Welcome to System 1 (and Decision Support (



Version 24.1 [May 2024]

Welcome

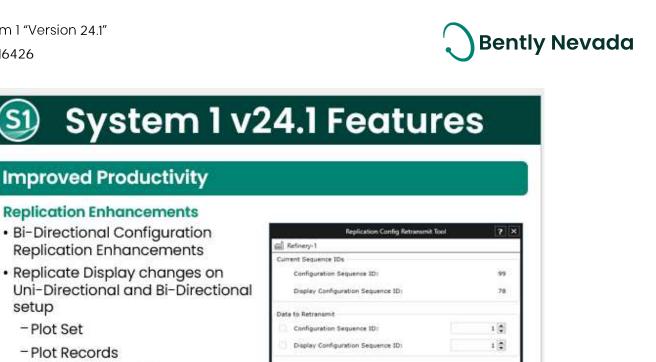
Bently Nevada is pleased to present System 1 (Figure 14.1.1-1) and System 1 Decision Support (Figure 1-2) version 24.1, with new capabilities.

Users upgrading to version 24.1 will benefit from the many capability enhancements to effective outcomes, which are summarized below.

Bently Nevada remains focused on delivering the world's premier plant-wide machinery management software through bi-annual product releases.

For a detailed overview of System 1, please visit the website.





- Plot Records

setup

- Plot Set

 Replication Extensibility Enhancements

Database Management

Remote Database Upgrade

Configuration Enhancements

- Channel Pairing for native Trendmaster DSM device
- Manual K & Z values for Isentropic Compression Process
- Additional Machine properties and Points

Edge Devices Monitoring

Orbit60

- Multiple CMMs under one device hierarchy in System 1 (Scalability)
- Recips Velocity System 1 Integration & Support
- Impulse acceleration channel enhancements



Figure 1-1 System 1 v24.1 Features



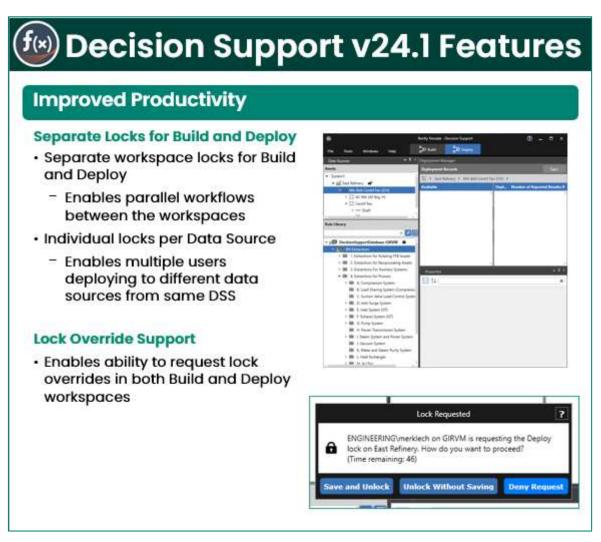


Figure 1-2 Decision Support v24.1 Features

Thank you,

by & Signt

Jeff Sipek, Product Manager

On behalf of your System 1 and DS Leadership and Development Teams



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1. SYSTEM 1 V24.1 FEATURE OVERVIEW

Table -4.1.1-1.1 : System 1 v24.1 – Improved Productivity

	Improved Productivity	
	Replication Enhancements	
Bi-directional Config Replication Enhancements	System 1 allows bi-directional replication of configuration. Users can add assets and OPC DA and UA servers from both the Rx and Tx. This allows users to securely modify configuration from the business network.	3.1.1
Replication Extensibility Enhancements	System 1 allows addition of OPC DA and UA servers to Rx databases. System 1 also allows import and export of data to and from the Rx databases using the OPC protocol. Also, users can send and receive portable data to and from the Rx databases.	3.1.2
Plot Set and Plot Records Replication	System 1 allows replication of display changes in uni-directional as well as bi-directional replication setups. The display changes supported now include Plot Sets and Plot Records, in addition to the HMIs and Performance Maps, available in version 23.2.	3.1.3
	Database Management	
Remote Database Upgrade	System 1 allows users to upgrade multiple databases on different servers remotely.	3.2.1
	Configuration Enhancements	
Support Channel Pairing for native Trendmaster DSM device	System 1 allows users to pair the X-Y channels of Trendmaster DSM that are either added natively or migrated from System 1 Classic.	3.3.1
Manually input K & Z values for Isentropic Compression Process	System 1 enables users to enter K & Z values which are processed by the Equation of States selected for Isentropic Compression Process for Recip Compressors.	3.3.2



