

SKF @ptitude Analyst 9.0

User Manual P/N 00000000-EN
Revision Letter A



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Introduction to SKF @ptitude Analyst 9.0

This *What's New* document provides an overview of the new features and functionality included with SKF @ptitude Analyst 9.0. It is intended as a supplement to the software's user manuals, online help, and README.txt file. Each chapter in this document focuses on an SKF @ptitude Analyst 9.0 feature and includes discussions of identified customer needs followed by the specifics as to how these needs were met by the feature.

Of primary importance for this release was the integration of *Harmonic Activity Locator (HAL) Alarm Automation* and *Contribution Analysis* functionality into SKF @ptitude Analyst.

Chapter 1, Harmonic Activity Locator (HAL) Alarm Automation, discusses how to use the expanded HAL alarm status functionality on vibration measurement POINTs. This chapter's three sections cover:

- details on how **HAL Alarm Status** is represented in the system,
- instruction on the use of **HAL Trend Plot** functionality, and
- everything you need to know about **HAL Alarm Configuration** to jump into setting up HAL alarms for your vibration measurement POINTs.

Chapter 2, Contribution Analysis, discusses how to use the new contribution analysis functionality on POINTs and their frequencies. This chapter's three sections cover:

- background on the concept of **Cyclic Time Averaging (CTA)**,
- instruction on the use of **Contribution/Profile Plot** functionality, and
- everything you need to know about **Contribution Analysis Configuration** to jump into setting up contribution analysis capabilities for POINTs and their frequencies.

Also of significant importance for this release was the enhancement of the SKF @ptitude Analyst's integrated Human Machine Interface (HMI). **Chapter 3, HMI View Configuration Improvements**, discusses added tools to streamline configuration of HMI views for quick and easy setup of large environments that contain large numbers of POINTs.

Finally, a number of miscellaneous small enhancements and defect fixes were completed with this release. **Chapter 4, Miscellaneous Enhancements and Defect Fixes**, provides detail on some of these minor updates applied to the software to improve usability and performance.

Harmonic Activity Locator (HAL) Alarm Automation

HAL alarms provide alert and danger alarms on Harmonic Activity Index (HAI) indicators for designated frequencies. Harmonic activity locators provide a method to differentiate between vibration measurements that indicate the presence of a component defect in a machine from vibration measurements that are unrelated to the component defect.

Previously, trending and alarms based on HAI values were available in @ptitude Analyst via derived POINTs only. With @ptitude Analyst 9.0, one can now observe trending and alarms based on HAI values visible on the vibration measurement POINTs.

For more information on how HAL works, see the application note: An Automatic Harmonic Activity Locator (HAL) Algorithm and Its Application in Machine Vibration Diagnosis (CM3070).

HAL Alarm Status



As a Vibration Analyst, I want HAL alarm status to display so I can easily determine when a POINT is in alarm and view the alarm detail. Specifically, I want to be able to:

- easily determine from my hierarchy display when a POINT is in alarm
- easily locate all alert and danger alarms in a single view
- view alarm details for a POINT
- report on all POINTs in HAL alarm
- easily manage POINTs in HAL alarm
- import/export HAL alarm status for my POINTs
- schedule an event based on a HAL alarm condition
- record HAL alarm events

@ptitude Analyst 9.0 offers HAL alarm status features for vibration measurement POINTs to better support vibration analysts' needs. The following pages provide greater detail and instruction on the expanded HAL alarm status functionality.

- Alarm status indicators in the hierarchy now support HAL alarm statuses for all applicable POINTs.**

These indicators function in the expected, standard "traffic light" manner.

- The Alarms view now supports POINTs in danger or alert HAL alarm statuses.**

These HAL alarm statuses appear in the same manner as all other danger or alert alarm statuses in the Alarms view.

- The Alarm Details view now supports investigation of details for a POINT in HAL alarm.**

The table in the Alarm Details view displays all alarms configured for the POINT and their statuses. For HAL alarms, specifically, you can learn about the frequency **Details**, including the bearing name, for example: 32204 60/630MA (SKF), and frequency identity, for example: BPF1.

The **Based On** column applies to HAL alarms only and indicates the measurement on which the displayed alarm status was based. If the latest HAL calculation failed for any frequency, the **Based On** column contains a date/time stamp for that frequency's alarm detail indicating the date/time of the frequency's last successful HAL calculation.

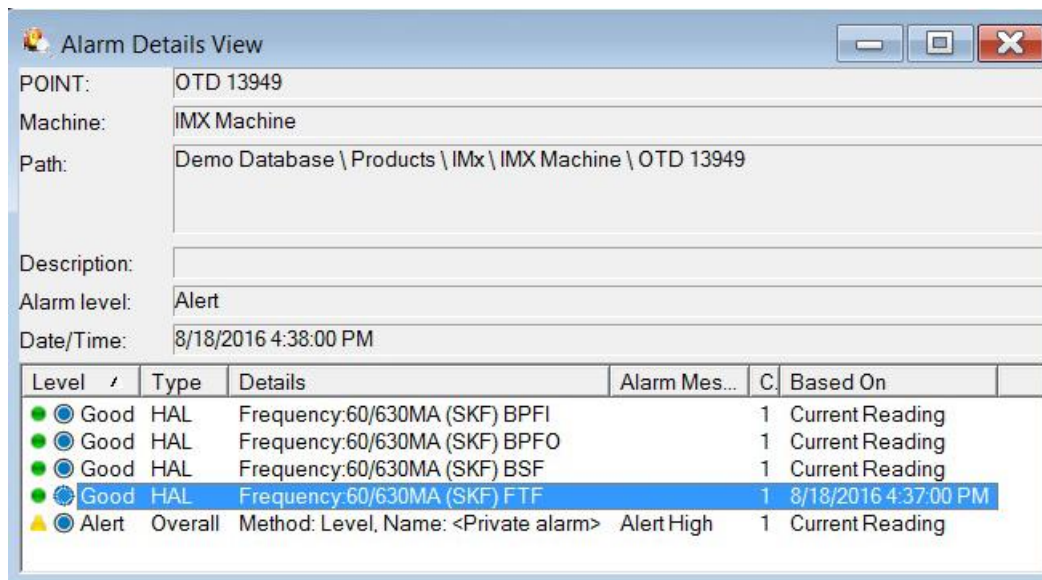


Figure 1 - 1.
 Alarm Details View.

- Reports now include HAL alarms when appropriate.**

On the **Report Editor's Definition** tab with the **Alarms** report criteria selected, select (check) "HAL" in the **Alarm Type** list to include HAL alarms of the specified **Alarm condition** in the report.

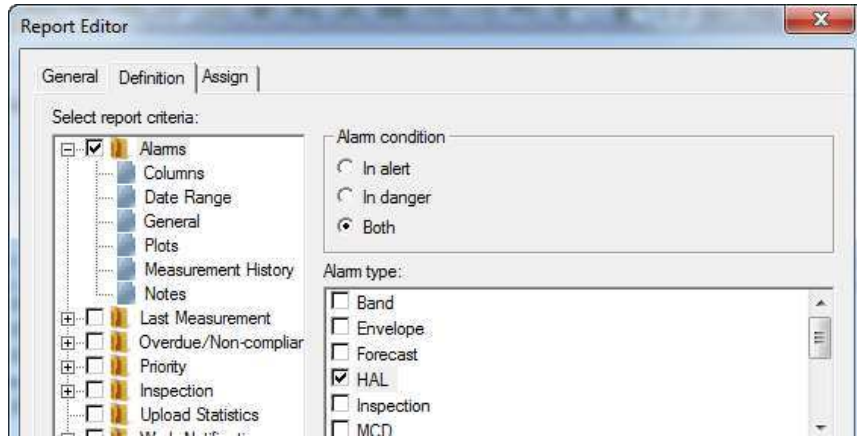


Figure 1 - 2.

Selecting "HAL" Alarm Type on the Report Editor's Definition Tab.

When you generate the report, POINTs in HAL alarm status will appear in the report in the same manner as other POINTs in alarm and will be denoted as having a HAL alarm condition in the report's **Alarm status** column.

- ☑ **Management of POINTs in HAL alarm can now take place within a workspace filtered specifically to display only POINTs with last measurements in HAL alarm.**

HAL is now an alarm type option for the **Measurement > Alarm** filter attribute, enabling you to filter a workspace for POINTs in a HAL alarm state.

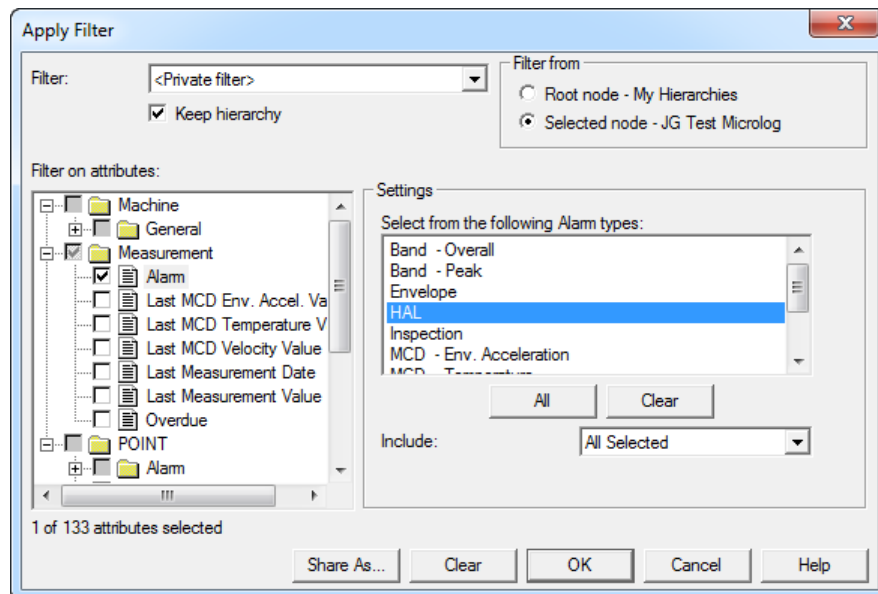


Figure 1 - 3.

HAL as Option for Measurement > Alarm Filter Attribute.

- ☑ **The MAB Import/Export, Event Scheduler, and Event Log features now support HAL Alarm status data.**

These features perform for HAL Alarm status data in the same manner they do for other data.

HAL Trend Plot



As a Vibration Analyst, I want to view historical HAL data graphically in a trend plot so I can easily and quickly analyze and detect specific HAL frequencies at fault. Specifically, I want to be able to:

- analyze how HAL calculations for selected frequencies on a POINT are trending over time
- use a single cursor overlay to easily identify HAL calculations for the applicable frequencies at a specific time
- easily identify which frequencies are associated with the data lines on the plot
- use a HAL alarm overlay to easily identify HAL alert and danger levels for applicable frequencies
- compare and analyze related spectrum and trend data from within a single view
- include HAL trend plots in my reports

@plitude Analyst 9.0 offers HAL trend plot functionality for vibration measurement POINTs to better support vibration analysts' needs. The following pages provide greater detail and instruction on the expanded HAL trend plot functionality.

- ☑ **HAL Trend plots display a POINT's historical HAL data in a graphical format.**

The HAL trend plot can be viewed for any POINT that has: a) a defined Frequency set in the POINT Properties dialog and b) FFT data measurements. The POINT does not need to be in HAL alarm to view the trend.

The HAL trend plot has the following characteristics:

- Trend plot shows the HAL values calculated from the FFT data.
- Each plot/data line in the HAL trend represents a frequency.
- The selection of one or more frequencies can be displayed.
- The HAL trend plot view supports individual POINT and multiple POINT trends.
- You can right-click the active plot line (triangle) anchor and select **View Frequencies** from the context menu to exclude or include specific frequency plot/data lines.
- The cursor in a HAL trend plot is used to update the frequency display for that particular date and time.

- You can drag and drop POINTs from the hierarchy into the HAL trend view to display all applicable HAL trends that are assigned to the same bearing type and same frequencies (BPF0, BPF1, etc.).
- Standard trend plot functionality applies.
 - Live HAL trend plots are NOT supported due to processing time constraints and the need to recalculate the HAL values before the next live measurement.
- If the HAI value for a frequency cannot be calculated, that frequency does not display on the plot. See *About HAL Trend Plot Calculation Limitations* below for details.

