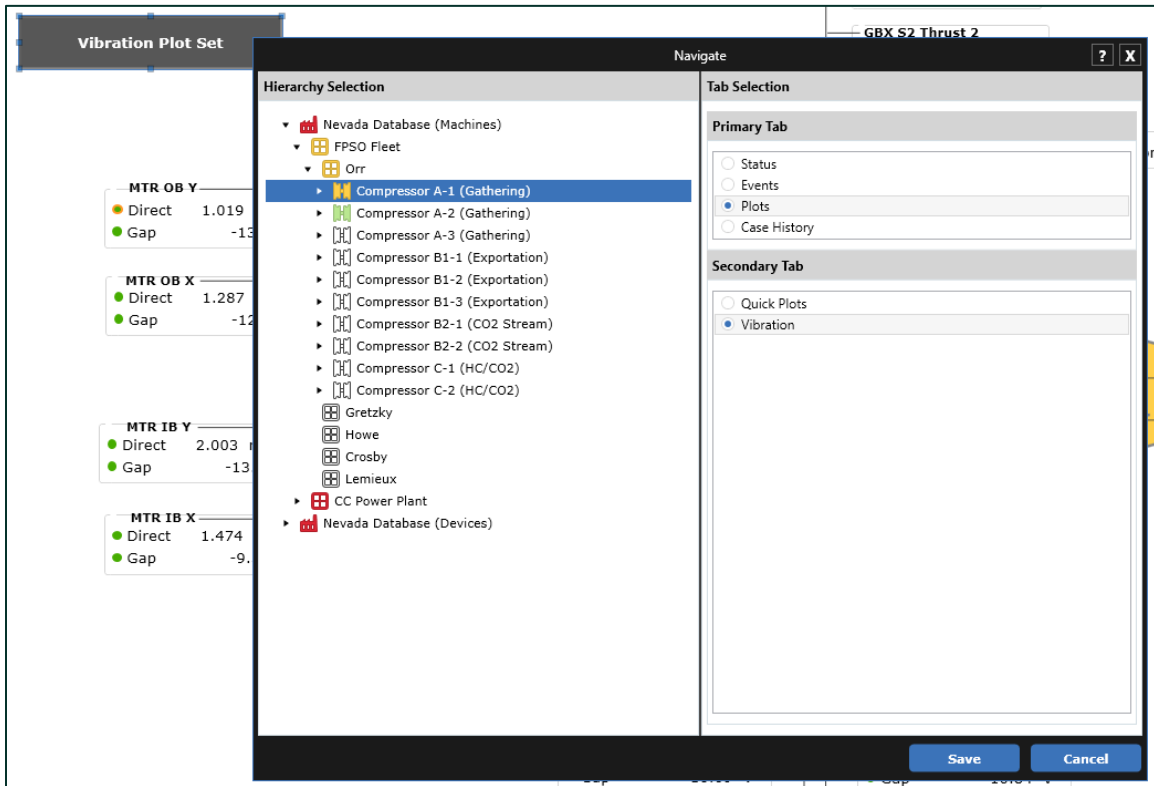


Figure 31: Navigate dialog, with Hierarchy and Tab Selection panes

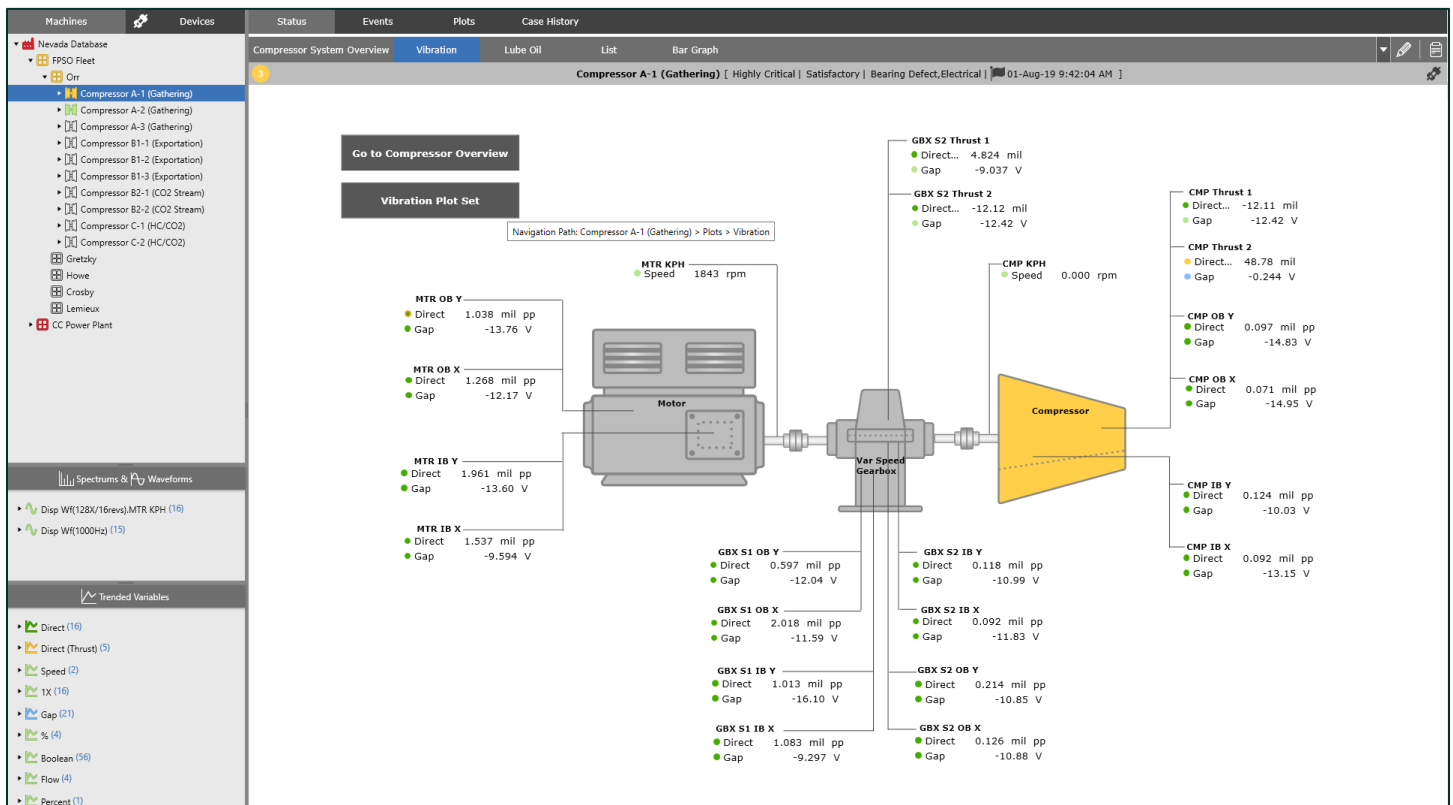


Figure 32: Vibration HMI View, with "Vibration Plot Set" navigation button

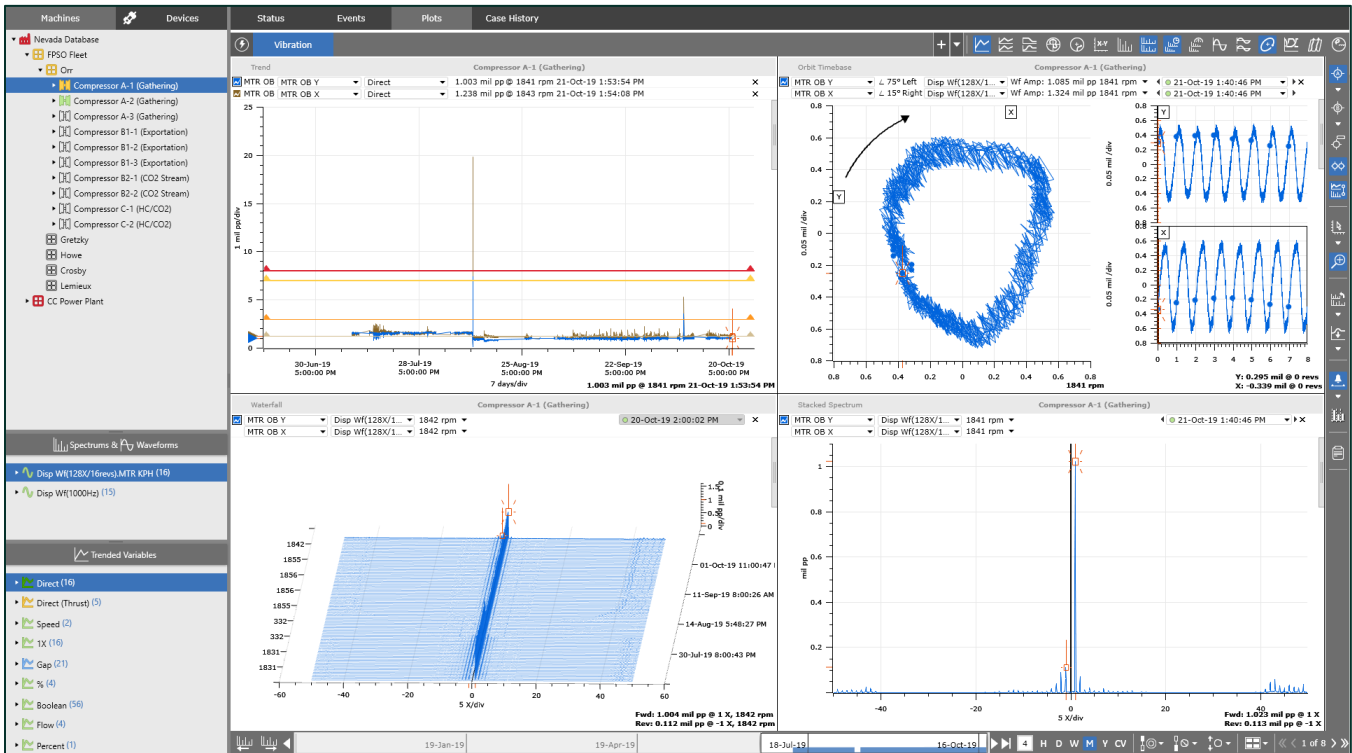


Figure 33: Navigation from Vibration HMI View to Vibration Plot Set

5.1.2 Measurement Point Copy, Paste, and Replace

Prior to v19.2, all content could be copied and pasted between HMI Views, EXCEPT measurement points. With the release of v19.2, measurement point tables can also be copied between views. To copy content, mouse-drag or Ctrl+click to select specific content, or utilize the shortcut Ctrl+A to select all content within the view. With the content selected, copy the content, using right-click or the shortcut key. Navigate to the desired HMI view and paste the content, again utilizing right-click or the shortcut key. Upon paste, a dialog will be launched asking if measurement tables should be auto-populated. If the user selects Yes, System 1 will attempt to populate the measurement tables based on the mapped configuration of the paste location. If the user selects No, point placeholders will be placed in the view.