Table -1.4.1.1-2 : System 1 v24.1 – Edge Devices Monitoring

Edge Devices Monitoring						
	Orbit 60					
Multiple CMMs under an	System 1 allows users to add up to 4 CMMs (Condition Monitoring Module) under an Orbit 60 Series device in the Devices hierarchy.	4.1.1				
Orbit 60 device hierarchy in System 1 (Scalability)	Multiple CMMs help to distribute configuration among different CMMs without duplicating protection data and events in System 1.	4.1.1				
Recips Velocity - System 1 Integration & Support	System 1 supports addition of Orbit 60 System with Recip Velocity channel and displays its protection data and events. Users can edit, delete, and add waveforms under the Recip velocity channel and also add System 1 trended variables.	4.1.2				
Recip Impulse Acceleration Channel enhancements	System 1 supports addition of Orbit 60 System with Recip Impulse Acceleration channel and displays its protection data and events. Users can edit, delete, and add waveforms under Recip velocity channel and also add System 1 trended variables.	4.1.3				



2. DECISION SUPPORT V24.1 FEATURE OVERVIEW

Table 2.1 Decision Support v24.1 Features

	Features	
	Decision Support has separate locks in Build and Deploy	
Separate Locks for Build and Deploy	workspaces to enable parallel workflows as well as deploying	5.1
	to different databases from the same rule library.	
Lock Override Support	Decision Support supports requesting lock overrides from	5.2
Lock Override Support	users who own locks in either Build or Deploy.	J.Z

2.1 Decision support is now available to download

Valid M&S Agreement Required

Starting with System 1 version 23.2, Decision Support Developer will be included with all new orders of System 1. Decision Support and System 1 both remain as separate products. However, they will be delivered through the same download folder in Flexera. Decision Support is now part of the System 1 package, and therefore does not require a separate license for installation. This excludes the Decision Support Analytics (formerly known as InsightPaks) and the DS Analytics library, which also remains as a separate commercial product. For more information on this change, contact your sales manager.

2.2 Decision Support Analytics Support

Existing installations of Decision Support Analytics are supported with Decision Support v23.2. However, if installing Decision Support Analytics for the first time after installing Decision Support v23.2, the latest version of Decision Support Analytics is required.



3. VERSION SUPPORT & OPERATING SYSTEM COMPATIBILITY

3.1 System 1

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

New Versions of System 1 benefit from:

- Compatibility with the latest Microsoft Client & Server Operating Systems
- Client backwards compatibility to previous versions under support (24.1 Client to 22.2 Server DB)
- Database upgrade from previous versions released within last 3 years (21.2 \rightarrow 24.1)
- For Replicated setups, database upgrade of Tx and Rx databases from previous versions released within last 2 years (22.2→24.1)
- Security patch and 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, however, escalation to engineering is not available. Users are encouraged to update software to the latest version to benefit from new features, OS (Operating System) compatibility, and bug fixes.