About HAL Trend Plot Calculation Limitations

Under specific limiting conditions, the HAI value for a frequency cannot be calculated or the calculation result is zero. When this occurs, a HAL trend plot for that frequency is not generated. The main benefit of these limiting conditions is to eliminate the display of trace lines that do not present coherent, useful information.

- Derived point HAL calculations that return a non-calculation result will produce a non-collection measurement.

The following terms are used in the table below:

$$\begin{aligned} \text{Fundamental Frequency} &= \text{Multiplier} \times \text{Running Speed} \\ \text{Resolution} &= F_{\max} / (\text{Number of Lines} - 1) \\ \text{Harmonics} &= F_{\max} / \text{Fundamental Frequency} \\ \text{Base Energy} &= \text{Sum (FFT values)} \\ \text{Average Base Energy} &= \text{Base Energy} / \text{Number of Lines} \end{aligned}$$

Reason a HAL Trend Plot Is Not Produced	One or More Limiting Conditions Applied to the Calculation
HAL Calculation Cannot Be Completed	No FFT values in the measurement Number of Lines = 0 Harmonics is greater than or equal to Number of Lines / 4
HAL Calculation Results = 0	Harmonics is less than 1.0. All individual harmonic energy levels are less than Average Base Energy.

Two additional limitations are enforced by Analyst to make the HAL calculation results meaningful for condition monitoring purposes.

- One is a global preference setting, **Maximum harmonics to use in HAL calculations**. The default range is 4 to 50, but the maximum can be increased up to 500.
- The other limitation is that the Fundamental Frequency cannot be in low frequency cut-off region. (**Low freq. cutoff** parameter displays on POINT Properties, Setup tab.)

Information Area Displays


In the **HAL Trend** tab (which shows the values for the measurement where the single cursor is active), the column is blank for any frequency that could not be calculated (the FTF column in the example below).

Info	Summary	HAL Trend	Notes	HAL Alarm						
POINT	/	Date/Time	Description	BPFO	BPFI	BSF	FTF	Other		
#78 DRYER ROLL BS \ DRY 78-D	6K 36/6	11/28/2012 12:29:59 AM	24260CA (SKF)	1.353	0.7944	1.19				

In the **Summary** tab, frequencies for which HAL values could not be calculated display in the **Not Calculated** column, as shown below.

Info	Summary	HAL Trend	Notes						
POINT	Information	Value	Not Calculated						
#78 DRYER ROLL BS \ DRY 78-D	6K 36/6	POINT description 2PM(DRYER 79/TEND)/TOP/7TH SECT							
	Units	HAL							
	Measurement	11/28/2012 12:29:59 AM 24260CA (SKF) BPFO = 1.353, BPFI = 0.7944, BSF = 1.19	FTF						
	Measurement	11/27/2012 12:30:39 AM 24260CA (SKF) BPFO = 1.558, BPFI = 0.896, BSF = 1.477	FTF						
	Measurement	11/26/2012 12:30:33 AM 24260CA (SKF) BPFO = 0.7649, BPFI = 0.4776, BSF = 0.9777	FTF						
	Measurement	11/25/2012 12:30:19 AM 24260CA (SKF) BPFO = 0.8897, BPFI = 0.7583, BSF = 1.047	FTF						
	Measurement	11/24/2012 12:30:33 AM 24260CA (SKF) BPFO = 0.6891, BPFI = 0.4688, BSF = 0.9889	FTF						

To view historical HAL data in a trend plot:

- From the hierarchy, select a POINT that meets the two requirements of having assigned frequencies and FFT data.
- Right-click the POINT and select **Plot > HAL Trend**, OR click the HAL trend icon 

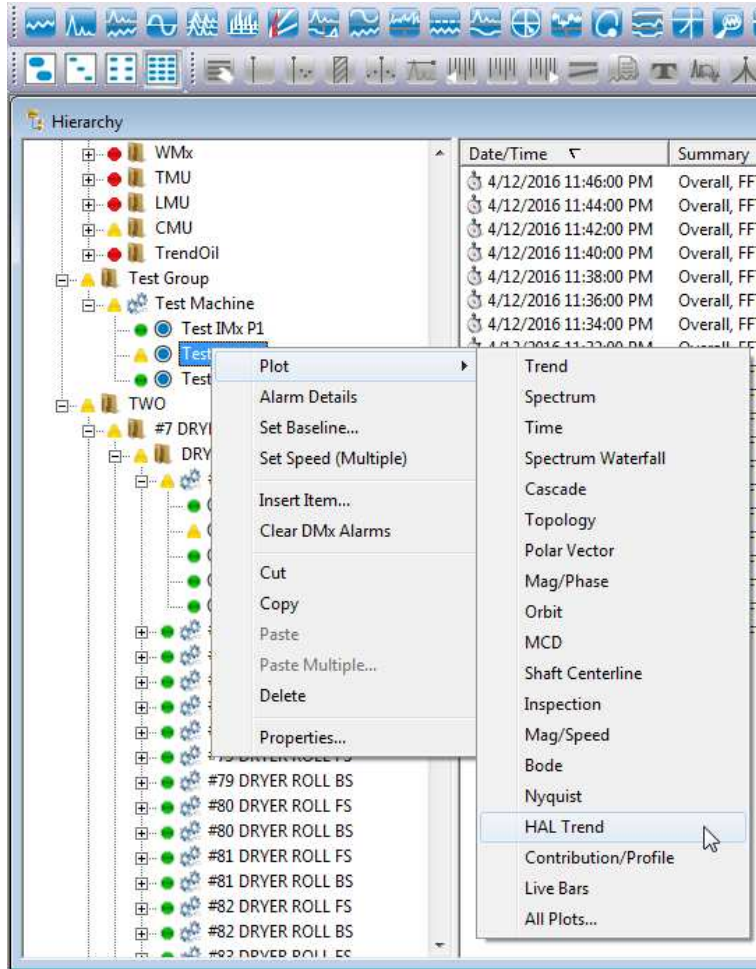


Figure 1 - 4.
Path to Open a HAL Trend Plot.



Harmonic Activity Locator (HAL) Alarm Automation

HAL Trend Plot



Figure 1 - 5.
Example of HAL Trend Plot.

All HAL trends display in one trend plot. Each frequency associated with the POINT displays a separate HAL trend line. When a frequency has a sideband cursor, two trends are displayed for the sidebands: one for the right side and one for the left.

- Click the **Previous Frequency/Next Frequency** buttons ( ) or use the -/+ keys on your keyboard's ten-key area to cycle through which frequencies are shown in the plot (all, each individually, etc.).

Preference settings determine how many historical spectra are computed in the HAL trend. The preferences for all measurements are set in the **Measurement** tab (go to **Customize > Preference > Measurement** tab).

- HAL Trend plot itself and the Summary tab show Units = HAI (harmonic activity index).
- A plot line anchor represents a POINT and one of its channels (indicated as X, Y, or Z). A 3-channel POINT will display three plot line anchors, as shown below.



Figure 1 - 6.
Example of a 3-channel POINT Showing Three Plot Line Anchors.

You can right-click the anchor at the upper left to open the context menu. Select **View Frequencies** to specify which frequencies to display in the HAL trend view.

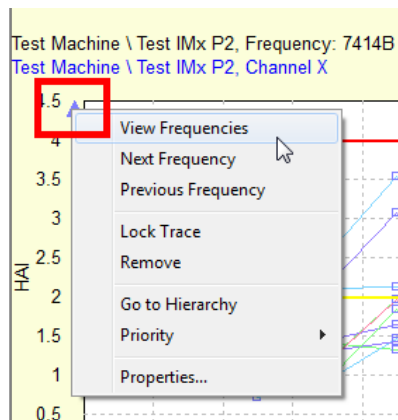


Figure 1 - 7.
Example of the Context Menu Accessible Via the Anchors.

The **View Frequency** dialog opens, showing only available frequencies.

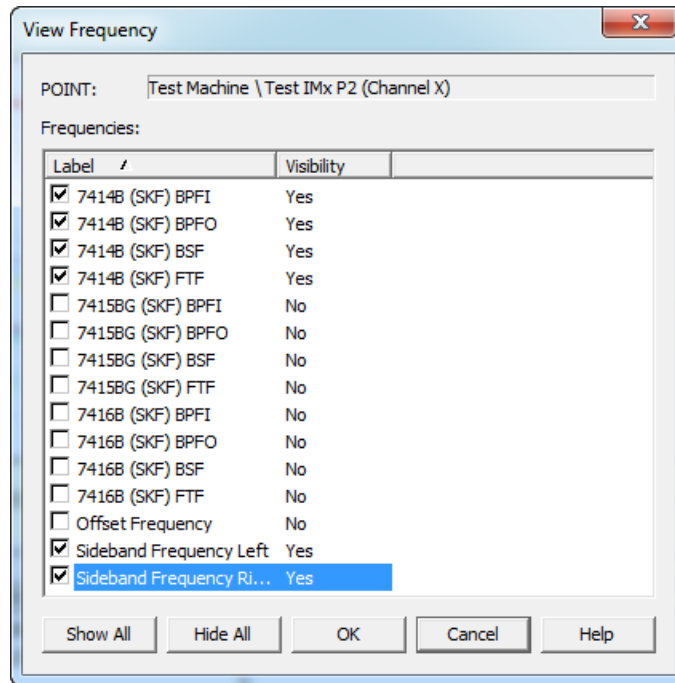


Figure 1 - 8.
 View Frequency Dialog.

In the **View Frequency** dialog, all frequencies associated with the POINT are listed with the **Visibility** set to **Yes** by default. You can deselect a checkbox to change **Visibility** in the HAL trend plot to **No**. Click **OK** to accept your changes.

- The **Show All** and **Hide All** buttons enable setting all the frequencies as visible or not visible.

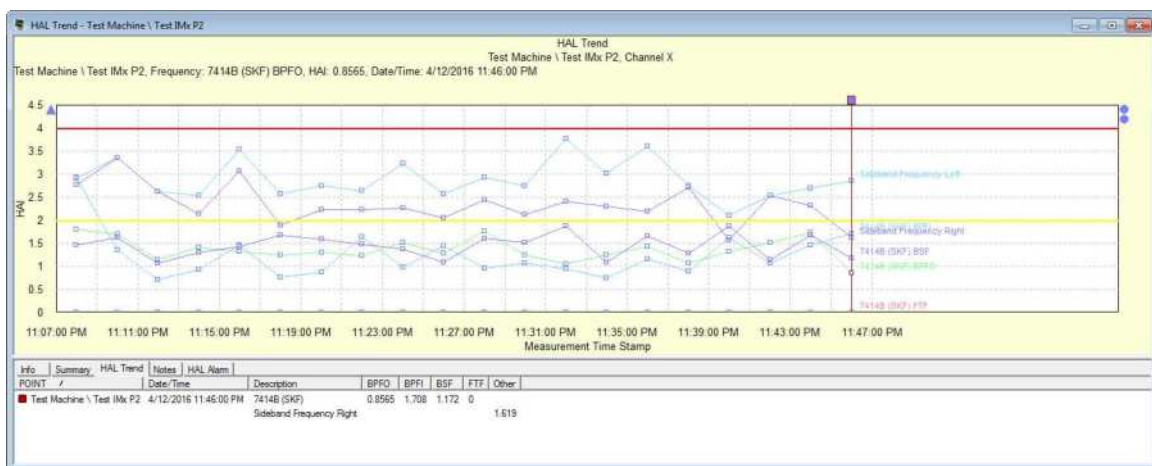


Figure 1 - 9.
 Example of HAL Trend Plot with Some Frequencies Changed to Not Visible.

If you drag a single channel POINT into the HAL trend, it will add another plot line anchor. Similarly, dragging in a 2-channel POINT will add two more plot line anchors and a 3-channel POINT will add three plot line anchors.

- The drag and drop feature does NOT check if the additional POINTs are assigned to the same bearings or frequencies. The **View Frequencies** dialog can be used to remove any frequencies that do not match the frequencies associated with the original POINT.