As an example, a user has configured a Lube Oil System view for Compressor A-1 and overlaid various process tags within the view (Figure 34). The user then selected all content within the view and copied that content to the clipboard (Figure 35). She then navigated to Compressor A-2 and Compressor A-3 and pasted the content within their respective Lube Oil System views. Upon paste:

- As Compressor A-2 has corresponding process tag measurements, the measurement point tables from Compressor A-1 are automatically replaced with the corresponding measurements from Compressor A-2 (Figure 36)
- As Compressor A-3 does not have corresponding process tag measurements, the measurement point tables from Compressor A-1 are replaced with measurement placeholder tables (Figure 37).

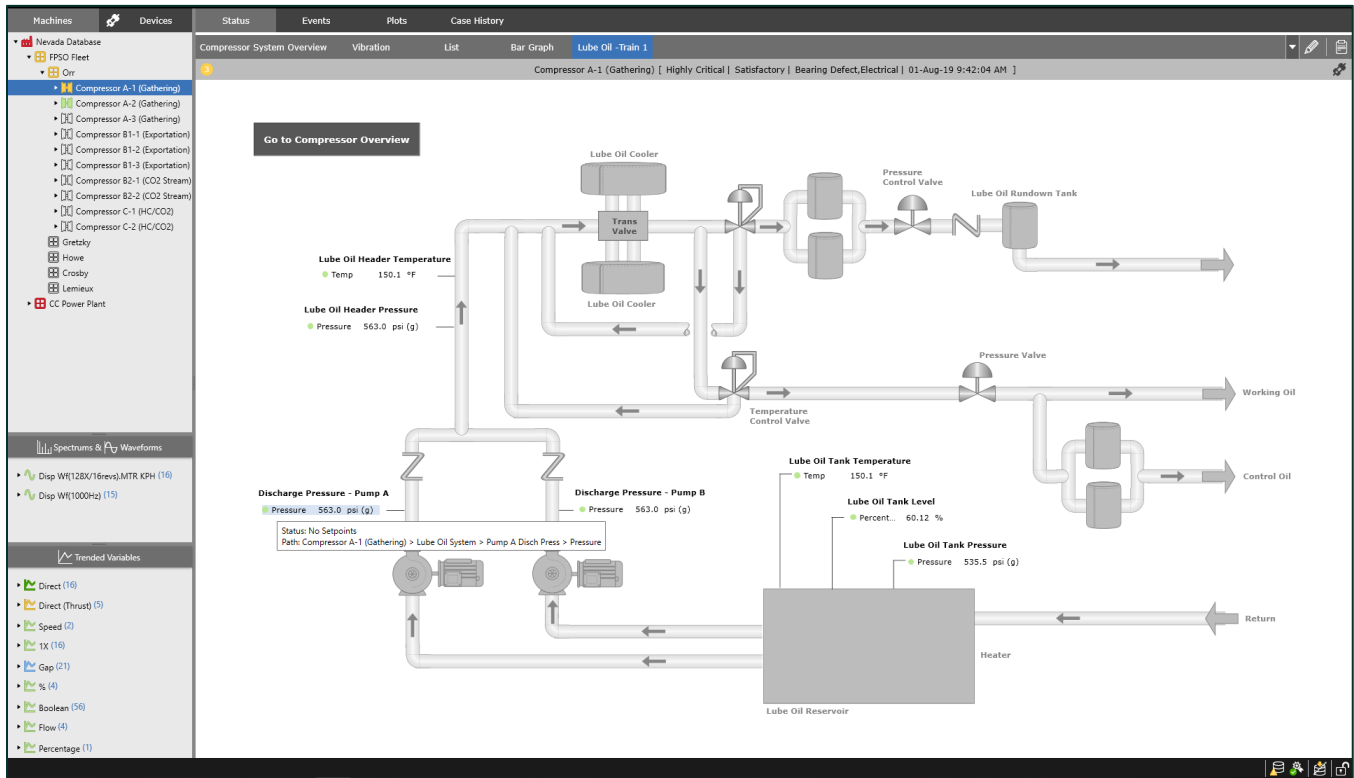


Figure 34: Original Lube Oil System HMI

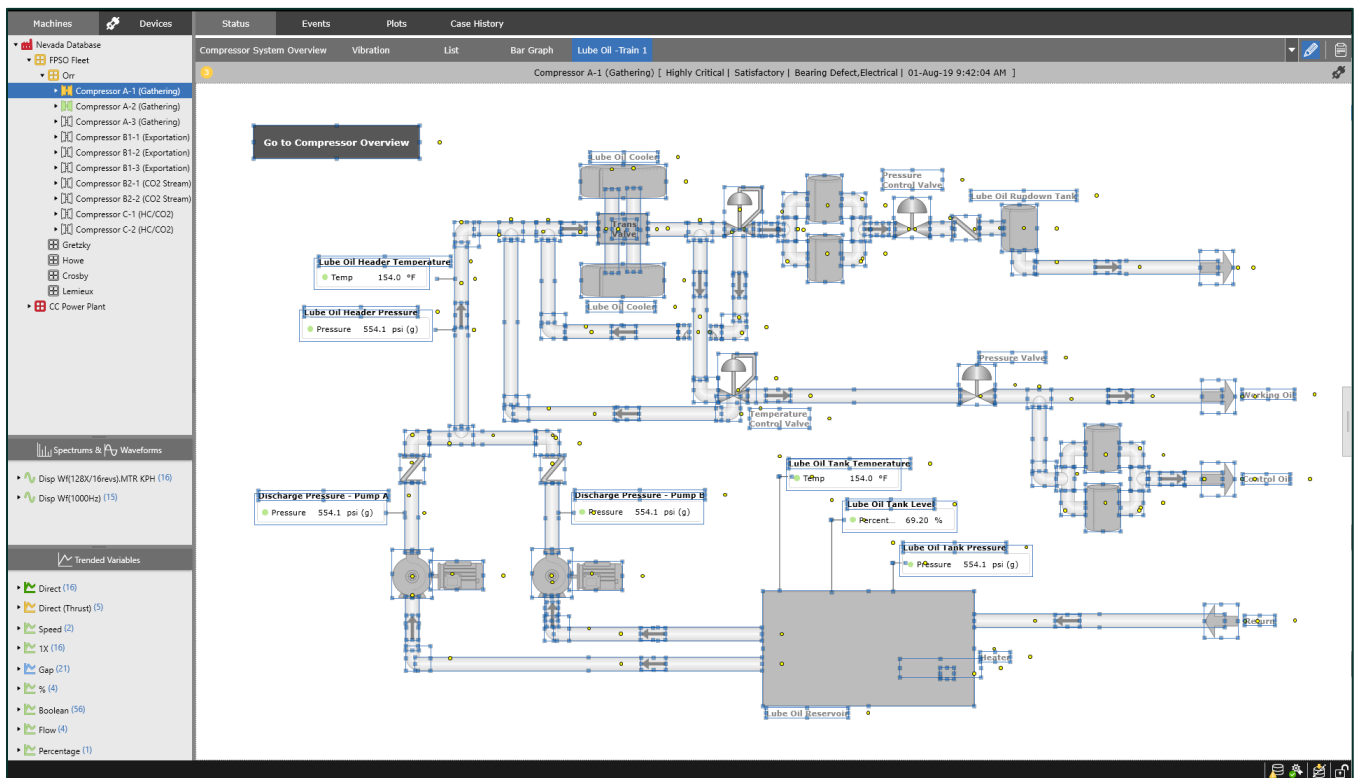


Figure 35: Copied Lube Oil System Content

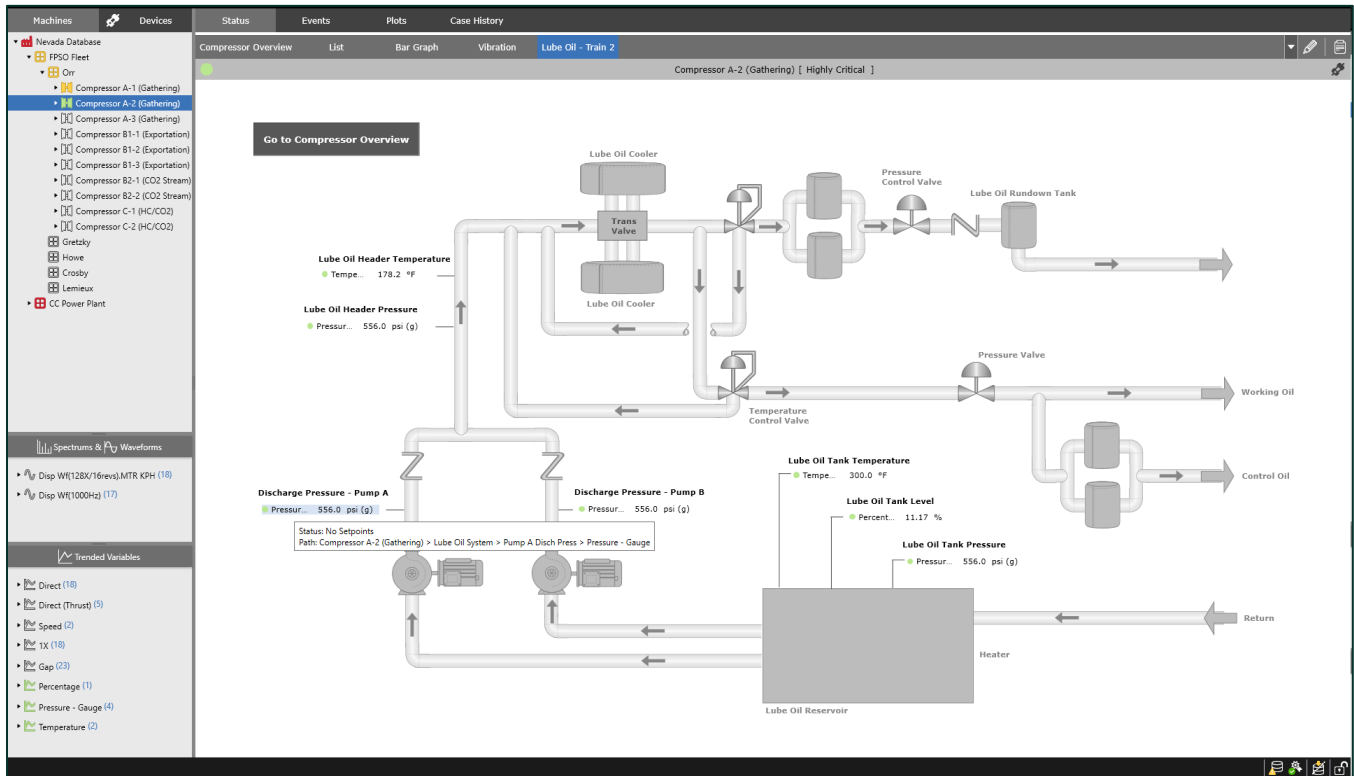


Figure 36: Pasted Lube Oil System Content, with points auto-swapped

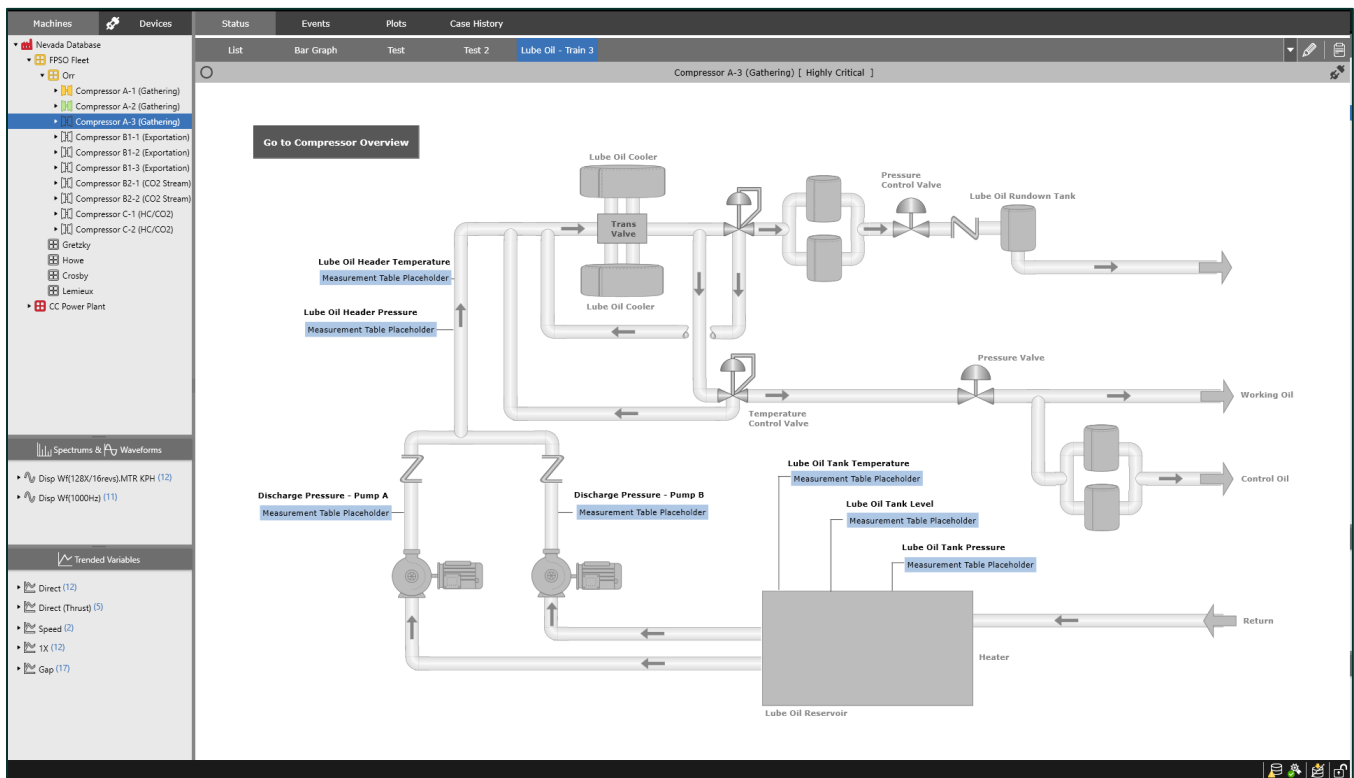


Figure 37: Pasted Lube Oil System Content, with point placeholders