Syste	em 1 Versions	s & Support	V	lindows	Server (OS	Windo	ows Clien (64bit)	t OS
Version	Available	End of Support	2022	2019	2016	2012 R2	11*	10**	8.1 U1
24.1	May 2024	May 2026	~	~	✓		~	~	
23.2	Nov 2023	Nov 2025	✓	×	✓		✓	~	
23.1	May 2023	May 2025	~	×	~		✓	~	
22.2	Nov 2022	Nov 2024	~	×	✓	~	✓	~	~
22.1	May 2022	May 2024	✓	×	✓	✓	✓	~	~
21.2	Nov 2021	Nov 2023		*	~	×		~	~

Table 4.1.1-1 : System 1 Version Support & OS Compatibility Matrix

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*Windows 11 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 11 under support as published on their website based on the System 1 version's published date of availability.

System 1 v24.1 (Windows 11 Pro/Enterprise 23H2, 22H2) System 1 v23.2 (Windows 11 Pro/Enterprise 22H2, 21H2) System 1 v23.1 (Windows 11 Pro/Enterprise 22H2, 21H2) System 1 v22.2 (Windows 11 Pro/Enterprise 21H2) System 1 v22.1 (Windows 11 Pro/Enterprise 21H2)

**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 v24.1 (Windows 10 Pro/Enterprise 22H2) System 1 v23.2 (Windows 10 Pro/Enterprise 22H2, 21H2) System 1 v23.1 (Windows 10 Pro/Enterprise 22H2, 21H2) System 1 v22.2 (Windows 10 Pro/Enterprise 22H2, 21H2, 21H1) System 1 v22.1 (Windows 10 Pro/Enterprise 21H2, 21H1, 20H2) System 1 v21.2 (Windows 10 Pro/Enterprise 21H1, 20H2, 2004)



3.2 Decision Support

System 1 Decision Support follows a semi-annual release cadence. Versions are fully supported for a minimum of two years from the published date of availability (see below).

System 1 Compatibility

• Decision Support is designed to work with System 1 version 20.1 and newer, utilizing PostgreSQL for Historical Database (Proficy not supported)

New Versions of System 1 Decision Support Benefit from:

- Compatibility with the latest Microsoft Client & Server Operating Systems
- Client backwards compatibility to previous versions under support (24.1 Client to 20.1 Server DB)
- 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.



4.IMPROVED PRODUCTIVITY

4.1 Replication Enhancements

Replication Enhancements video located in Bently Nevada Tech Support Training Library Valid M&S Agreement Required

4.1.1 Bi-directional Configuration Replication Enhancements

System 1 v24.1 now supports the addition of new assets to bidirectional Tx databases from the associated Rx database, which also includes receiving off-route configurations from portable devices. This functionality is not available in Bently-defined train assets for Wind license.

Replication Config Retransmit Tool	? ×
🛗 Refinery-1	
Current Sequence IDs]
Configuration Sequence ID:	99
Display Configuration Sequence ID:	78
Data to Retransmit	
Configuration Sequence ID:	1
Display Configuration Sequence ID:	1
Request Retransmit	Cancel

Figure 4.1-1 – Replication Config Retransmit Tool for both Rx and Tx databases

Additionally, the Replication Config Retransmit tool is also now available on the Rx in bi-directional mode, which enables retransmit of configuration data from the Rx to Tx for troubleshooting purposes. The tool now displays sequence numbers for configuration and display configuration databases, and has the Data to Retransmit fields on Tx as well as Rx.



4.1.2 Replication Extensibility Enhancements

System 1 v24.1 allows users to configure Rx databases for direct communication with OPC Servers located on the Rx network. This is available for both OPC UA and OPC DA Servers. OPC Servers can be added to both unidirectional and bidirectional Rx databases. For unidirectional databases, the OPC Server can communicate only through the Rx network. However, for bidirectional databases, the OPC server can be set to communicate either through the Rx or Tx network using the "Server Location" property.