The single cursor is the default overlay when the HAL trend plot opens.

You may use the single cursor in the HAL trend display to:

- Determine the local trend value.
- Update the frequency display for that particular date and time stamp.

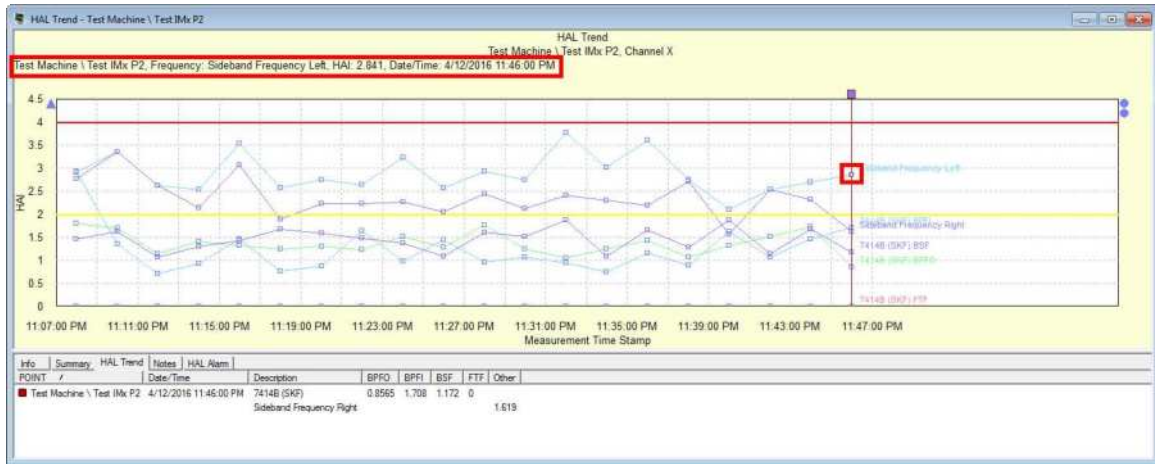


Figure 1 - 10.
 Example of HAL Trend Plot Single Cursor Overlay.

The Feedback Text above the plot shows the value of the current active highlight rectangle for the single cursor.

- Right-click on the single cursor to open the context menu.

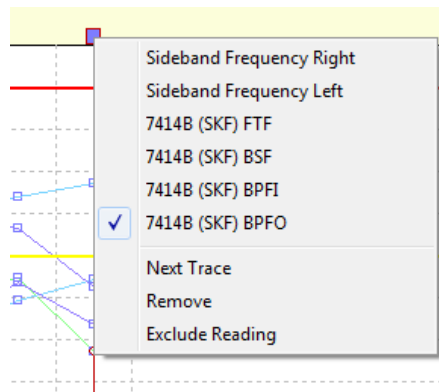


Figure 1 - 11.
 Example of Single Cursor Context Menu.


- You can select another frequency to be the active one. For example, checking Bearing B (Custom) BSF will result in: the Feedback text changing to Bearing B (Custom) BSF, the highlight rectangle moving to Bearing B (Custom) BSF, and the HAL Trend tab showing the BEARING B (CUSTOM) BSF value on the first line.

As stated previously, when you have multiple POINTs, or a multi channel POINT, in the HAL trend plot you will see additional anchors on the left. The example below shows three anchors (blue, purple and green). On top of the single cursor, the square is green. This means that the active cursor is pointing to the green data lines.



Figure 1 - 12.
 Example of Multi Channel POINT HAL Trend Plot.

- When you select **Next Trace** in the context menu, or simply left-click the single cursor square, the focus will jump to the blue lines. The square color changes to the same color as the lines the cursor is on. The values in the feedback text are always based on the values on the line.
- If you select **Remove**, the cursor is removed from the HAL Trend plot.
- If you select **Exclude Reading**, the measurement the cursor is on is excluded.

Click the Information Area tool  to open the information tabs under the plot. At the bottom of the HAL trend plot, the **Info** tab presents basic information about the POINT that is similar to a trend plot, but lacks the standard deviation and mean values. The **Summary** tab presents information about the HAL readings from the measurements.

Info	Summary	HAL Trend	Notes	HAL Alarm
POINT	/			
■ Three Channels \ 3Ch-ACC-FFT.TWF		POINT description	@3ACC	
		Units	HAI	
		Measurement	7/9/2009 4:53:07 PM 362699 (SKF) BPFO = 7.441, BPFI = 5.829, BSF = 0.9075, FTF = 2.395	
		Measurement	7/9/2009 4:45:56 PM 362699 (SKF) BPFO = 6.888, BPFI = 4.573, BSF = 1.611, FTF = 3.136	
		Measurement	7/9/2009 4:37:45 PM 362699 (SKF) BPFO = 1.902, BPFI = 2.39, BSF = 6.09, FTF = 4.492	
		Measurement	7/9/2009 4:22:31 PM 362699 (SKF) BPFO = 3.082, BPFI = 2.444, BSF = 3.483, FTF = 0	
■ Three Channels \ 3Ch-ACC-FFT.TWF		POINT description	@3ACC	
		Units	HAI	
		Measurement	7/9/2009 4:53:07 PM 362699 (SKF) BPFO = 7.135, BPFI = 3.106, BSF = 0.4278, FTF = 1.652	
		Measurement	7/9/2009 4:45:56 PM 362699 (SKF) BPFO = 2.149, BPFI = 1.502, BSF = 1.213, FTF = 2.301	
		Measurement	7/9/2009 4:37:45 PM 362699 (SKF) BPFO = 1.514, BPFI = 1.412, BSF = 3.562, FTF = 3.422	
		Measurement	7/9/2009 4:22:31 PM 362699 (SKF) BPFO = 2.455, BPFI = 1.923, BSF = 3.258, FTF = 0	
■ Three Channels \ 3Ch-ACC-FFT.TWF		POINT description	@3ACC	
		Units	HAI	
		Measurement	7/9/2009 4:53:07 PM 362699 (SKF) BPFO = 4.071, BPFI = 2.484, BSF = 0.677, FTF = 1.76	
		Measurement	7/9/2009 4:45:56 PM 362699 (SKF) BPFO = 1.914, BPFI = 1.08, BSF = 1.08, FTF = 1.775	
		Measurement	7/9/2009 4:37:45 PM 362699 (SKF) BPFO = 1.278, BPFI = 1.477, BSF = 3.128, FTF = 0	
		Measurement	7/9/2009 4:22:31 PM 362699 (SKF) BPFO = 2.485, BPFI = 2.066, BSF = 3.513, FTF = 0	

Figure 1 - 13.
 HAL Trend Plot Summary Tab.

The HAL Trend tab lists all the HAL frequencies.

Info	Summary	HAL Trend	Notes	HAL Alarm				
POINT	/							
■ Three Channels \ 3Ch-ACC-FFT.TWF		Date/Time	Description	BPFO	BPFI	BSF	FTF	Other
		7/9/2009 4:53:07 PM	362699 (SKF)	7.441	5.829	0.9075	2.395	

Figure 1 - 14.
 Example of HAL Trend Tab in the Information Area.

Item lines display in the following sequence:

- The first line shows the selected rectangle value, matching the feedback text, for the single cursor.
- The second line shows the first bearing name and the entire list of frequencies for the single cursor line.
- The third line shows the second bearing name and the entire list of frequencies for the single cursor line.

A new HAL Alarm Overlay exists to represent HAL alert and danger levels.

The HAL alarm overlay has the following characteristics:

- If HAL alarm levels have been defined for a POINT in the POINT Properties > HAL Alarms tab, then the HAL trend plot will open with the HAL alarm overlay displaying the alert and danger level lines.
- The alert (yellow) and danger (red) lines are shown for the selected frequency.

Harmonic Activity Locator (HAL) Alarm Automation HAL Trend Plot

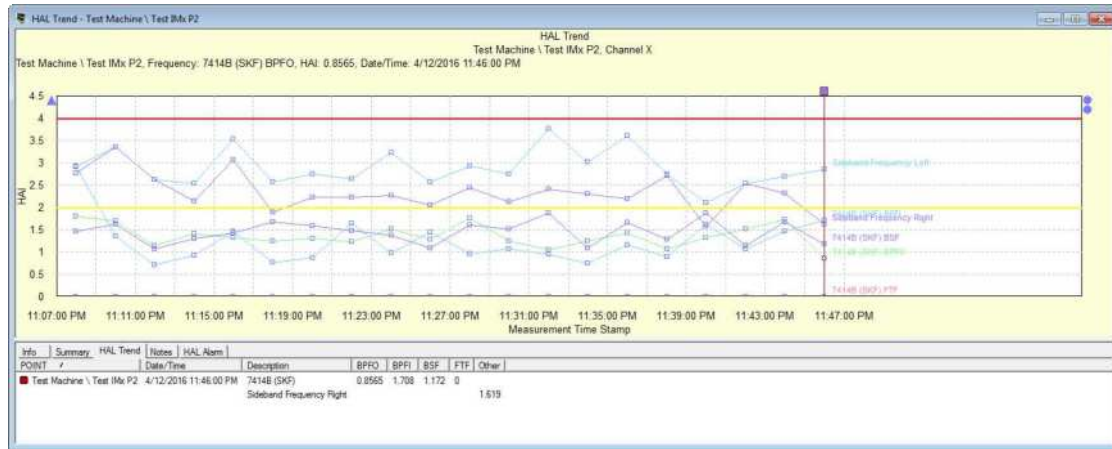


Figure 1 - 15.
Example of HAL Trend Plot with HAL Alarm Overlay.

In the example below, the active overlay is the single cursor (indicated by the square box on the cursor) and the primary feedback text is displayed in black. When you use the mouse to hover your cursor on the circle at the right, representing the HAL Alarm overlay, the blue secondary feedback text highlights and displays alarm information.

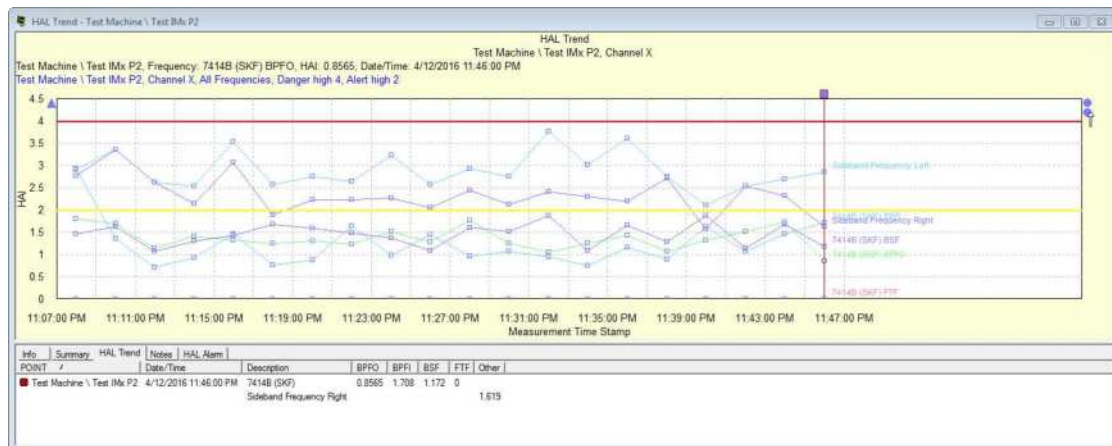


Figure 1 - 16.
Example of HAL Trend Plot with HAL Alarm Overlay Feedback Text.

To change the HAL alarm cursor to a different frequency, either:

- click the HAL alarm anchor and use the up/down arrow keys to select different frequencies on the HAL Alarm plot, OR
- right click the HAL alarm anchor to open the context menu and then select another HAL alarm frequency to highlight on the trend plot.

The line for the selected frequency is highlighted and the corresponding highlight rectangle indicates the current measurement displayed in the feedback text.