Any measurement table within the HMI building workspace can now be replaced with other measurements. To replace a measurement point, right-click and select "Replace Point" in the context menu (Figure 38). This launches the Replace Point dialog (Figure 39) with the selection defaulted to the current measurement point. Within the dialog, users can locate the desired point and click "Save". The measurement point is updated to reflect the new selection. NOTE: This capability can be utilized with both measurement table placeholders and standard measurement tables.

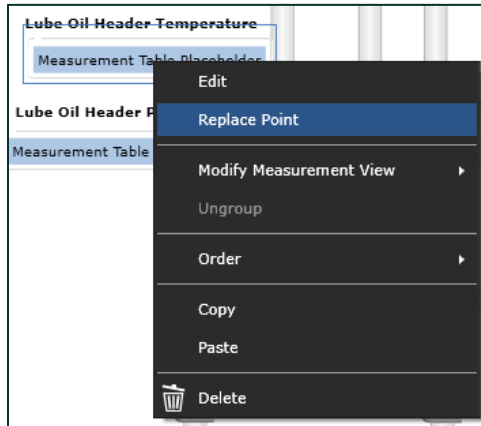


Figure 38: Replace Point option

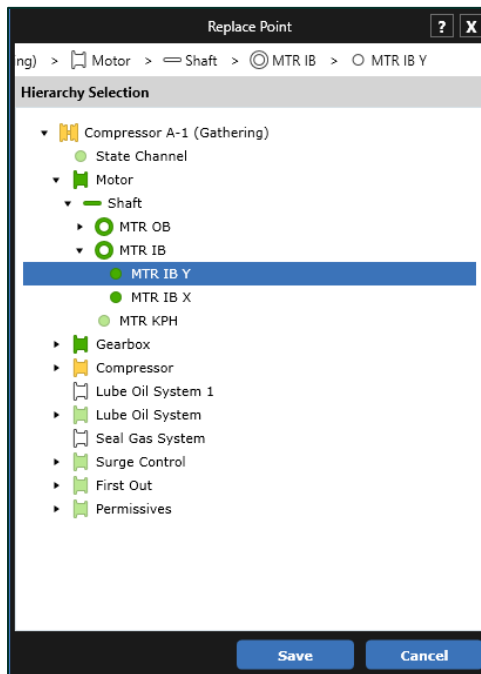


Figure 39: Replace Point Dialog

PRO TIP 7: HMI View content can be copied and pasted between views defined at the same hierarchy level, between hierarchy levels, and across databases. This allows users to efficiently create consistent views across their databases and sites.

5.1.3 Measurement Table Flexibility

With v19.2, users can now adjust measurement table views within the HMI workspace. When right-clicking in the workspace, a new option is shown in the context menu, "Modify Measurement View", with four sub-options (Figure 40). When selecting an option, the tables in the HMI view are updated to reflect the selection. The only option prior to v19.2 was "Point Name with Status", and this continues to be the default measurement table view (Figure 41).