Features		23.2	24.1
reatures	System1Tx	System1Rx	System1Rx
OPC UA Import			
Static	Y	Ν	Y
Async Waveform	Y	N	Y
OPC UA Export			
Static	Y	Y	Y
Waveform	Y	Y	Y
Alarms and Events	Y	Y	Y
System health events	Y	Y	Y
OPC DA Import			
Static	Y	Υ*	Y
OPC DA Export			
Static	Y	Y*	Y
Health Status	Y	Y*	Y

Table 4.1.2-1 OPC Import/Export

Y* - Partially supported by configuring it on TX

Additionally, System 1 now supports export of data using the OPC protocol from the Rx database. It also supports sending and receiving of portable data from and to the Rx database. These functionalities are available for both unidirectional and bidirectional Rx databases. For bidirectional databases, the synchronization of imported data back to the Tx database is restricted.



4.1.3 Plot Set and Plot Record Replication

System 1 v24.1 now supports replication of display changes in Plot Sets and Plot Records, in addition to the already supported HMI diagrams and Performance Maps, in both Unidirectional and Bi-directional replication modes. To replicate display changes, users need to select the Include Display Changes check box under Replication Settings on the Tx database. This option replicates all changes made to Plot Sets and Plot Records.

Replication Settings	
File Creation Rate:	20 Sec 🗸
Data to Include:	✓ Trend
	All V Trended Variables 1 hour V Spectrum and Waveforms Alarm and Startup/Shutdown
Events to Include:	 ✓ Alarms ✓ System Health
Include Display Changes:	Ensure that a Display Change Priority option is selected on the Rx server to replicate display changes.

Figure 4.1-2 - Include Display Changes option in Database Replication tab of Database Manager

To resolve any conflicts in display changes between Tx and Rx, on the Rx side, the users must choose a Display Change Priority option. The "Take Tx changes" option prioritizes Tx changes and overwrites the Rx changes. The "Ignore Tx Changes" option retains Rx changes and ignores Tx changes. Newly added Plot Sets and Plot Records are replicated regardless of the Display Change Priority selection. Tx deletions are only replicated if the priority is set to "Take Tx Changes".

General		
Database:	Refinery-2	Browse
Replication Type:	Receiver 🗸	
Receive Data Location:	C:\Replication Drop	Browse
Send Data Location:	C:\Rx Send	Browse
	Ensure System 1 Replication Service has folder. Check help for further information	s write and read permissions on the destination n.
Configuration Type:	Bi-directional 🗸	
Replication Settings		
Display Change Priority:	Take Tx Changes	

Figure 4.1-3 - Display Change Priority in Database Replication tab of Database Manager



4.2 Database Enhancements

Database Enhancements video located in Bently Nevada Tech Support Training Library Valid M&S Agreement Required

4.2.1 Remote Database Upgrade

System 1 v24.1 can upgrade System 1 Databases from a remote client in the same network. In the Upgrade tab of System 1 Database Manager, users can enter the server name or IP address to add and list the databases within the server. The current and the latest version of the database is displayed. Users can choose the databases within each server to upgrade. Multiple databases from different servers can be upgraded at the same time. Within a server, System 1 can upgrade up to three databases concurrently. The status column indicates the status of the database upgrade: Not Started, In progress, Successful, and Failed. If the database row appears dimmed, users can hover over it to display more information.

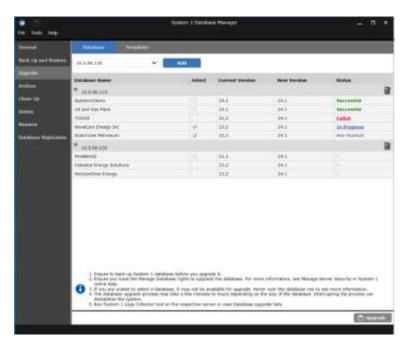


Figure 4.2.1-1 Remote Database Upgrade Pane



4.3 Configuration Enhancements

Configuration Enhancements video located in Bently Nevada Tech Support Training

Library

Valid M&S Agreement Required

4.3.1 Support Channel Pairing for native Trendmaster DSM device

System 1 version 24.1 supports addition, modification, and deletion of channel pairs for Trendmaster DSM device that are either added natively or migrated from System 1 Classic. The paired channel information is sent to the DSM device and the device returns time synchronized data for the paired channels. The data can be viewed in System 1 plots such as Orbit time base, Full spectrum, and average shaft centerline.