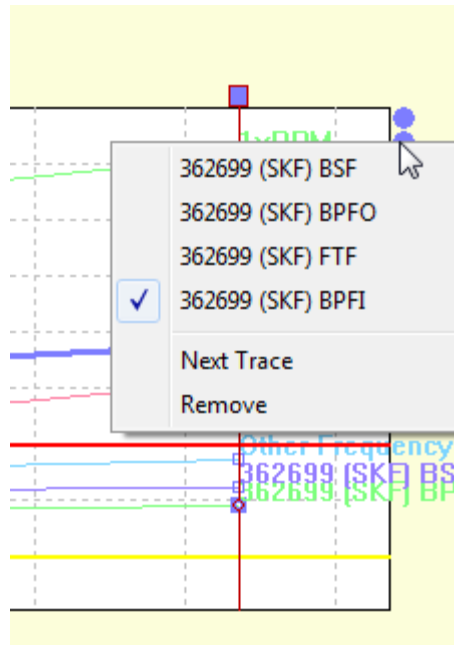


Figure 1 - 17.
 Example of the HAL Trend Plot Anchor Context Menu.

A HAL Alarm tab is added to the information area at the bottom of the HAL trend plot when the cursor is visible. The tab shows the POINT name, its frequency, and the alert and danger threshold values set on the POINT Properties > HAL Alarm tab for the current selected HAL alarm. Alarm levels display in the plot and are updated appropriately for each HAL frequency.

Info	Summary	HAL Trend	Notes	HAL Alarm
POINT	Frequency	Alert High	Danger High	
<input checked="" type="checkbox"/> Test Machine \ Test IMx P2	All Frequencies	2	4	

Figure 1 - 18.
 Example of the HAL Alarm Tab for the HAL Trend Plot.

☑ A new Spectrum/HAL Trend combination plot exists.

When a POINT with associated frequencies is selected in the hierarchy, you can view the Spectrum and HAL Trend plots together. The two plots interact so that the measurement and frequency selections made on one plot alter the data displayed on the other. This behavior is described in detail below.

To open a Spectrum/HAL Trend combo plot:

- Select a POINT in the hierarchy that has associated frequencies and HAL alarm level settings.
- Go to View > Plot > All Plots > Spectrum/HAL Trend.

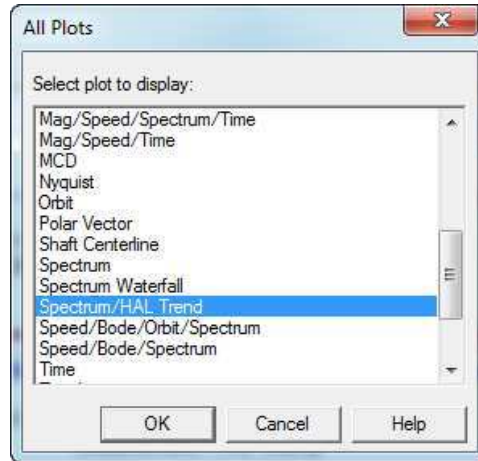


Figure 1 - 19.
Spectrum/HAL Trend Option in All Plots Dialog.

When the Spectrum/HAL Trend plot opens, the spectrum is highlighted by default and the HAL trend below is disabled by default. HAL trends are plotted for all frequencies called out with spectrum plot single cursors in addition to specific frequencies associated with the POINT in the **POINT Properties > Frequencies** tab.

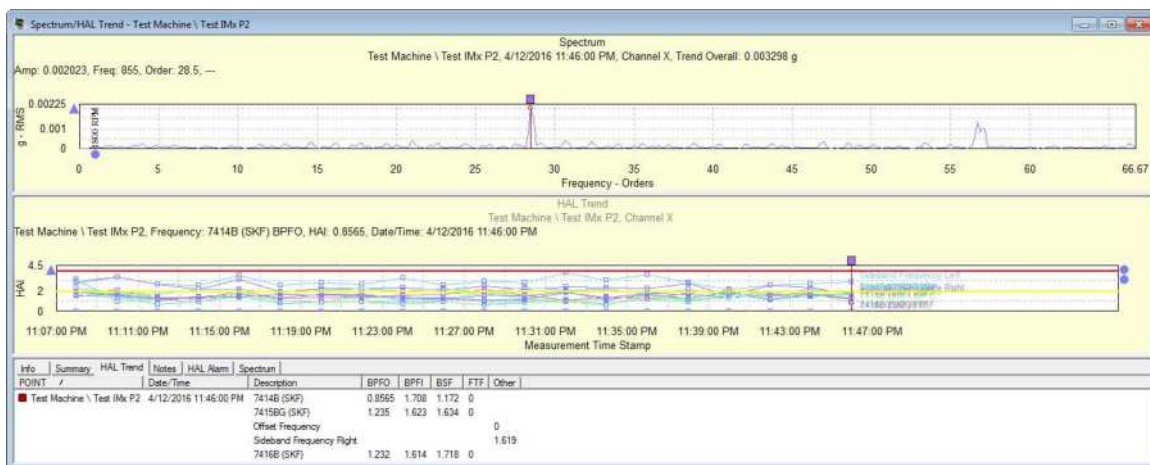


Figure 1 - 20.
Example of a Spectrum/HAL Trend Combo Plot.

Click on the spectrum plot and the **Spectrum** tab in the info area opens to show the spectrum data for the POINT.

Info	Summary	HAL Trend	Notes	HAL Alarm	Spectrum
POINT	/	Frequency	Order	Amplitude	Phase
Test Machine \ Test IMx P2	855	28.5	0.002023 (g - RMS)		

Figure 1 - 21.
 Example of the **Spectrum** Information Tab.

Click on the HAL trend plot and the **HAL Trend** tab in the info area opens to show the frequencies associated with the POINT.

Info	Summary	HAL Trend	Notes	HAL Alarm	Spectrum			
POINT	/	Date/Time	Description	BPFO	BPFI	BSF	FTF	Other
Test Machine \ Test IMx P2	4/12/2016 11:46:00 PM	7414B (SKF)	0.8565	1.708	1.172	0		
		7415BG (SKF)	1.235	1.623	1.634	0		
		Offset Frequency						0
		Sideband Frequency Right						1.619
		7416B (SKF)	1.232	1.614	1.718	0		

Figure 1 - 22.
 Example of the **HAL Trend** Information Tab.

Data Source

The position of the single cursor in the HAL trend plot controls the data source used for the combo plot.


- Removing the HAL trend single cursor will remove the data in the spectrum plot.
- Adding a HAL trend single cursor to a plot that doesn't already show one will update all the data in the spectrum.
- Whenever the HAL trend plot single cursor position is changed, the spectrum displayed in the spectrum plot area updates to reflect the spectrum for the measurement currently identified by the single cursor. In other words, moving the single cursor changes the data source of the spectrum to a different measurement, and everything associated with the new measurement will be updated.
- The running speed in the spectrum updates to the same DATE/TIME as the measurement the HAL trend single cursor is positioned on.

Frequencies Displayed

The frequencies displayed in the spectrum plot control which frequencies are shown in the HAL trend plot. This includes the frequencies indicated with spectrum single cursor markers and the frequency markers shown by the frequency overlay.

The Spectrum/HAL trend combo plot does not support the frequency selection menus that are available on the standalone HAL trend plot. Instead, the frequencies displayed

in the HAL trend plot are controlled by the frequencies being called out in the spectrum plot. You can show or hide frequencies by using the methods described below.

- To show all frequencies, click on the **Frequencies**  icon in the SKF @ptitude Analyst toolbar. The spectrum plot will show all the frequencies available. The info area is also updated and the **FAM** tab appears containing the details of the frequencies.

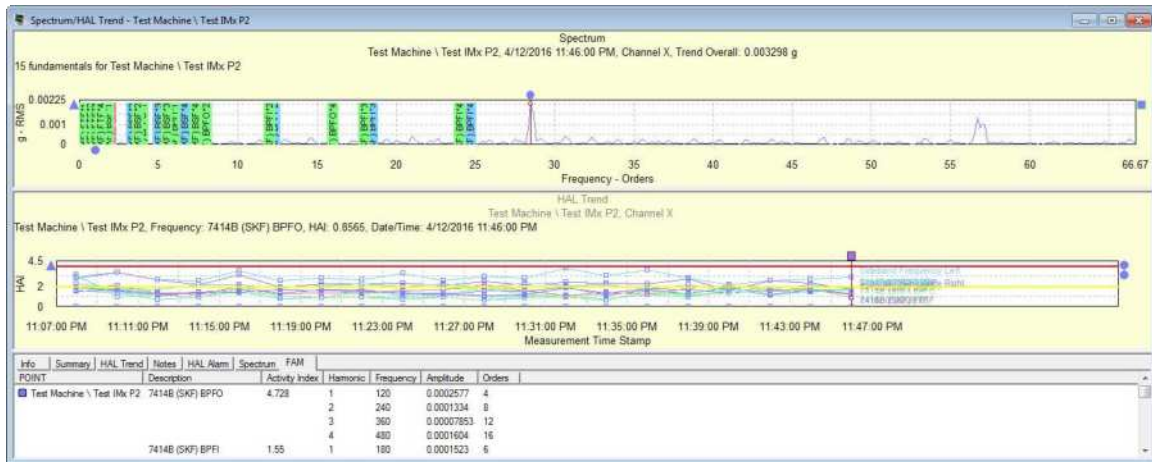




Figure 1 - 23.

Example of Spectrum Plot Showing all Available Frequencies with the Cursor on 7414B (SKF) BPFO.

- You can change from one frequency to another by clicking the **Next Frequency**  or **Previous Frequency**  icons in the toolbar. The frequency now displayed in the spectrum plot is reflected in the HAL trend also.
- To select a specific frequency (hiding the others), you can right-click on any frequency in the spectrum to open the **Frequency Settings** dialog. Enable the desired frequency (in this example, 7416B (SKF) BPF1) to show, and then click **OK**.

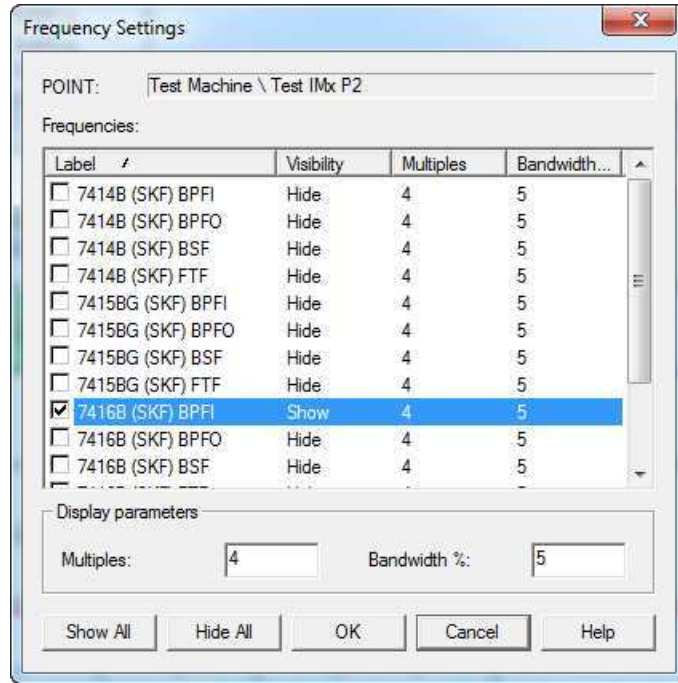


Figure 1 - 24.
 The **Frequency Settings** Dialog.

- The selected frequency is now the only one shown in the in the HAL trend plot.