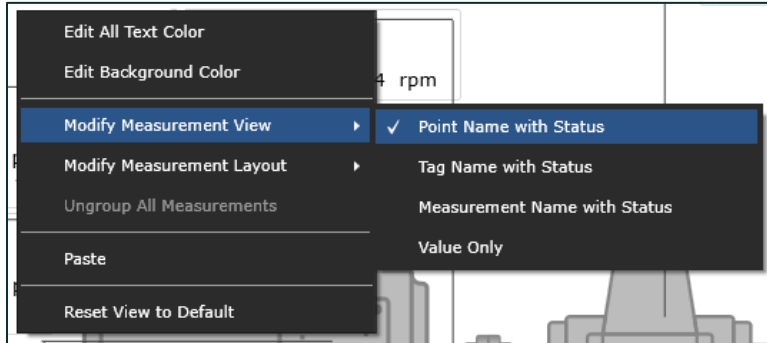


Figure 40: Modify Measurement View context menu

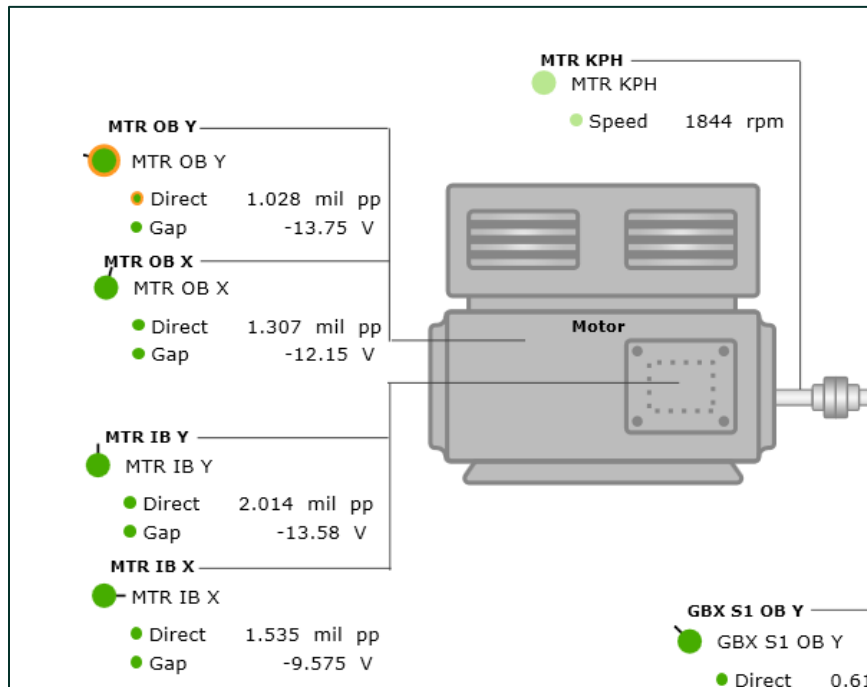


Figure 41: Measurement View set as "Point Name with Status"

When selecting "Tag Name with Status", the Point Name is swapped with the configured Tag Name. When selecting "Measurement Name with Status", the Point/Tag Name is removed from the view, with only the measurement name and value visible (Figure 42). Finally, "Value Only" removes the measurement name from the view, leaving only the value visible (Figure 43).

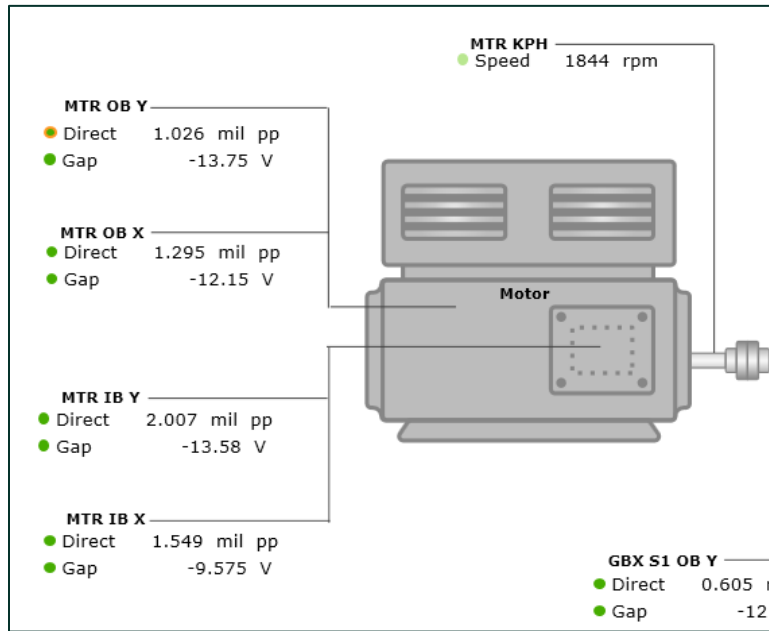


Figure 42: Measurement View set as "Measurement Name with Status"

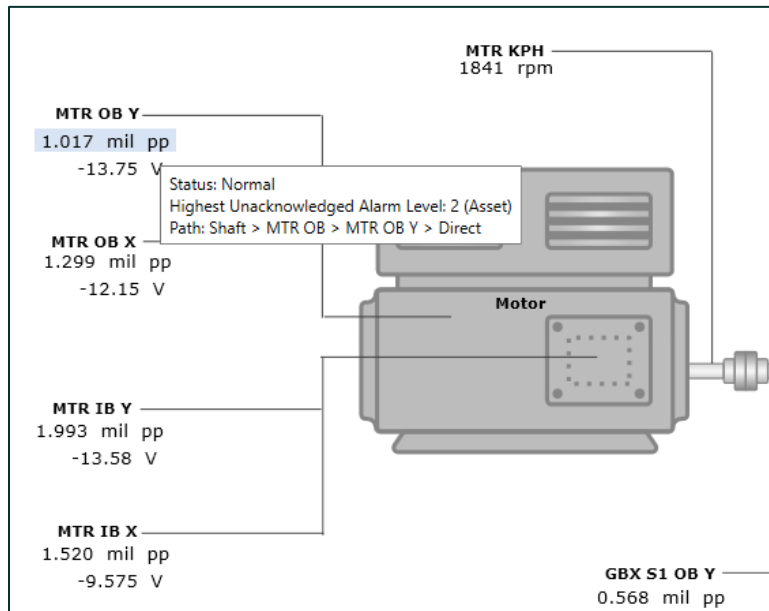


Figure 43: Measurement View set as "Value Only"

- PRO TIP 8:** Hovering over measurements displays a tooltip with alarm status and measurement path.
- PRO TIP 9:** To bulk update measurement tables, right-click in the workspace with no measurement tables selected and select the desired option. To update specific measurements, right-click on selected table(s).
- PRO TIP 10:** The right-click "Edit" option allows users to modify measurement text size, color, and style.

5.1.4 New HMI Symbols

Many new HMI symbols have been added to the HMI Library, expanding the Industrial Process views that can be modeled within System 1 (Figure 44). Added symbols include:

- Industries: Steel, Paper, Air Products
- Bentley Nevada Devices: 3500, Orbit60, Ranger Pro, Trendmaster DSM & TIM
- Network: Data Diode, Firewall, Server, Network Switch
- Equipment: Flare, Heat Exchanger, Cooling Tower, Gearbox

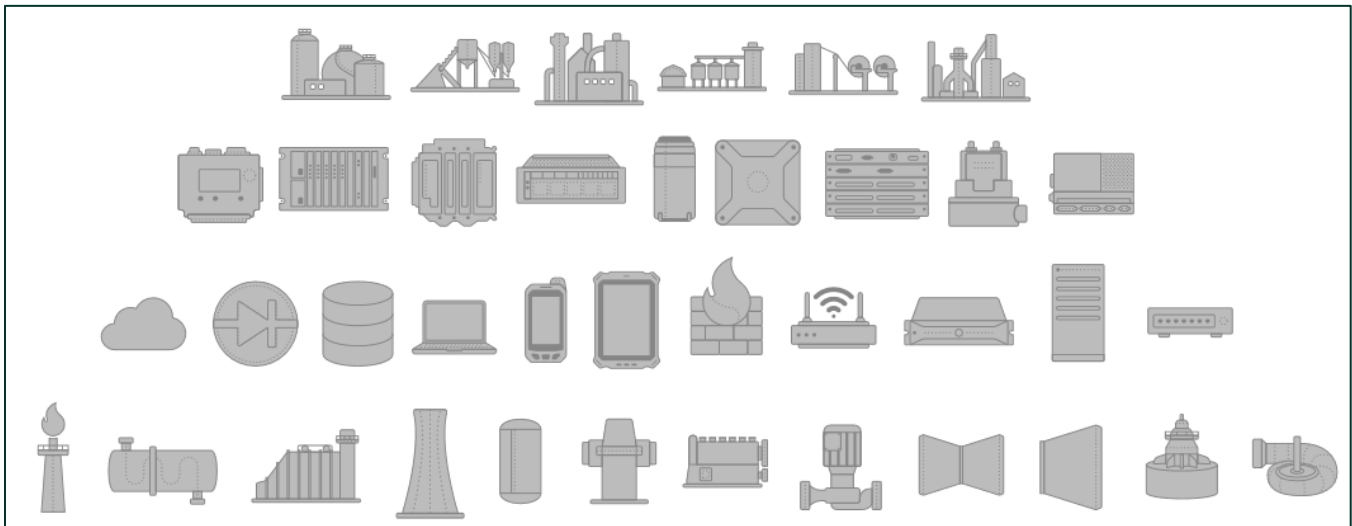


Figure 44: New HMI Symbols in Component Pane

PRO TIP 11: With symbols selected in the HMI builder, right-click and select "Edit" to modify the symbol properties. Properties that can be modified include size, fill color, and line color (Figure 45).