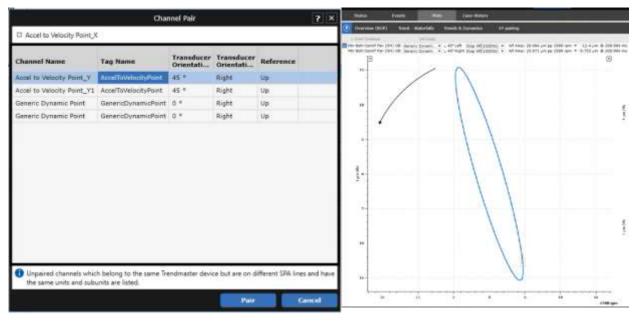


Figure 4.3.1-1 X-Y Channel pairing and Orbit Plot

4.3.2 Manually input K & Z values for Isentropic Compression Process

System 1 version 24.1 allows users to edit K & Z constants by selecting the "User Defined" option in the Compressibility settings in the Configure workspace. The user entered values are processed by the Equation of States configured in the Isentropic compression process. The theoretical Adiabatic curve changes based on the user entered values and the same can be validated on PV and Pressure v/s Crank angle plots. To determine the optimum value for constants, users can test the effect of changes in K & Z values on the Theoretical Adiabatic curve using the context menu from the Display workspace. After they determine the final set of values, they can update it in the Configure workspace to permanently apply the values. Apart from the theoretical Adiabatic curve,



some software calculated variables are also recalculated based on the user entered K and Z values. Note that the updated K and Z values does not affect any historical data, only the new data is calculated based on the user defined values.

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al Oil and Gas > 디아	elip Cmp					
9ages						
Property	Stage1	Stage 2	Stage 3	Stage 4		
General General						
Name	Stage1	Stage 2	Stage 3	Stage 4		
Gas Composition	Winter Normal Feed	Winter Normal Feed	Winter Normal Feed	Winter Normal Feed		
Gas Model	Peng-Robinson	Peng-Robinson	Peng-Robinson	Peng-Robinson		
Chamber / Stage A	Association					
Throw > Cylinder	CE Chamber / HE Chamber	None	None	None		
Throw 2 > Cylinder	None	CE Chamber / HE Chamber	None	None		
Throw 3 > Cylinder	None	None	CE Chamber / HE Chamber	None		
Throw 4 > Cylinder	None	None	None	CE Chamber / HE Chamber		
Chamber Process I	Parameters					
Suction Temperature	125.0 %	100.0 -r	125.0 °F	100.0 °F		
Discharge Temperature	209.0 *	176.0 **	209.0 *F	176.0 -		
Suttion Pressure	0.1 psi (a)	0.1 psi (a)	0.1 psl (a)	0.1 psi (a)		
Discharge Pressure	0.1 psi (a)	0.1 psi (a)	0.1 psi (a)	0.1 psi (a)		
Compressibility Co	nstants					
Compressibility Setting	User Defined	Calculated	User Defined	User Defined		
2 Standard	0.5	0.996	0.996	0.998		
2 Suction	0.5	1.0	0.997	0.97		
2. Discharge	0.5	1.0	0.998	1.403		
K Average	1.0	1,251	1.245	3.67		
A Suction	1	3.259	1.254	3.67		

Figure 4.3.2-1 Isentropic Compression Process Configuration with User Defined K & Z values