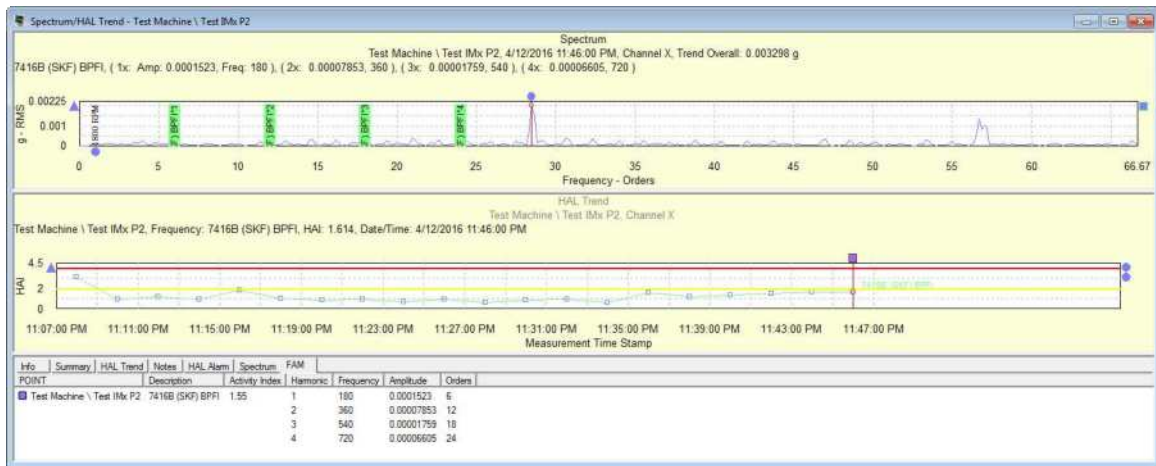


Figure 1 - 25.
 Example of Frequency Changed to 7416B (SKF) BPFI in the Spectrum/HAL Trend Plot.

You can drag and drop an additional POINT on to the existing combo plot window in the same manner as other plot types. The additional POINT will display all HAL trends related to it.

- ☑ **Now, you can include POINTS' HAL Trend and Spectrum/HAL Trend plots in your reports.**
 - On the Report Editor's Definition tab with Plots highlighted beneath the Alarms, Last Measurement, Overdue/Non-compliant, or Transient criteria, a Criteria Setup area displays.
 - Select (check) "HAL Trend" in the Plots list to include HAL trend plots in the report and/or "Spectrum/HAL Trend" to include Spectrum/HAL trend plots in the report.
 - Select (check) the Overlays to include with each HAL trend plot in the report.

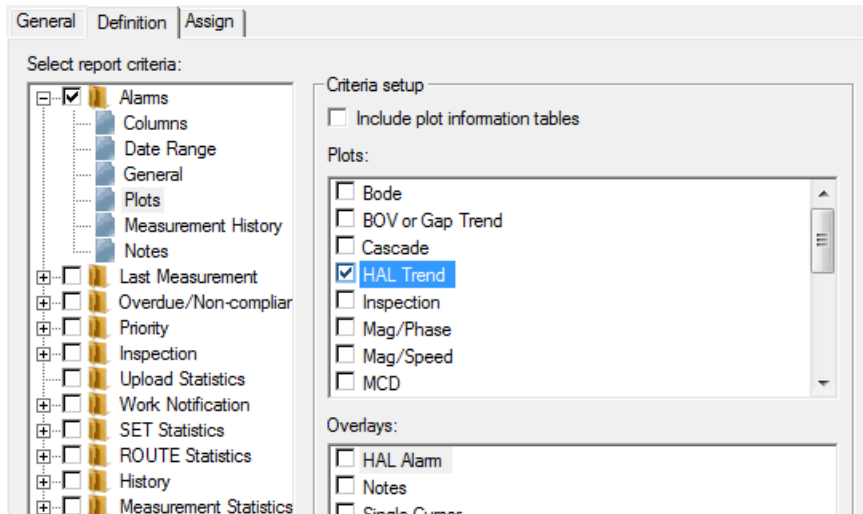


Figure 1 - 26.
Selecting "HAL Trend" **Plots** on the **Report Editor's Definition Tab**.

When you generate the report, HAL Trend plots will appear in the report for all POINTs.

HAL Alarm Configuration



As a Vibration Analyst, I want direct HAL alarm configuration, so I can quickly and easily set up HAL alarms. Specifically, I want to be able to:

- set up HAL alarms directly to POINTs
- easily change HAL alarm settings for one or more machines or POINTs
- import and export POINT settings for HAL alarms
- filter on all POINTs that have a HAL alarm configuration

@ptitude Analyst 9.0 brings expanded HAL alarm configuration support to better match vibration analysts' needs. The following pages provide greater detail and instruction on the expanded HAL alarm configuration functionality.

- The POINT Properties screen now includes HAL alarm capabilities for most types of POINTs. For such POINTs, you can set HAL alarms to operate on frequency sets or individual frequencies.**

It is not advisable to enable HAL alarms for every frequency on every POINT, as doing so would lead to significant performance issues.

HAL alarms provide alert and danger alarms on Harmonic Activity Index (HAI) indicators for designated frequencies. Use the HAL Alarms tab to configure HAL alarms for a dynamic measurement POINT.

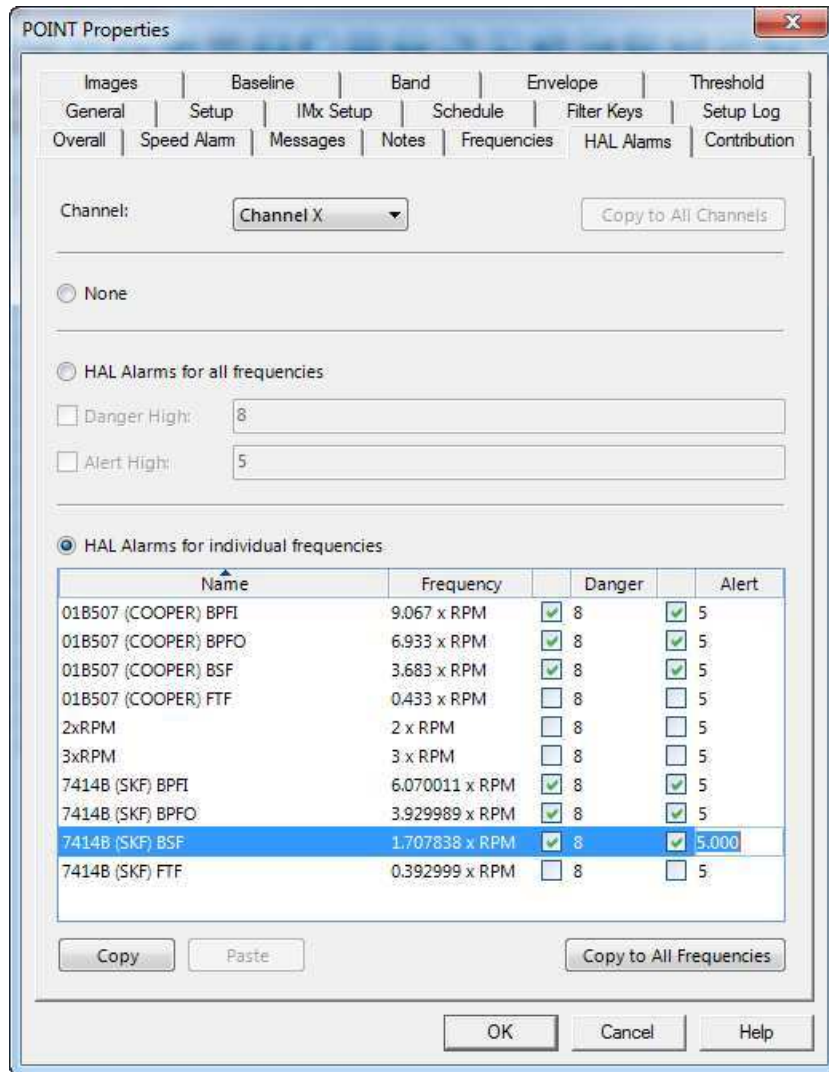


Figure 1 - 27.
 HAL Alarms tab.

If you are working with a multi-channel POINT, first select a **Channel**. Any existing HAL alarm settings that display and any existing or new HAL alarm settings you configure are for the selected **Channel** only.

- At any time, you can click **Copy to All Channels** to apply the selected **Channel**'s settings to all channels.

To exclude all frequencies from HAL alarm analysis on the selected channel:

- Select (mark) the **None** radio button.
 - If no frequencies are defined for the POINT, **None** is the only available option. To associate a frequency set with the POINT, go to the **Frequencies** tab.

To set the same HAL alarms for all frequencies on the selected channel:

- Select (mark) the **HAL Alarms for all frequencies** radio button.
 - At least one frequency must be defined for the POINT before you can select this radio button.
- Select (check) the **Danger High** checkbox and enter a value to represent the HAI value danger alarm threshold. Any calculated HAI values for any of the frequencies on this channel that are greater than or equal to the value entered will trigger a danger alarm.
 - The default value is “8.”
- Select (check) the **Alert High** checkbox and enter a value to represent the HAI value alert alarm threshold. Any calculated HAI values for any of the frequencies on this channel that are greater than or equal to the value entered but less than the **Danger High** threshold value will trigger an alert alarm.
 - The default value is “5.”

To set HAL alarms individually per frequency on the selected channel:

- Select (mark) the **HAL Alarms for individual frequencies** radio button.
 - At least one frequency must be defined for the POINT before you can select this radio button.

Each row in the grid represents an individual frequency on the selected channel and contains the **Name** assigned to the frequency, the **Frequency** value itself, the **Danger** alarm threshold, and the **Alert** alarm threshold.

- Select (check) a row's **Danger** checkbox and enter a value to represent the HAI value danger alarm threshold for the frequency. Any calculated HAI value for this frequency on this channel that is greater than or equal to the value entered will trigger a danger alarm.
- Select (check) a row's **Alert** checkbox and enter a value to represent the HAI value alert alarm threshold for the frequency. Any calculated HAI value for this frequency on this channel that is greater than or equal to the value entered but less than the frequency's **Danger** threshold value will trigger an alert alarm.

To copy one frequency's HAL alarm settings to other individual frequencies on a channel:

- Select the entire source frequency row and click **Copy**.
- Select the entire destination frequency row and click **Paste**.
 - To copy the source frequency's thresholds to all frequencies on this channel, click **Copy to All Frequencies** instead of **Paste**.
- If you wish to disable an alarm for any frequency, deselect (uncheck) the appropriate checkbox.

If you are working with a multi-channel POINT, select each **Channel** and proceed with any of the appropriate steps described above. When you click **OK** to save all changes on the POINT Properties screen, the system saves all settings you have configured or updated for each applicable channel on this tab.

- ☑ **You can modify certain HAL alarm attributes for multiple machines and/or POINTs via the Modify by Attribute functionality.**

HAL Alarm is now a modifiable attribute on under the Modify By Attribute screen's **Alarm Settings** category.

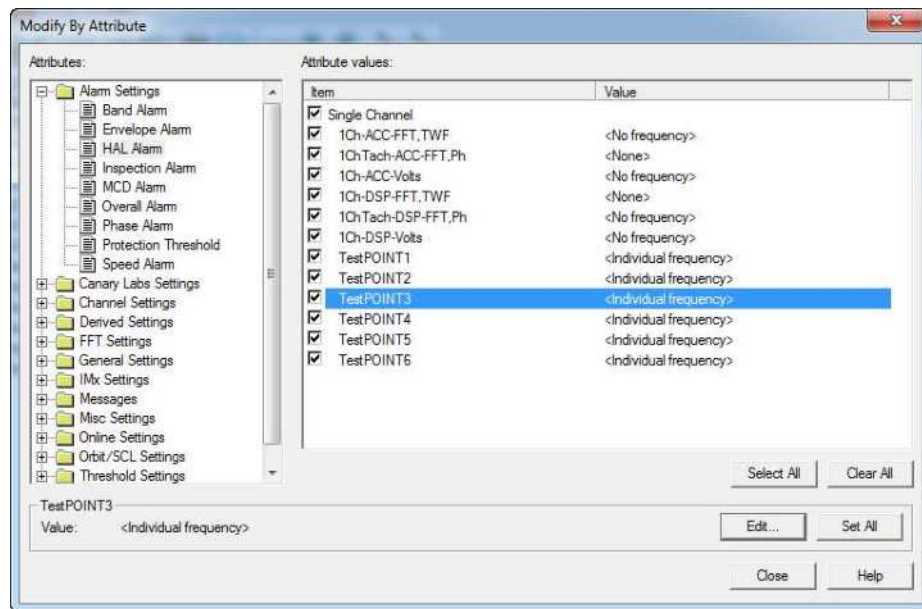


Figure 1 - 28.
Modify by Attribute Screen.