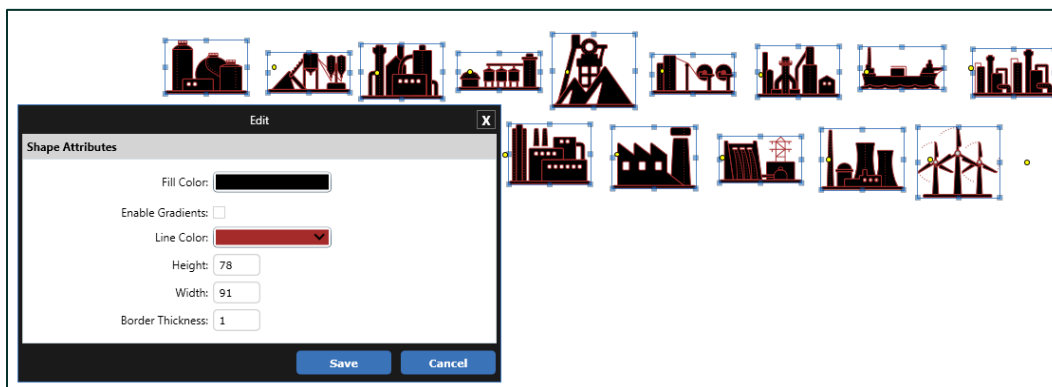


Figure 45: Symbol editing in HMI Builder

PRO TIP 12: When dragging content around the HMI workspace, lines appear to assist users with aligning content.

5.1.5 Device Views

HMI Views can now be built within the Devices Hierarchy. The interaction and workflow are identical to constructing views on the Machines Hierarchy. Enter Edit Mode, expose the library of symbols on the right-side of the workspace, and graphically depict your Network Architecture to visualize Device and System Health (Figure 46). The library has been extended to include Bentley device symbols and network symbols. Alarm Association and Navigation are also supported.

PRO TIP 13: Add a symbol representing the monitoring device to your Machine Train HMI view. In this way, you can visually depict the overall health of your device within the Machines Hierarchy and navigate from that view to the associated device when investigation is warranted.

PRO TIP 14: Remember to take advantage of the shortcut keys within the HMI Builder (documented in Help > Shortcut Keys). These include Copy/Paste, Delete, Bring to Front, Send to Back, and Flip.

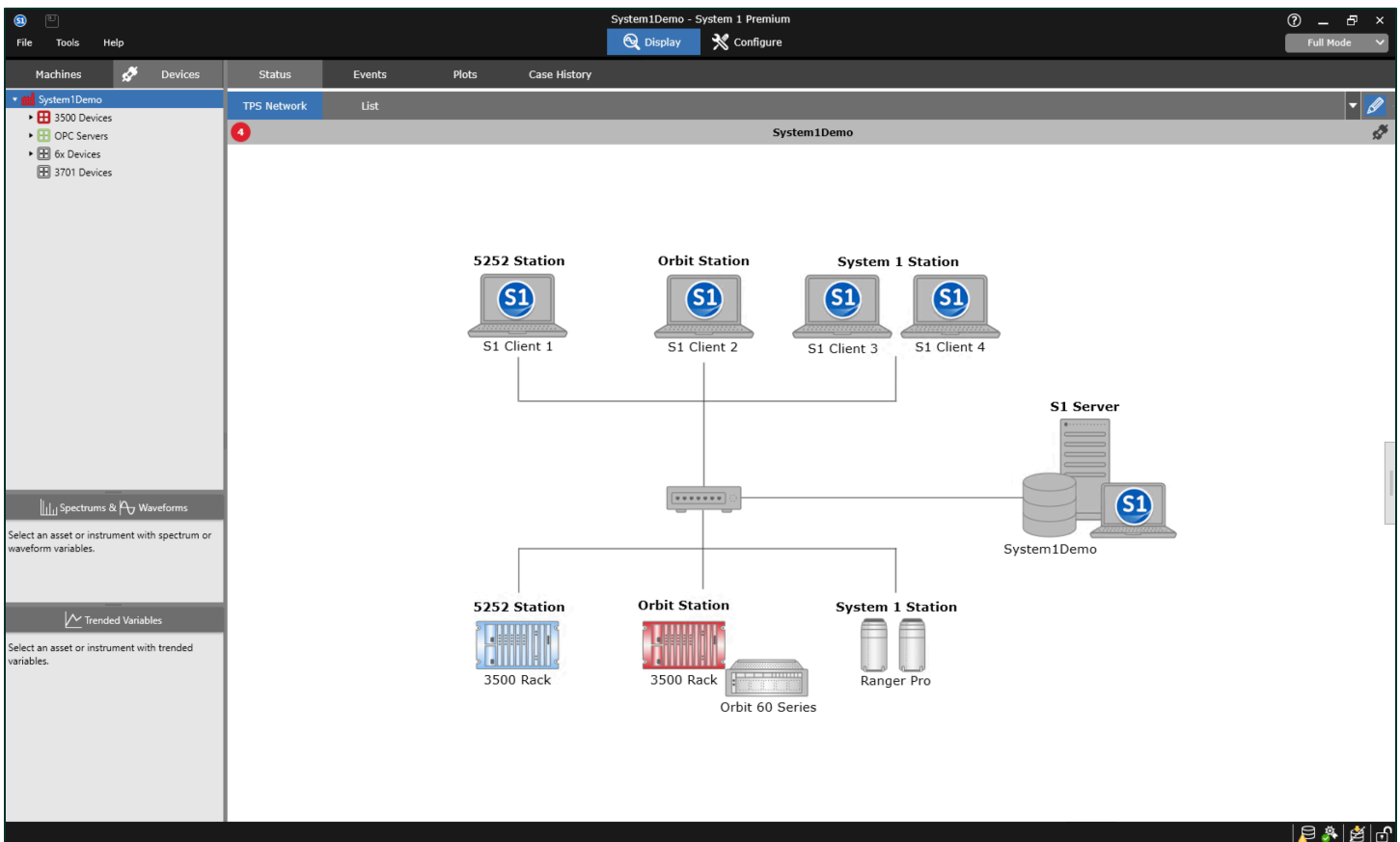


Figure 46: Utilizing Device and Network Symbols to create a Device Hierarchy HMI

5.2 Plots

5.2.1 State Data Filtering

State Data Filtering video located in Bentley Nevada Tech Support Training Library
[Valid M&S Agreement Required](#)

State-based data filtering within the Plots workspace is now supported! This filtering capability is only available for System 1 installations with **PostgreSQL** as the historian. It is applicable to all plots except polar, bode & shaft centerline.

This capability can be applied both globally within a plot set, as well as locally on an individual plot. To filter data globally, use the "Filter" icon to the right of the mini-trend region to launch the Select States dialog (Figure 47). This dialog shows all operating states that are configured for the machine train(s) plotted in the workspace. Simply select the desired state(s) and click Select to apply. All plots that support filtering will be refreshed to include data from the selected state(s) (Figure 48). To turn off filtering, click on the global filter button again.

To filter data locally, right-click on a plot that supports data filtering and select "Filter Data > Select States", which will launch the Select States dialog (Figure 49). To remove filtering locally, right-click on the plot where filtering was applied and select "Filter Data > All Data".

State filtering settings are preserved within User Defined Plot Sets and Plot Records.