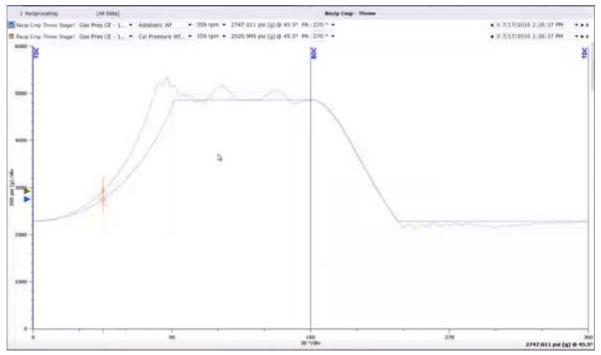


Figure 4.3.2-2 Non-Adjusted Adiabatic waveform

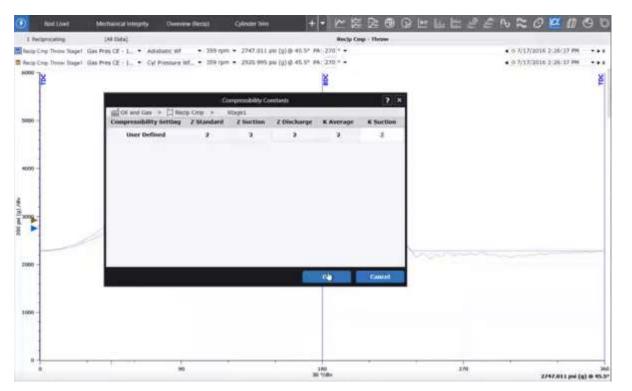


Figure 4.3.2-4 Editing User Defined Compressibility constants from Display workspace

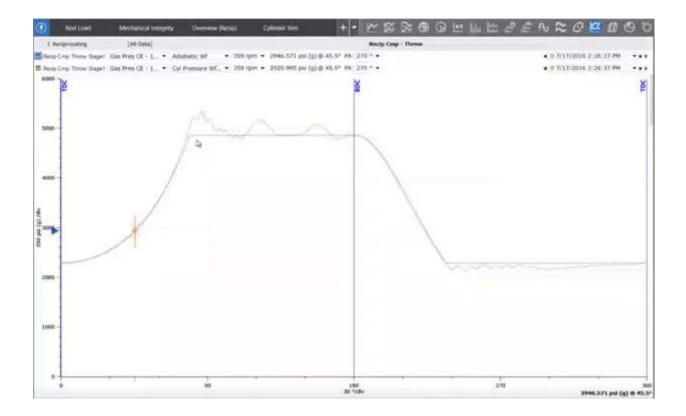


Figure 4.3.2-3 Adjusted Adiabatic waveform

Bently Nevada



5. DEVICE CONNECTIVITY

5.1 Orbit60

Orbit60 Enhancements video located in Bently Nevada Tech Support Training Library Valid M&S Agreement Required

5.1.1 Multiple CMMs under an Orbit 60 device hierarchy in System 1 (Scalability)

Till version 23.2, System 1 only supported one Condition Monitoring Module (CMM) under each device. If another CMM was added, it got added as a separate Orbit 60 device, which results in duplicate data and events. To overcome this limitation, System 1 version 24.1 now supports up to four CMMs under an Orbit 60 Series System in the Device hierarchy without duplicating data and events coming from the device. This functionality helps users to scale their system by distributing management configuration between multiple CMMs and configuring more waveforms to perform better diagnostics. System 1 enables users to assign CMMs to collection groups and channels. Users can view the utilization of each CMM in the CM Module Utilization dialog and then distribute configuration accordingly.

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Figure 5.1.1-1 CMM association with Collection group and CMM Utilization dialog



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Figure 5.1.1-2 CMM association with channels and CMM Utilization dialog

5.1.2 Recips Velocity - System 1 Integration & Support

System 1 version 24.1 now supports Orbit 60 series device with Recip Velocity channel configured. System 1 displays channel, measurement, and setpoint configurations for Recip Velocity channel in read-only mode. Users can add, edit, and delete Synchronous and