To view HAL Alarm attribute values for one or more POINT(s):

- Open the **Alarm Settings** category's folder to view its attributes, and then select **HAL Alarm**. The right panel updates to show the **HAL Alarm** attribute's current setting **Value(s)** for each applicable **Item**:

<None> - All of the POINT's frequencies (per channel, if appropriate) are excluded from HAL Alarm analysis.

<All frequencies> - The POINT has the same HAL alarm thresholds defined for all frequencies (per channel, if appropriate).

<Individual frequency> - The POINT has different HAL alarm thresholds defined individually per frequency (per channel, if appropriate).

<No frequency> - The POINT does not have any frequencies defined (per channel, if appropriate).

- Each **Item** in this list is a set, machine, or POINT. Any such items that are included under the portion you selected of your hierarchy

appear in this list. Only POINTs that are capable of having a HAL Alarm setting are editable for HAL Alarm attributes in this list.

- For a multi-channel POINT, the **Value** for each channel appears in this view.

To modify an individual POINT's HAL Alarm attribute settings:

- Select (check) the checkbox next to the POINT.
- Click within the same POINT's row to highlight it, also. If the POINT is capable of having a HAL Alarm setting, the **Edit...** button enables.
- Click **Edit....** A **HAL Alarms** attribute edit screen appears. The **HAL Alarms** attribute edit screen functions in the same manner as the HAL Alarms Tab on the POINT Properties Screen, described above.
- Modify the currently-selected POINT's HAL alarm attribute settings as desired, and then click **OK**.

To apply an individual POINT's HAL Alarm attribute settings to multiple POINTs:

- Select (check) the checkbox next to the POINT from which you intend to copy HAL Alarm attribute settings.
- Select (check) the checkbox next to each POINT to which you intend to apply the source POINT's settings.
- Click within the row of the source POINT to highlight it. The **Set All** button enables.
- Click **Set All**. The system copies all of the source POINT's HAL Alarm attribute settings for all applicable channels and applies those settings to any of the selected POINTs for the same defined frequencies on matching channels only.
- Click the **Close** button to save the settings in the database.

- You can export and import HAL alarm settings via Machine Analyst Binary (MAB) files. If HAL alarm values have been set globally, they are not exported but are instead maintained as part of one's personal preferences.**

The **Export Analyst Data** wizard now handles HAL alarm POINT settings data like any other POINT settings when creating a .MAB file.

- If HAL alarm settings are selected to be exported, then the frequencies associated with the POINT (through the **POINT Properties > Frequencies** tab) are automatically included in the export. It is not necessary to select the frequencies also.

- You can filter on all POINTs that are in a HAL alarm state or on those that have a HAL alarm configuration.

HAL Alarm is now a filter attribute in the **POINT > Alarm** category, ultimately enabling you to filter a workspace for POINTs that have a HAL alarm configuration.

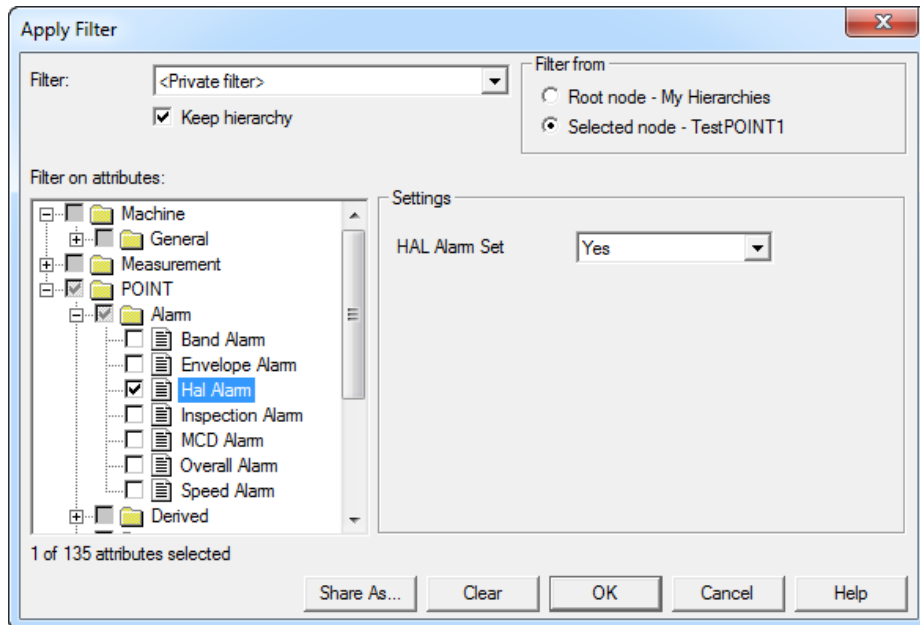


Figure 1 - 29.
HAL Alarm as Attribute in the **POINT > Alarm** Category.

Contribution Analysis

Contribution analysis examines the contribution that specific frequencies make to the overall vibration within a POINT. The Contribution/Profile plot presents an overview of selected frequencies in different formats. The Contribution/Profile results are based on Cyclic Time Averaging (CTA), described briefly below.

Cyclic Time Averaging (CTA)

CTA is a post process operation that operates on time waveform signals, creating an averaged waveform similar to a Synchronous Time Averaging (STA) measurement. Unlike STA, CTA does not require a trigger and can be computed on already acquired time domain signals.

One of the best cases for using Cyclic Time Averaging is when an external trigger is not possible, or practical, such as when monitoring the inner shafts of a gearbox. The goal is to find out if there are damaged gear teeth on the gear without having to stop the machine and open it up for inspection.

CTA uses only a single measurement to perform averaging. CTA can be performed on any time domain measurement as long as this measurement covers more than two revolutions of the defect source under study. Consider a measurement length of 10 seconds (not uncommon in the paper industry) and a defect frequency of 5 Hz (200 ms). One single measurement captures $10/0.2 = 50$ cycles of the defect. CTA realigns the samples in the measurement so that they can be averaged to produce an improved signal waveform with reduced noise.

In the Roundness Profile plot, the time domain is wrapped around each component frequency's periodic cycle time. It can be seen that a damaged gear tooth generates a significant amount of high frequency vibration during initial contact with the mating tooth.

Contribution/Profile Plot



As a Machine Operator, I want a display that combines contribution, profile, and trend plots, so I can easily view all plot information to determine if additional analysis is required. Specifically, I want:

- a three-plot combination display (contribution, profile, trend)
- all plots linked for consistent behavior
- the ability to resize plot panes
- a common information area and the ability to enable/disable it
- a live mode (for online systems only) and the ability to enable/disable it
- the ability to save live data
- "View" rights



As a Control Room Operator, I want the same combination plot for additional analysis. Specifically, I want:

- integrated behavior between the trend and contribution plots so as I navigate among the measurements in the trend, the contribution plot displays frequency contribution data for the selected measurement
- integrated behavior between the contribution and profile plots so as I navigate among the frequencies in the contribution, the profile plot displays the selected frequency's time waveform data
- an indication of those measurements without time waveform data
- a common information area for all plots
- a common information area and the ability to enable/disable it
- a live mode (for online systems only) and the ability to enable/disable it so I can immediately determine the results of recent corrective maintenance actions
- the ability to print Contribution/Profile plots and to include them in my reports
- Auto-Link mode for these plots and the ability to enable/disable it

@ptitude Analyst 9.0 offers the Contribution/Profile combination plot, which includes a trend plot, to support the operators' abilities to easily view and compare information. The following pages provide greater detail and instruction on the Contribution/Profile plot functionality.

- The Contribution/Profile combo plot consists of three distinct plots (contribution, profile, and trend), which are linked.**

The Contribution/Profile combo plot shows the contribution bar graph. The Trend plot in the bottom panel is a standard Trend plot that displays traces for selected points and channels. The Contribution (upper left panel) and Roundness Profile (upper right panel) plots display data for the point and channel indicated by the active Single Cursor on the trend plot.

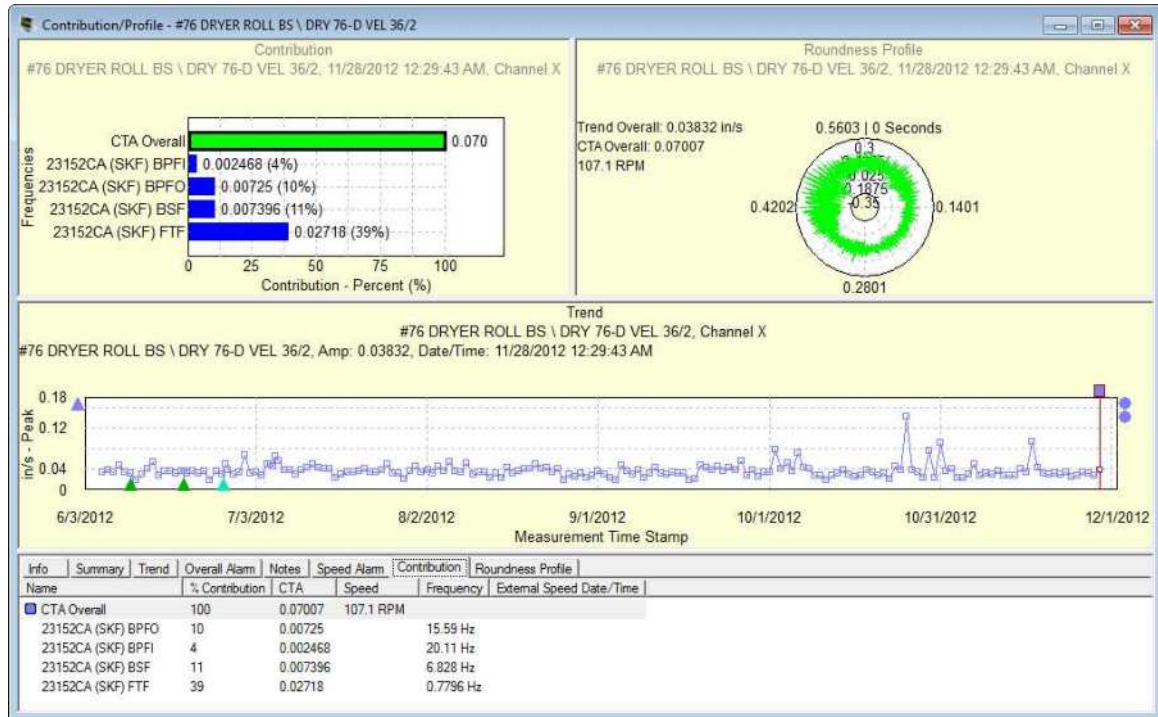


Figure 2 - 1.
Example of Contribution/Profile Plot with Contribution Tab Below.

The Trend Plot and Data Selection

The Trend plot is the standard Trend plot so it supports the usual behaviors and overlays. It opens with a Single Cursor but additional Single Cursors can be added.

The data selection process through the plots is as follows:

- The Trend plot is the initial content driver. The active Single Cursor determines the data that displays in the Contribution plot. When there are multiple Single Cursors on the Trend plot, only the active Single Cursor drives the Contribution plot.
- Use the arrow keys to navigate among measurements. The Contribution plot updates to display data for the selected measurement.
- The Contribution plot drives the content of the Roundness Profile plot based on the selected bar (either the CTA Overall or a Frequency). The CTA Overall bar is initially selected. CTA stands for Cyclical Time Averaging; CTA Overall applies specifically to the Contribution plot.
 - If the Single Cursor that currently drives the Contribution plot is removed, the Contribution and Roundness Profile plots will go blank and show the message: “There is no data available to display on the plot”.
 - The Contribution/Profile combo plot supports “live data” mode. Details are provided later in this document.
 - Only the Trend plot supports the zoom function.

The Contribution Plot

As stated, the contribution plot displays data for the frequencies associated with the particular trace that is indicated by the active single cursor on the Trend plot. The plot title presents the following elements: plot type as Contribution, Machine/Point name, Measurement date/time, and Channel.