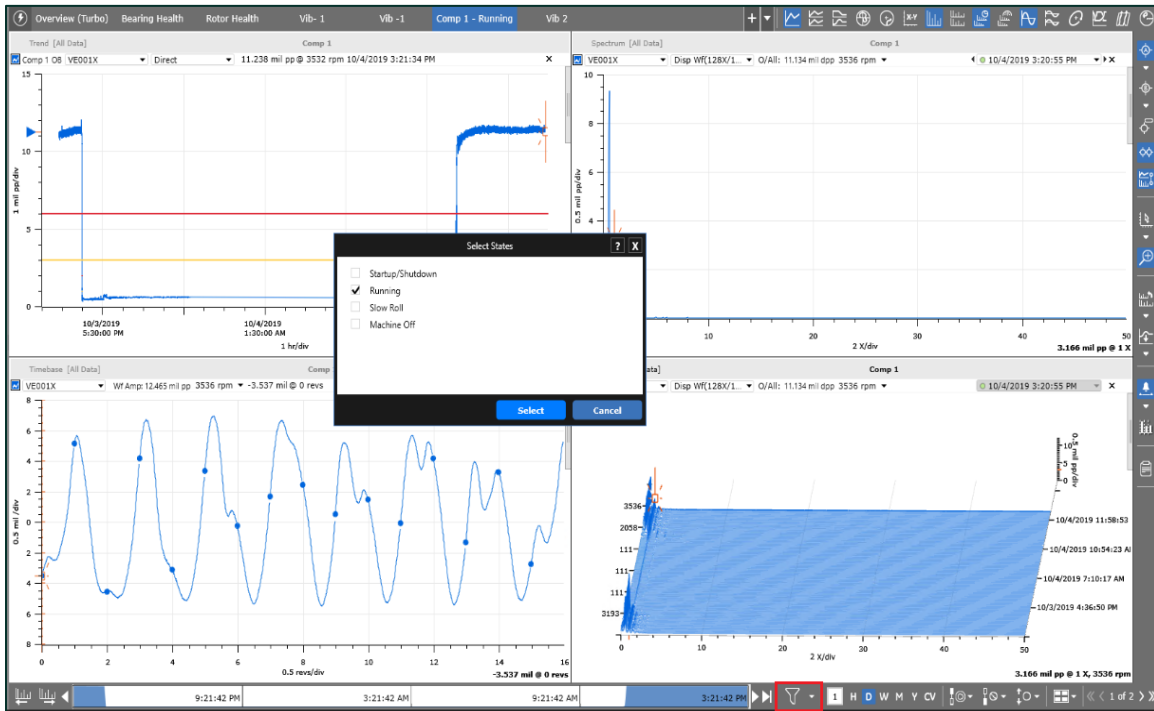


Figure 47: Global Filtering Tool, with "Select States" Dialog

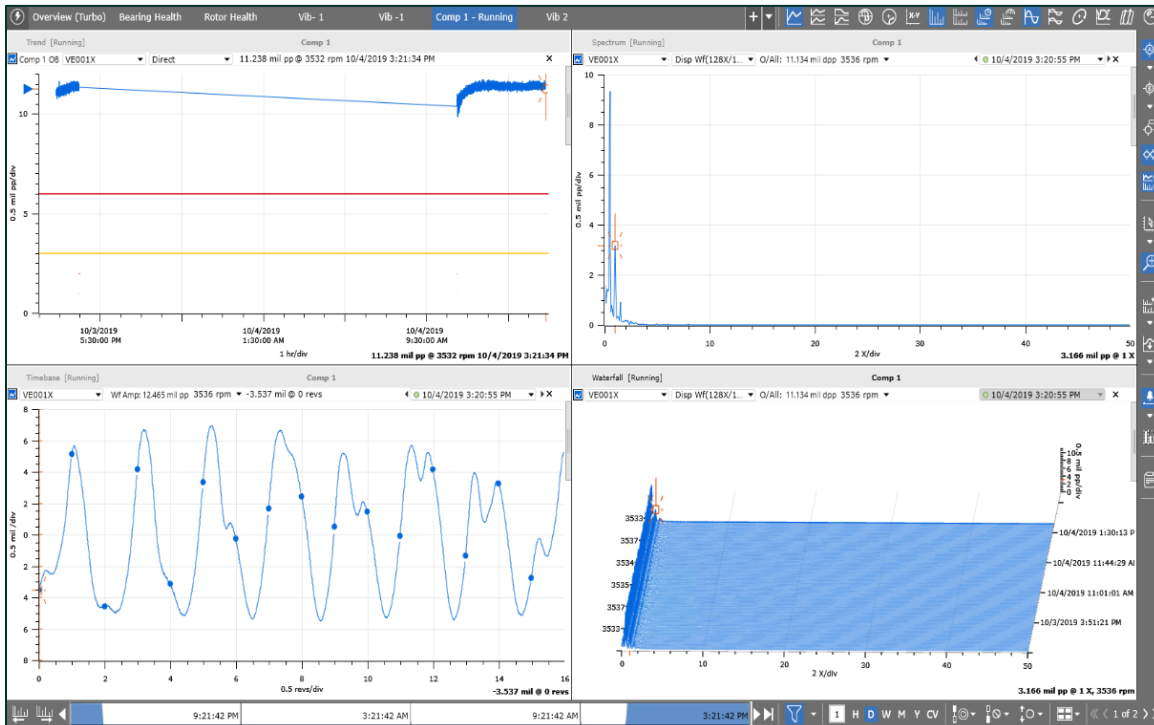


Figure 48: Plot Set filtered to include data from the Running state

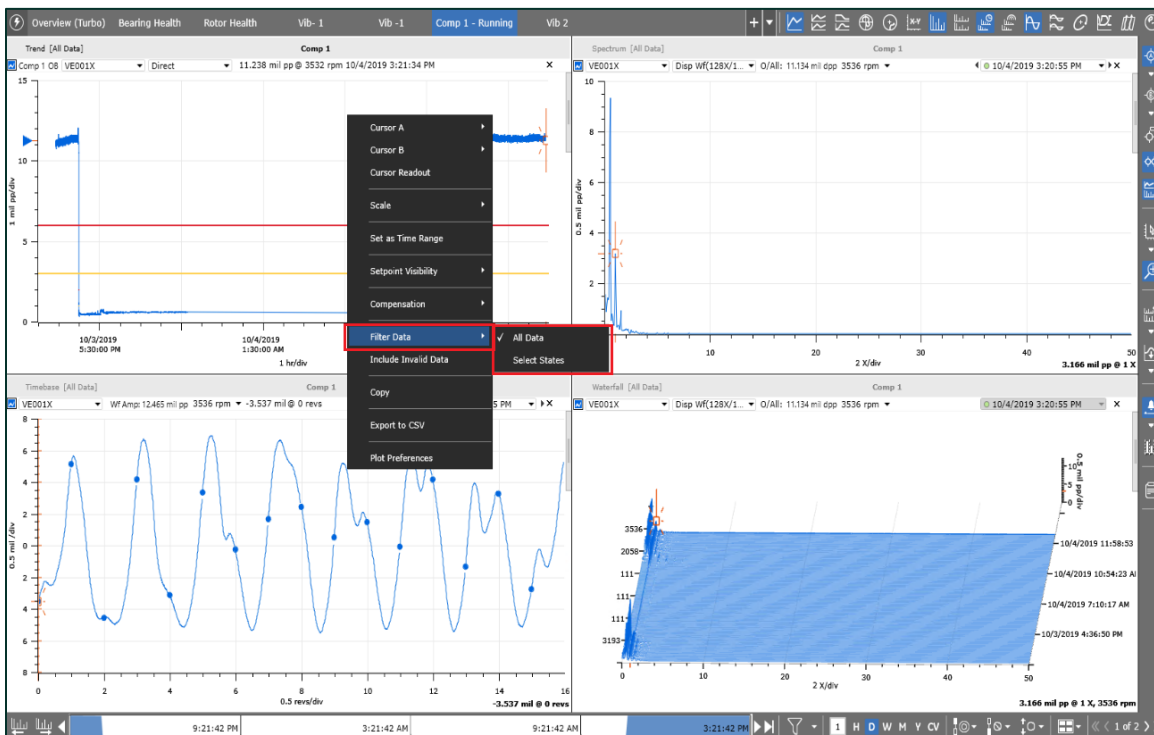


Figure 49: Local Filtering through right-click

5.2.2 Plot Set Save As

[Plot Set Enhancement video located in Bently Nevada Tech Support Training Library](#)
[Valid M&S Agreement Required](#)

In System 1 v19.2, users can now make modifications to existing User Defined Plot Sets and commit those changes to the existing plot set.

After making changes to an existing plot set within the plotting workspace (e.g., Plot Types, Tools, Time Range, Measurements), right-click on the tab and select "Save Existing Plot Set" (Figure 50). This will relaunch the Defined Plot Set dialog, with the previously committed "General" and "Details" properties of the Plot Set. If desired, modify any existing settings (e.g., Plot Set Name, Analyst, Description, etc.) and click "Save".

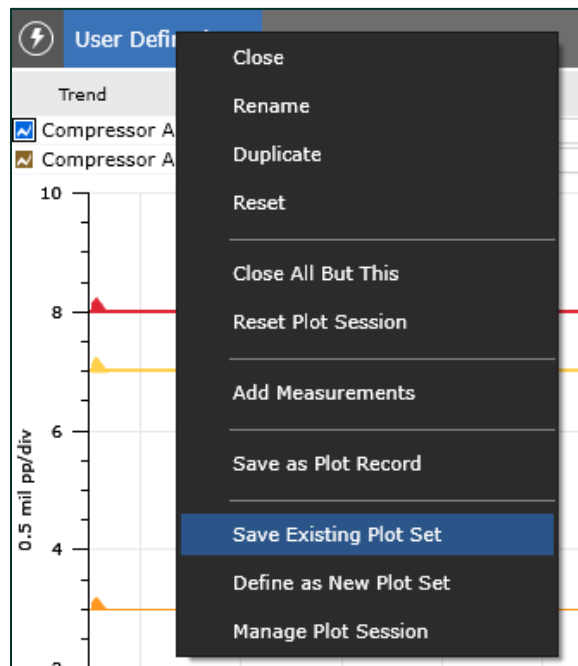


Figure 50: "Save Existing Plot Set" option

5.2.3 Plot Set Delete

[Plot Set Enhancement video located in Bently Nevada Tech Support Training Library](#)
[Valid M&S Agreement Required](#)

User Defined Plot Sets can now be deleted. To delete a defined plot set, right-click on the plot set tab and select "Manage Plot Session" (Figure 51). This will launch the Plot Session dialog.

To delete a defined plot set, move it from the "Selected" to the "Available" column. Then right-click on the Plot Set and select "Delete" (Figure 52). A confirmation dialog is launched to confirm the user action.