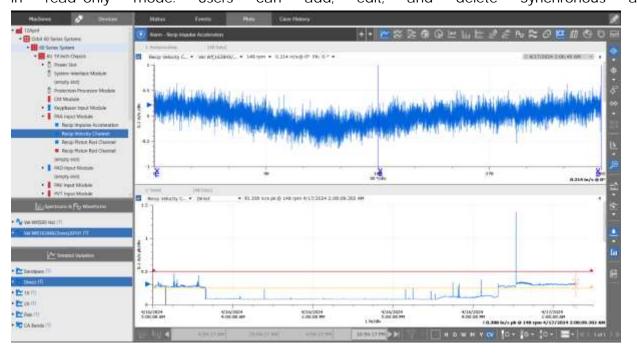


Figure 5.1.2-1 Recip Velocity waveform and static variable trend plot



Asynchronous waveforms under the Recip Velocity channel and then send the configuration to CMM. The maximum waveform sample size supported for both Sync and Async waveforms is 32,000. For Synchronous waveform, the sampling rate is in the order of 2. Users can add System 1 calculated variables under the Recip velocity channel and trend the data.

5.1.3 Recip Impulse Acceleration Channel Enhancement

System 1 version 23.2 supported the Recip Impulse Acceleration Channel's Direct and Bias measurements. System 1 version 24.1 now supports Orbit 60 series device with Recip Impulse Acceleration channel configured and displays all the additional static measurements and waveforms which are supported in Orbit 60 version 24.1. Users can now add, edit, and delete Synchronous, Filtered Synchronous, and Asynchronous waveforms under Recip Impulse Acceleration channel and then send the configuration to CMM. Maximum waveform sample size for both Sync and Async waveforms is 32,000. For Synchronous waveform, the sampling rate is in the order of 2. Users can add System 1 calculated variables under the Recip Impulse Acceleration channel and trend the data.

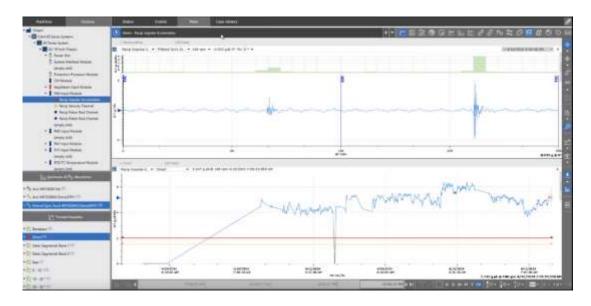


Figure 5.1.3-1 Recip Impulse Acceleration waveform and static variable trend plot



6. DECISION SUPPORT V24.1 FEATURES

DS Enhancements video located in Bently Nevada Tech Support Training Library Valid M&S Agreement Required

6.1 Updates to Locking Mechanisms

6.1.1 Separate Locks for Build and Deploy

Decision Support v24.1 supports separate locks for the Build and Deploy workspaces, further enabling parallel workflows. Users can request and return locks on rule libraries in Build as well as data sources in Deploy, the latter of which enables multiple users to deploy to different System 1 databases from the same rule library.

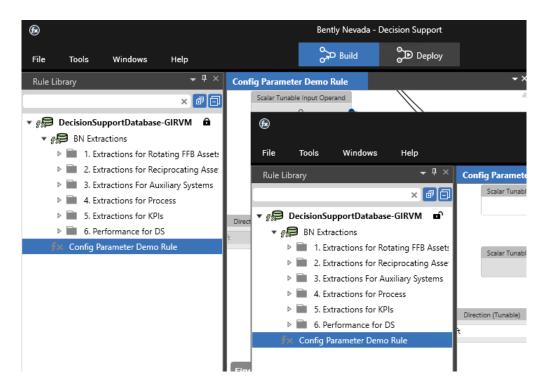


Figure 6.1.1-1 Two clients with the same open rule library in the Build workspace. The forward client owns the rule library Build lock while the background client is locked out from editing.