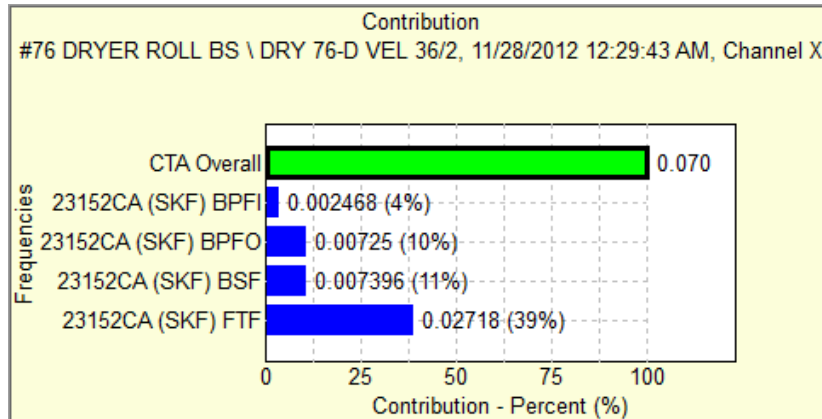


Figure 2 - 2.
Example of a Contribution Plot Only.

The data displays in bar chart format, showing the measurement value and vibration contribution by percent of the total (the x-axis) for each frequency (the y-axis). The top bar, labeled **CTA Overall**, represents the total of the selected frequencies associated with the POINT and therefore represents 100%. The overall value of the measurement is given at the right of the **CTA Overall** bar.

The other bars show the names (up to 15 characters) of the frequencies selected for inclusion by the checkboxes on the **POINT Properties > Frequencies** tab. Each bar represents the relative contribution of a frequency; the label at the right provides both the measurement value and percent of the contribution to the CTA overall. If more than 15 frequencies are enabled on the **Frequencies** tab, only the first 15 (depending on the sort type) will display in the bar chart.

Right-click in the Contribution plot to open the context menu.

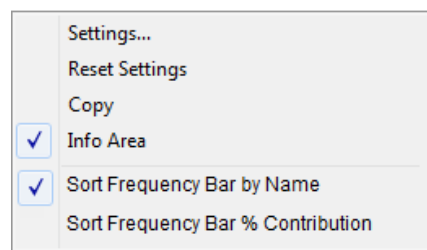


Figure 2 - 3.
Contribution Plot Context Menu

Settings... - open the Contribution Settings dialog.

Reset Settings - reset changes made in the **Contribution Settings** dialog to the default settings.

Copy - copy the Contribution plot to the Windows clipboard. (This menu item appears in all plots.)

Info Area - hide or show the Info Area. (This menu item appears in all plots.)

Sort Frequency Bar by Name - sort the Frequency bars by the frequency name in ascending order.

➤ The **CTA Overall** bar is not sortable and remains at the top.

Sort Frequency Bar by % Contribution - sort the Frequency bars by the % contribution in descending order.

To change the Speed Reference Time Window:

- Select **Settings...** to open the **Contribution Plot Settings** dialog.

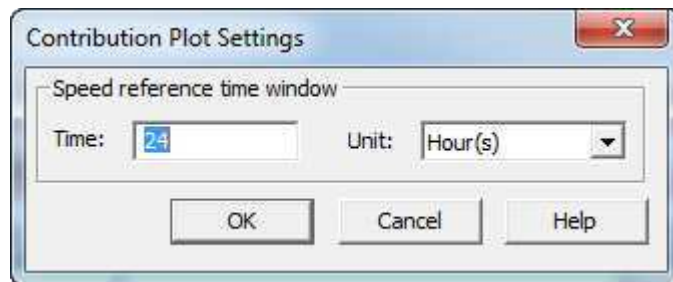


Figure 2 - 4.
Contribution Plot Settings Dialog.

- You can change the **Speed reference time window** value and units. The maximum allowable value is 48 hours; this is equivalent to 2880 minutes or 172800 seconds.
- Click **OK** to save the settings. Any change you make applies only to the plot currently open; the global plot preference setting is not changed. Bear in mind that the settings implemented in this dialog continue to be applied to this plot when the data changes (until the settings are changed manually again).

The Roundness Profile Plot

The Roundness Profile plot shows only one time waveform at a time. The Roundness Profile plot is determined by the frequency bar selected in the Contribution section. Selecting a frequency bar (the color changes upon selection) updates the profile to show CTA(Fd) in a roundness plot. The calculated statistics for the Contribution-derived time waveform are also displayed.

➤ The Roundness Profile plot supports only the **Linear Speed** overlay

The Roundness Profile plot is drawn as follows:

- The circle angle represents the Time.
 - 0 degree is 0 second.
 - 360 degrees is the time for one revolution, using the specified speed reference.
- Each circle represents the waveform amplitude.
 - The innermost circle is the minimum amplitude.

- The outermost outer circle is the maximum amplitude.
- There are five circles for the max value, min value, mid level, a circle between the mid and max circles and another between the mid and min circles.
- Traces for values outside the minimum and maximum values will be clipped.

When first opened, the **CTA Overall** bar is selected in the Contribution plot and the Roundness Profile plot draws the whole raw time waveform, with each cycle representing one revolution. The plot line color matches the color of the CTA Overall bar in the Contribution plot. (Refer to the first example, Figure 2-1.) The plot title presents the following elements: plot type as Roundness Profile, Machine/Point name, Measurement date/time, Channel, and Overall value. The Machine/Point name, Measurement date/time, Channel, and Overall value reflect the data from the trace selected by active single cursor in the Trend plot.

When a Frequency bar is selected in the Contribution plot, the Roundness Profile plot draws one revolution of the frequency time waveform. The plot line color matches the color of the selected Frequency bar in the Contribution plot. The plot title presents the following additional elements: the selected frequency name, RMS and speed.



Figure 2 - 5.
The Roundness Profile Plot with a Frequency Bar Selected.

Right-click in the Roundness Profile plot to open the context menu.

- The access levels "Operator" and "View Data HMI Operator" will not see **Settings...** and **Reset Settings**. All users will see the **Copy** and **Info Area** options.

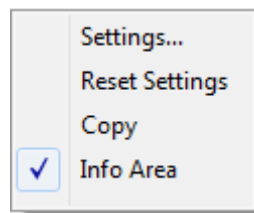


Figure 2 - 6.
Roundness Profile Plot Context Menu (Complete).

Settings... - open the Roundness Profile Plot Settings dialog.

Reset Settings - reset changes made in the **Roundness Profile Plot Settings** dialog to the default settings.

Copy - copy the Contribution plot to the Windows clipboard. (This menu item appears in all plots.)

Info Area – hide or show the Info Area. (This menu item appears in all plots.)

To change the Magnitude Range:

- Select Settings... to open the Roundness Profile Plot Settings dialog.

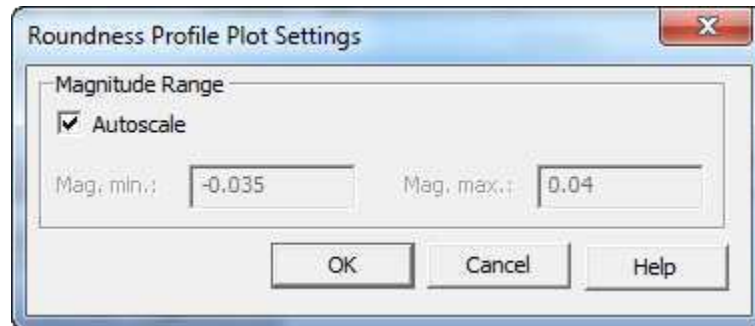



Figure 2 - 7.
Roundness Profile Plot Settings Dialog.

- When **Autoscale** is disabled, you can change the values for **Mag. min.** and **Mag. max.** Negative values and values with decimal points are allowed.
- Click **OK** to save the settings.

Linear Speed Overlay

From the Roundness Profile plot, click the **Linear Speed** tool  in the overlay toolbar. Or go to **View > Plot Overlays > All Overlays** and select **Linear Speed**.

- Only one instance of the Linear Speed overlay is supported in the Roundness Profile plot.

The overlay behavior is the same as Linear Speed in the Time plot. An anchor displays at the top left of the plot and feedback for Linear Speed displays.

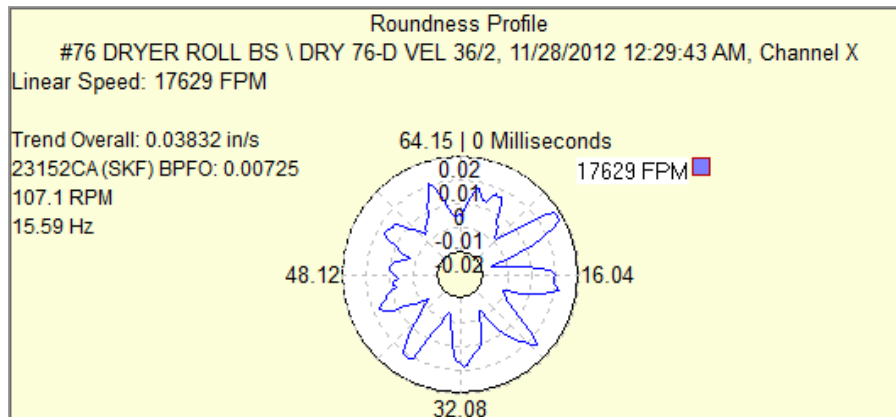


Figure 2 - 8.
Roundness Profile Plot with Linear Speed Overlay.

Speed References

As stated previously, the Contribution/Profile combo plot supports “live” display. For setups that require an external speed reference, the live display includes the external speed reference as part of the live display so that a valid value is obtained.

If the nearest speed measurement is outside the allowable speed reference window time, the frequency bar will change different color. The Contribution plot will display the message: “Speed reference out of range”. The same color change and message also appear in the Roundness Profile plot.

If the speed measurement is not available (that is, the speed reference was removed from system, or no measurement data is available), then the Frequency bar is not shown. Instead, there is the message: “No speed data”.

If any of the calculations fail (for frequencies or CTA Overall), then the bar is not shown. Instead, there is the message: “Insufficient data”.

Live Data Mode

Click the **Live Data** tool to switch the Trend plot (main content driver) into live mode. As the Trend plot is updated with live data, the Contribution plot is also updated depending on the Single Cursor position in the live Trend plot.

If the frequency uses an external speed point, the speed point is also put into live mode so that the frequency will have the live speed data.

- The external speed point live data will not be shown in the Trend plot.
- If one or more external speed points fail to go live, a message will inform you of it, but other live POINTs will continue.
- As with other plots, saving live data is supported. If an external speed point is used, the speed point’s live data is saved as well.

Contribution Analysis Configuration



As a Senior Vibration Analyst, I want to configure POINT frequencies so I can quickly and easily include these frequencies for the POINT in a contribution plot. Specifically, I want to be able to:

- specify the frequencies within a POINT to include in the contribution analysis
- assign a speed reference to any frequency, so I can specify the frequency's own speed reference or an external speed reference to be used in its contribution analysis
- export and import contribution-related POINT property settings, so I can export and import POINTs that have been configured for contribution analysis

@ptitude Analyst 9.0 brings contribution analysis configuration support to better match senior vibration analysts' needs. The following pages provide greater detail and instruction on the contribution configuration.

- The POINT Properties screen now includes contribution analysis capabilities for most types of POINTs. For such POINTs, you can set the frequencies that will show in contribution plots.**

To configure the combination contribution bar chart and profile plot display, the **POINT Properties** provides the **Contribution** tab. The list of frequencies presented on the **Contribution** tab is always based on the frequencies currently associated with the POINT on the **Frequency** tab. Any frequency types that are not supported on the **Contribution** plot are excluded from the **Contribution** tab. The **Contribution** tab displays two types of frequencies:

- Frequencies from bearings
- Non-bearing RPM multiple frequencies
 - Unsupported frequencies are: Non-bearing Constant, Non-bearing Offset and Non-bearing Sideband

Use the **Contribution** tab to choose which frequencies to include in the contribution bar graph and profile plot display, as well as to select an external source to use as the **Speed Reference**.