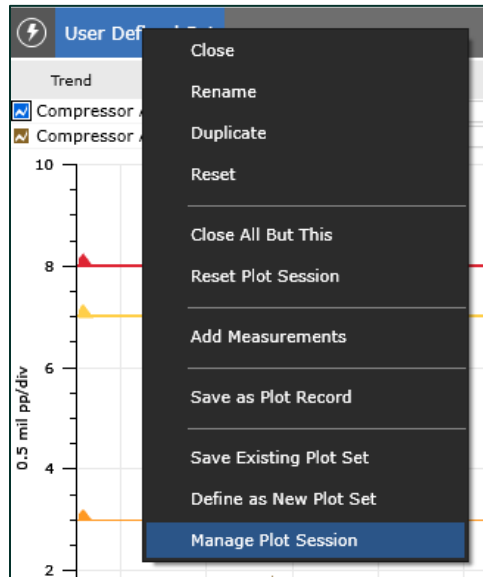


Figure 51: "Manage Plot Session" option

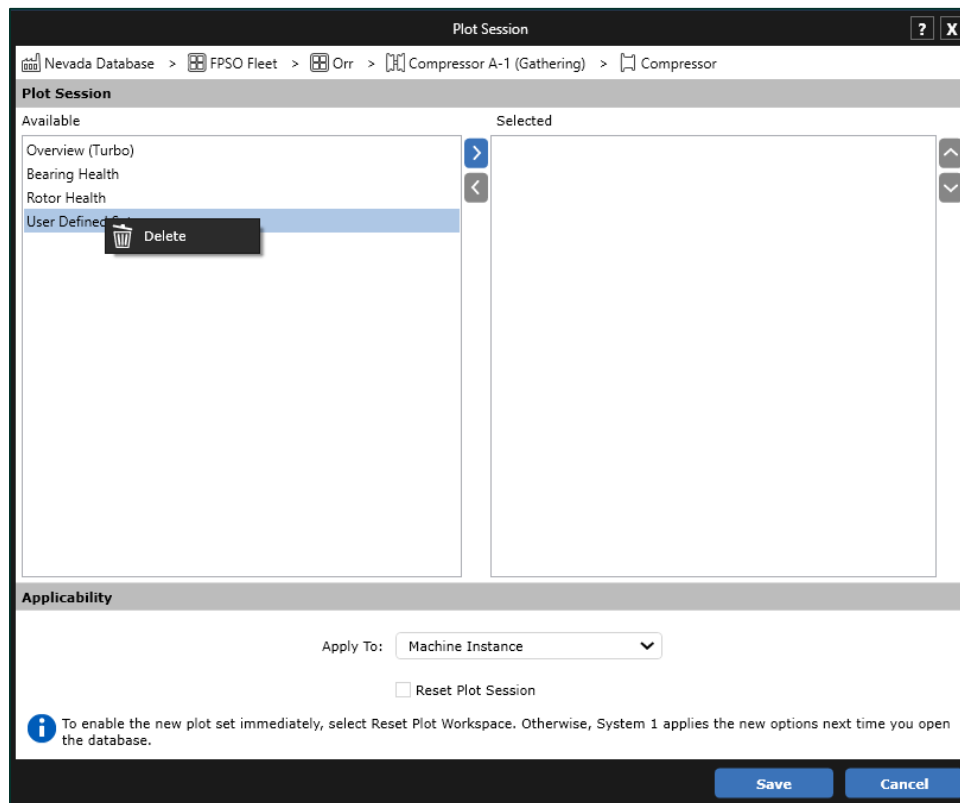


Figure 52: "Plot Session" dialog with Delete context menu

PRO TIP 15: Multiple user defined plot sets can be deleted at one time by multi-selecting the plot sets in the Available column, then right-clicking to delete.

5.2.4 Plot Set Time Management

[Plot Set Enhancement video located in Bentley Nevada Tech Support Training Library](#)
[Valid M&S Agreement Required](#)

An exciting addition to Plot Sets is the Time Setting property, providing users with more control over the default time range of their Plot Sets. Within the Defined Plot Set dialog, the Time Setting property has been added to the Details section (Figure 53). The property has four options (Table 9).

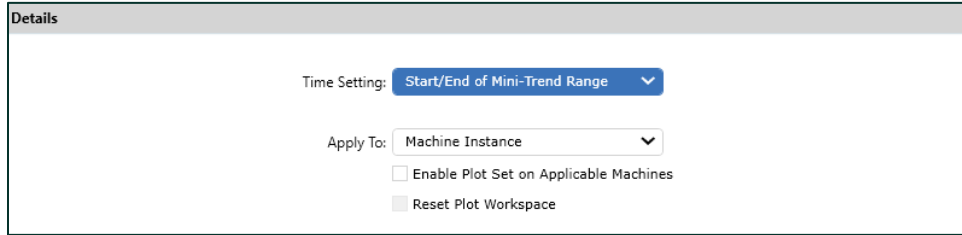


Figure 53: "Time Setting" option in Defined Plot Set dialog

Table 9: Time Setting Options

Time Setting	Description
Start/End of Mini-Trend Range	The start and end time of the Mini-Trend is applied to the plot set.
Present Time Minus Mini-Trend Range	Present time less span of the Mini-Trend is applied to the plot set.
Latest Sample Minus Mini-Trend Range	Obtains the time stamp of last sample found in the plot set and sets that as the end date. Subtracts the value of the Mini-Trend from the sample end date and applies it to the plot set. With online data, the resulting span will be similar to that of "Present Time Minus Mini-Trend Range". For offline data, this setting ensures that data is present within the range when the plot set is loaded
Current Values	The time setting is defaulted to Current Values.

For example, a Plot Set is saved with a mini-trend range of 4 weeks, spanning from 7-Sep-2019 to 5-Oct-2019. When the Time Setting is set to:

- "Start/End of Mini-Trend Range", the Defined Plot Set is loaded with the exact saved range (Figure 54).
- "Present Time Minus Mini-Trend Range", the Defined Plot Set is loaded with a time range of 4 weeks with the span ending at present time. In the example figure, present time was 15-Oct-2019 (Figure 55).
- "Latest Sample Minus Mini-Trend Range", the Defined Plot Set is loaded with a time range of 4 weeks with the span ending at the last stored sample. In the example figure, the data is from 3500, so the last stored sample was also on 15-Oct-2019 (Figure 56).
- Current Values, the Plot Set is loaded in the Current Values mode (Figure 57)

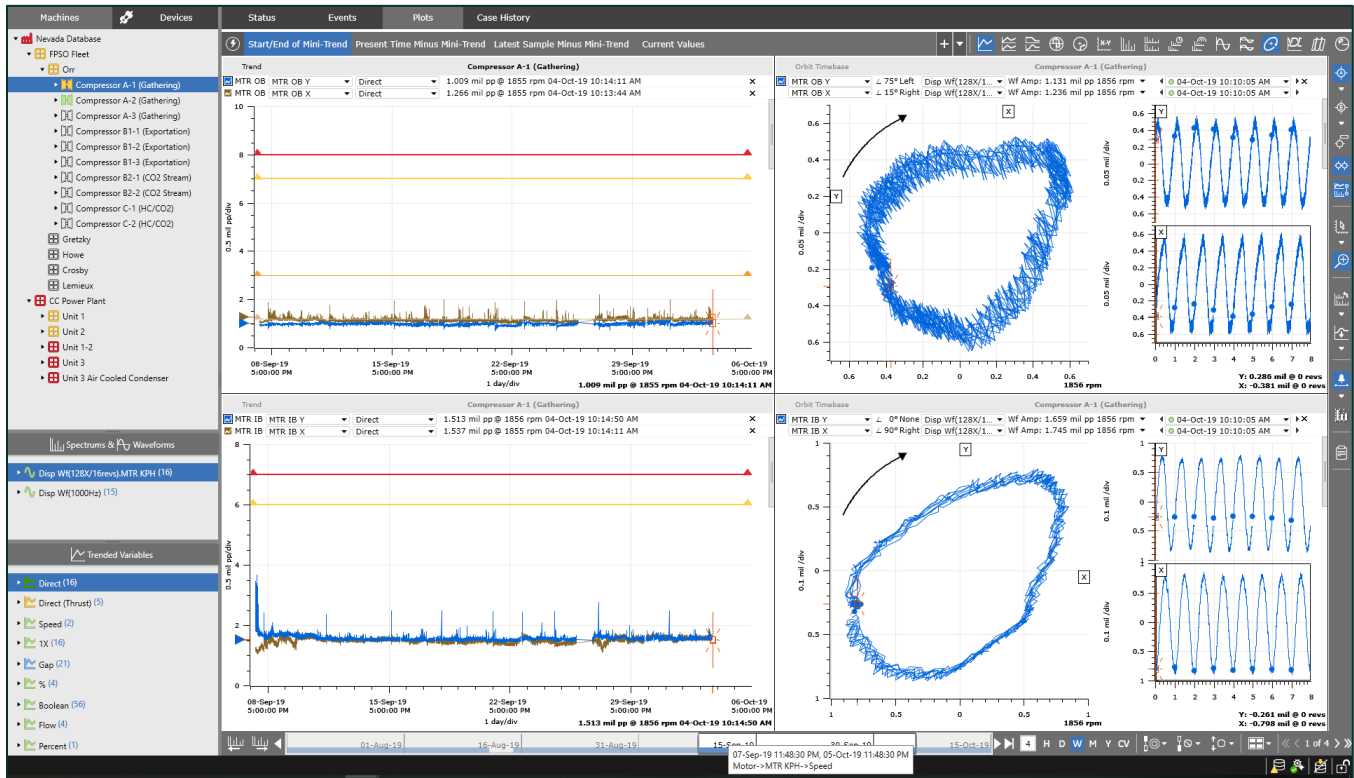


Figure 54: "Start/End of Mini-Trend Range"