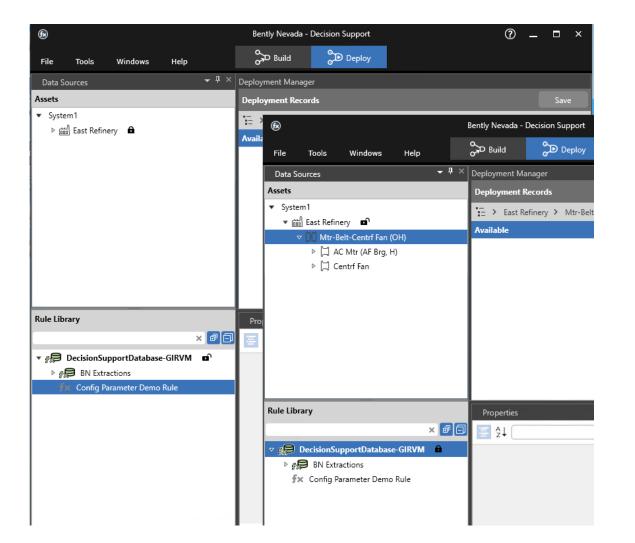


Figure 6.1.1-2 Two clients demonstrating how one has the Deploy lock for the connected data source while the other does not.

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6.1.2 Lock Override Support

Decision Support v24.1 supports the ability to request lock overrides in both the Build and Deploy workspaces. If a rule library or data source is currently locked for editing, another user can send a request to take the lock. The user who owns the lock is given the option to save changes, discard changes, or deny the request. If the user who owns the lock does not respond within the 60 second time frame, the lock is automatically given to the requesting user.

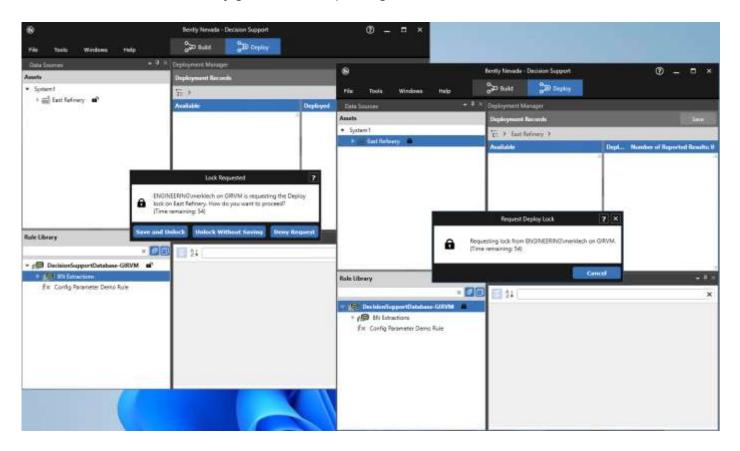


Figure 6.1.2-1 Two clients showing how one is requesting the Deploy lock from the other.



ONLY APPLICABLE WHEN UPGRADING FROM VERSIONS PRIOR TO 22.1

! License Changes !

If you upgrade from System 1 21.2 or prior, the existing licenses are not visible in the Licenses tab because of the Publisher Name change to "Baker Hughes". Therefore, before you install the latest System 1 version, return your existing licenses to the Licensing Portal. After the upgrade, register the License Server again using your existing activation code and relicense System 1. For more details, refer to the System 1 Licensing User Guide.

! Postgres version upgrade !

System 1 version 22.1 onwards supports Postgres 14 as the historian. Databases on Postgres 11 need to be upgraded to Postgres 14.

While upgrading to Postgres 14, it is recommended to create a backup before installing the latest System 1 version.

When you upgrade to PostgreSQL14 on System 1 22.1 or later, rollback installation to earlier System 1 versions is not allowed. Rollback is only possible by restoring VSS/Acronis backup.

To upgrade the historian from Postgres 11 database to Postgres 14, launch the Database Manager tool and click "Upgrade PostgreSQL Database".

! Proficy Obsolescence !

Proficy is no longer supported as historian. Users need to migrate their database from Proficy to Postgres. Users must migrate Proficy databases to PostgreSQL to upgrade to System 122.1 or later.

This is applicable for customers who have an older System 1 version with Proficy databases. This does not impact customers who already have PostgreSQL databases as historians.

For more details, please refer to System 1 Help.



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