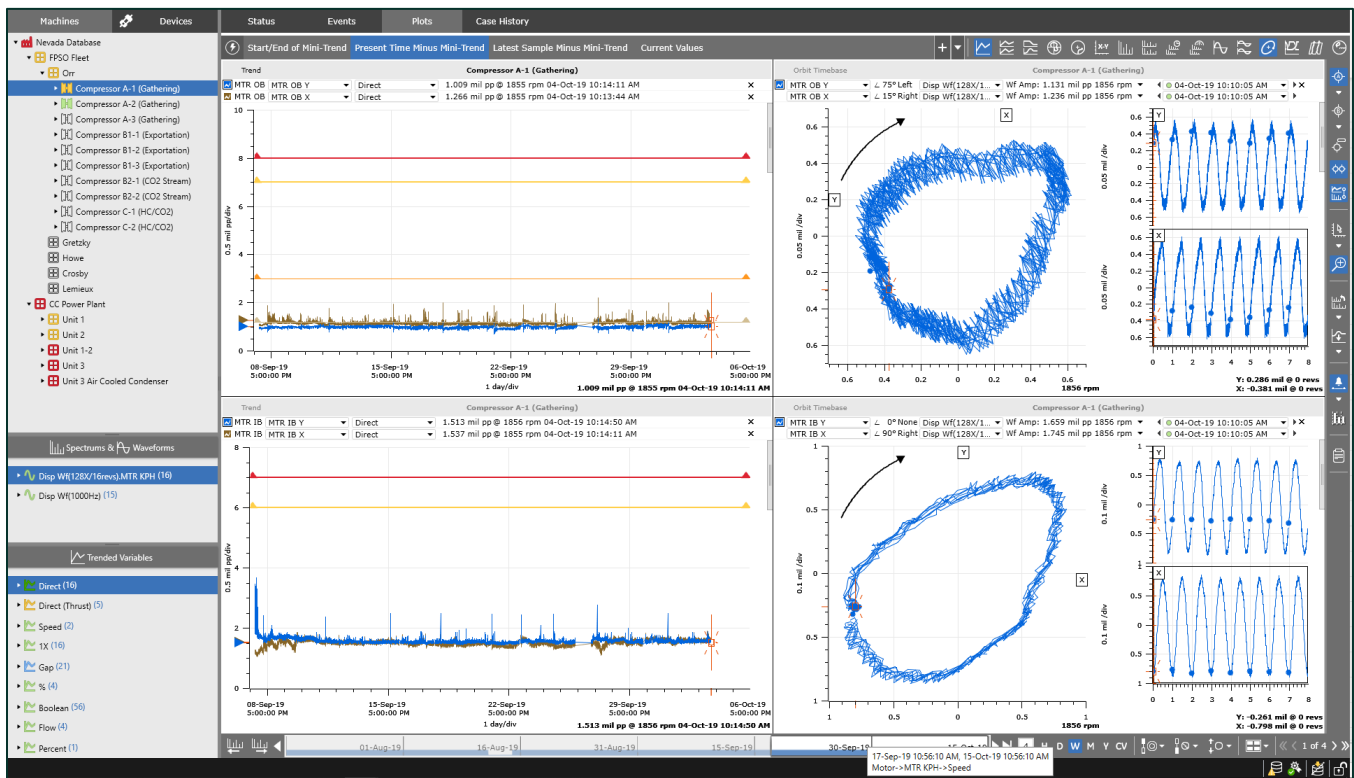


Figure 55: "Present Time Minus Mini-Trend Range"

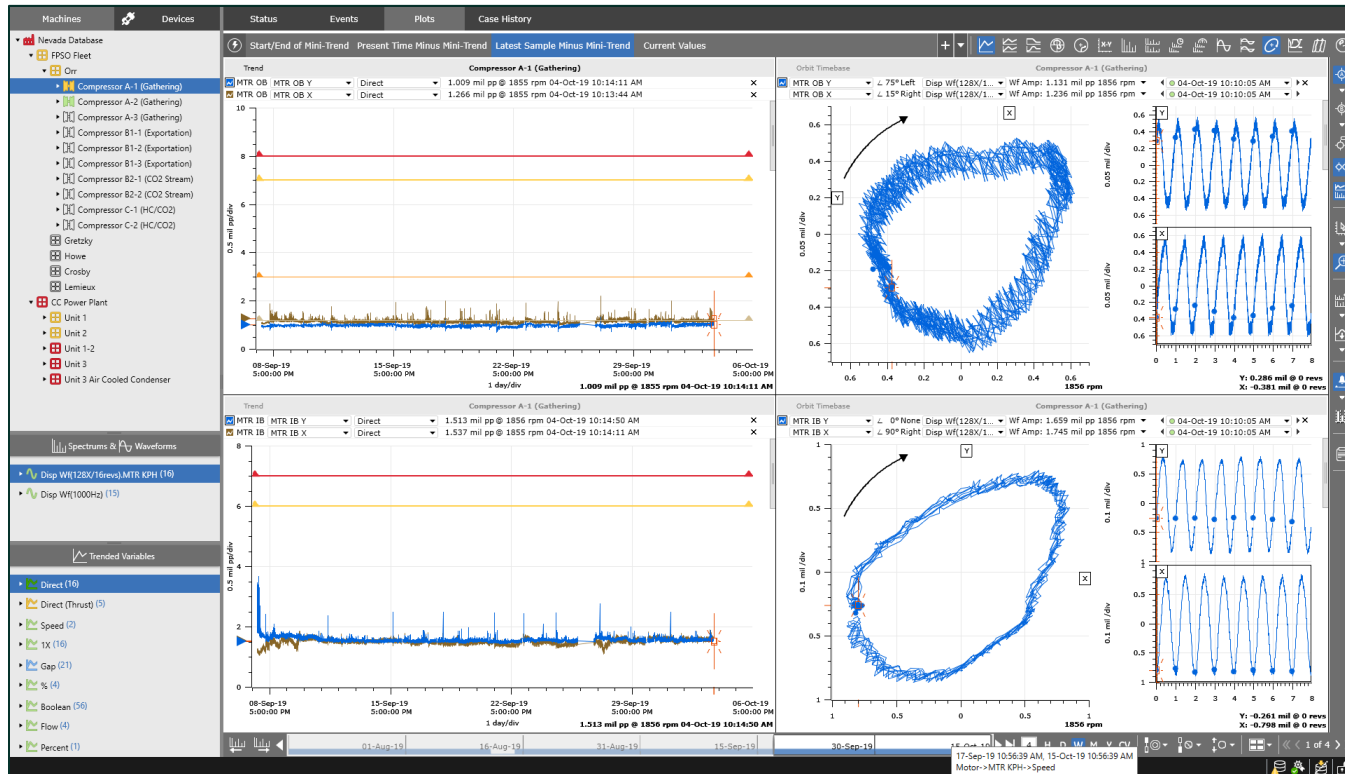


Figure 56: "Latest Sample Minus Mini-Trend Range"

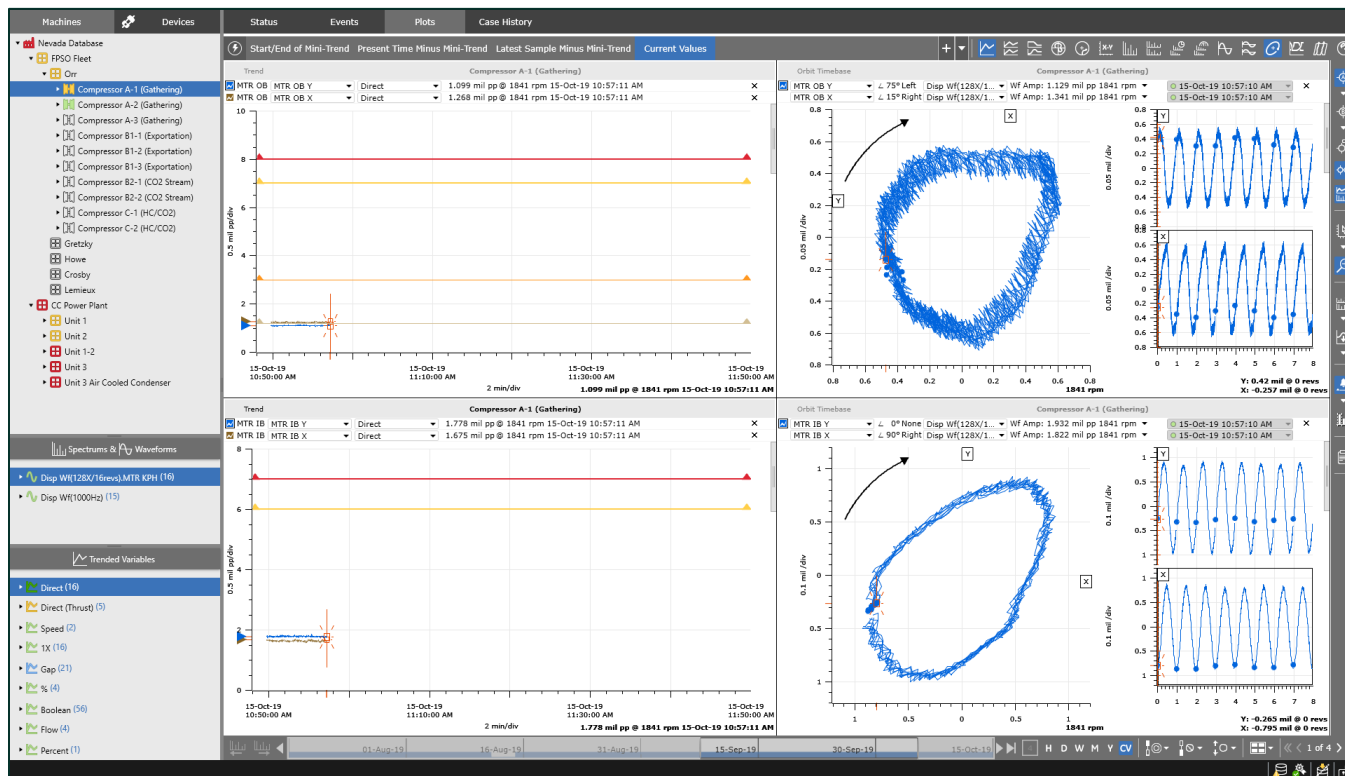


Figure 57: "Current Values"

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