Important! Upon opening, the Contribution tab list of frequencies will update to match changes made to the Frequency tab list. If frequencies from bearings or non-bearing RPM-multiple frequencies were edited on the Frequencies tab, the list on the Contribution tab will update to match those changes. Any frequencies of the relevant types (from bearings or Non-bearing RPM multiple frequencies) that were deleted are removed from the Contribution tab list. Any frequencies of the relevant types that were added are also added to the Contribution tab list. They are set to their default settings: unchecked, with the speed reference set to the current point.

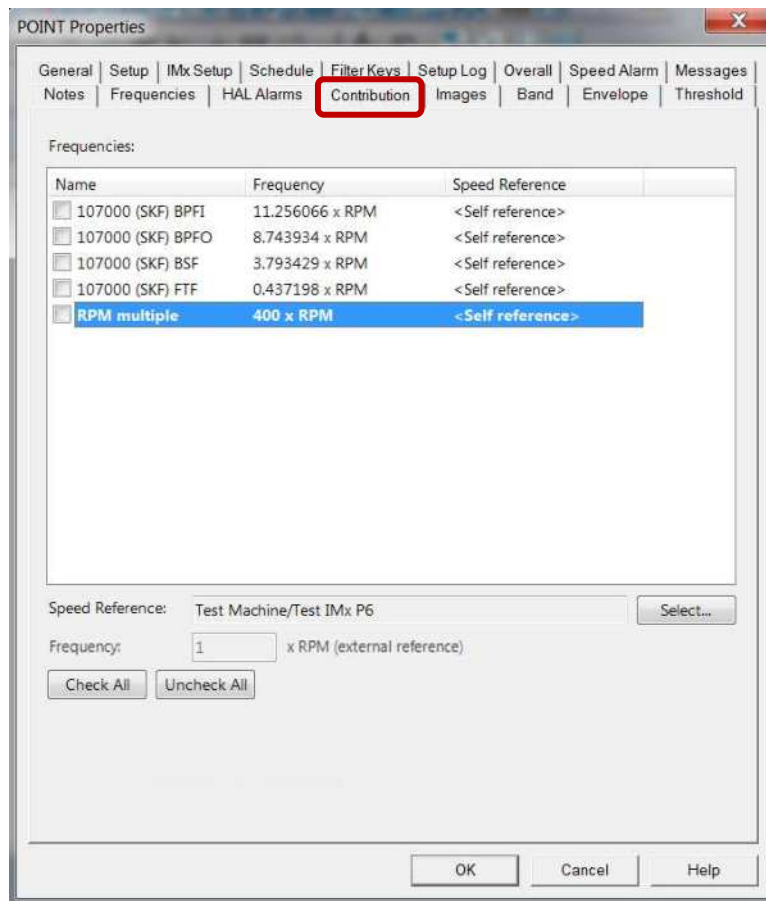


Figure 2 - 9.
 POINT Properties > Contribution Tab.

The columns and features on the **Contribution** tab are described below:

Name – If the checkbox in the **Name** column is selected, that frequency will be displayed in the POINT’s contribution bar graph and profile plot display. Click **Check All** to select and include all the frequencies. Click **Uncheck All** to deselect all the frequencies.

Frequency – This column displays the frequency as <F> x RPM>. The value of *F* depends on the frequency type, the **Speed reference** and **Frequency: <value> x RPM (external reference)** values. If the frequency is for a bearing, the numeric value substituted for *F* will be the Fundamental frequency for the row (for example, BPFO, BPFI etc.).

- Bearing frequencies do not support external Speed References or Frequency: <value> x RPM (external reference) values.

Speed Reference – Each frequency has its own speed reference. The default speed reference is the current POINT itself, shown in the column as <Self reference>. If the frequency is for a non-bearing RPM multiple and no external speed reference is set, *F* is the value of the **Frequency formula** of the row.

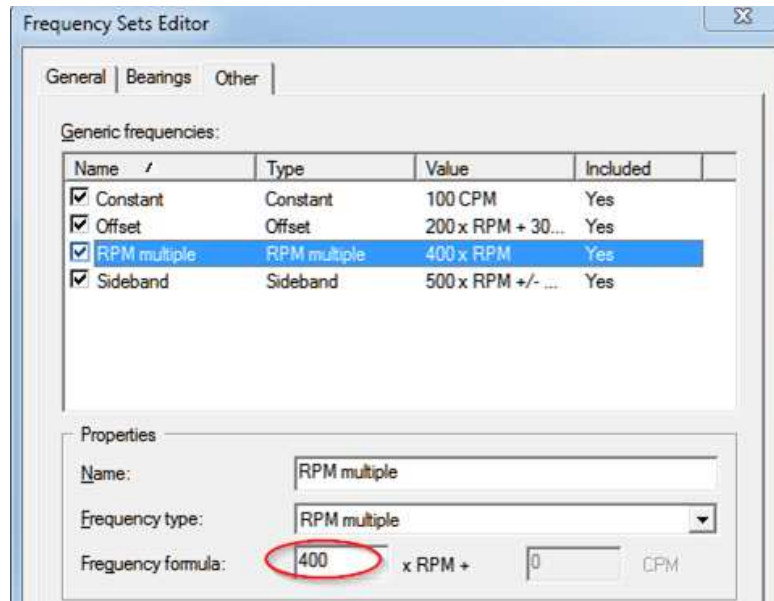


Figure 2 - 10.
Frequency Sets Editor > Other Tab, Frequency Formula Field.

The speed reference value for a non-bearing RPM multiple frequency can be changed to an external speed reference (for example, a tachometer signal), as detailed in the procedure below.

- A POINT Selection dialog enables selection of a speed reference POINT for the applicable frequencies.**

To change the speed reference POINT for the selected frequency:

- Highlight the frequency you want to modify. The **Speed Reference** field displays the speed reference point that will be used to derive the speed for calculations made in contribution graphs for this point.
- Click the **"Select..."** button. The **POINT Selection** dialog opens.

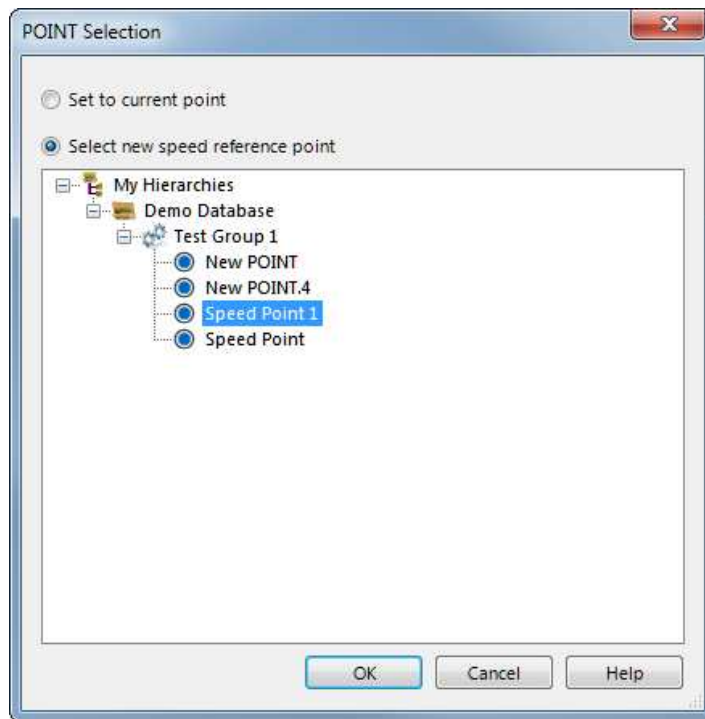


Figure 2 - 11.

POINT Selection Dialog for Selecting a New Speed Reference Point.

If the speed reference for the current frequency is set to the default, the **Set to current point** option button will be selected and the machine for the current POINT will be displayed in the item hierarchy presented.

- Select the option button **Select new speed reference point**.
- Browse to the POINT in the hierarchy that you want to use as the speed reference. (See the section *About Speed References*, below.)
- When the correct POINT is highlighted, click **OK**.
 - To return the speed reference to its default, select the option button **Set to current point**, and then press **OK**.

You are returned to the **Contribution** tab. The new reference for the selected row displays in the **Speed Reference** field as “<Machine>/<Point>”.

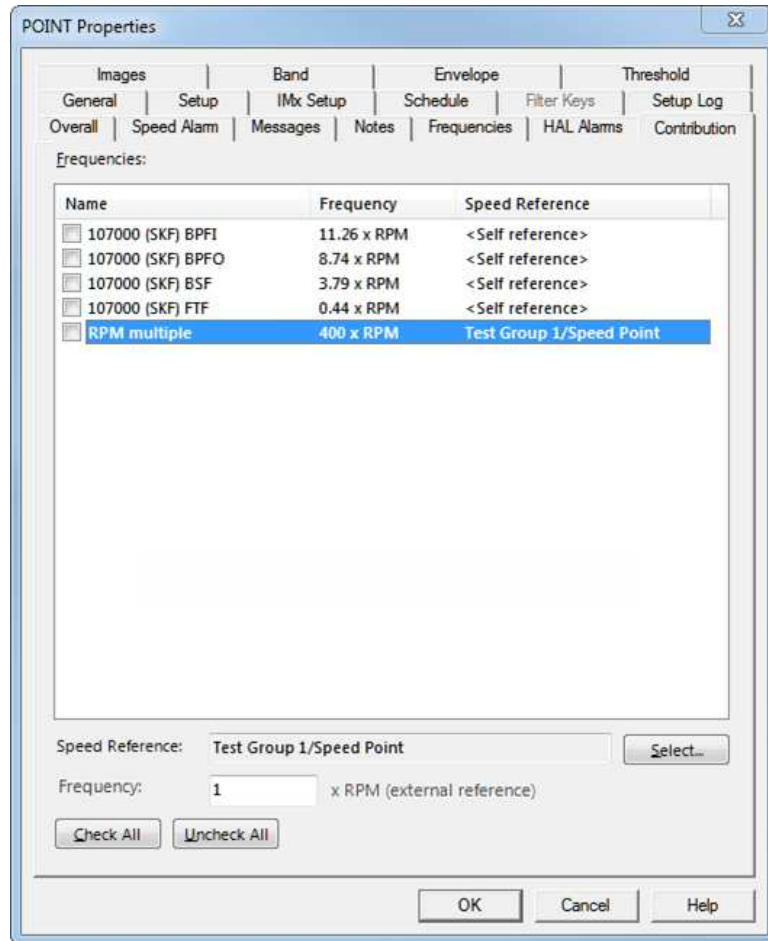


Figure 2 - 12.

Contribution Tab Showing One External Speed Reference.

Frequency: <value> x RPM (external reference) is enabled when the selected row is using an external speed reference. The **Frequency: <value> x RPM (external reference)** is used in conjunction with the frequency to calculate the speed for the frequency on the Contribution plot. The default value is 1.0. Enter the **Frequency: <value> x RPM (external reference)** value.

- If the Frequency: <value> x RPM (external reference) value is *not* 1.0, *F* is the value of the Frequency: <value> x RPM (external reference) field.
- If the **Frequency: <value> x RPM (external reference)** is 1.0, *F* is the value of the Frequency formula of the row (the same as no external reference).
- If the speed reference is set back by using the **Set to current point** option button, then the **Frequency: <value> x RPM (external reference)** returns to its default value of 1.0.

OK – Click **OK** to save changes. Settings changed on the **Contribution** tab are saved only when one of the following conditions is met:

- At least one frequency is checked, or
- At least one **Speed Reference** or **Frequency: <value> x RPM (external reference)** value is set to something other than the default.

More about Speed References

Valid speed references can be any POINT (static or dynamic). For static measurements, the overall value is to be taken as the speed reference. For dynamic measurements which are speed stamped, the speed stamp will be used as the external reference. OPC provided speeds, as well as MODBUS provided speeds, are also supported.

The date/time stamp (DTS) of the incoming measurement and DTS of the tachometer/speed reference must be within a user-defined window of time (in seconds) or else a warning message will be displayed on the Contribution plot. The message states: Speed reference out of range.

The initial size of this window is set in a pair of Plot preferences: Speed Reference Time Window (Unit) and Speed Reference Time Window (Value). Go to **Customize > Preferences > Plot** tab to set these preferences.

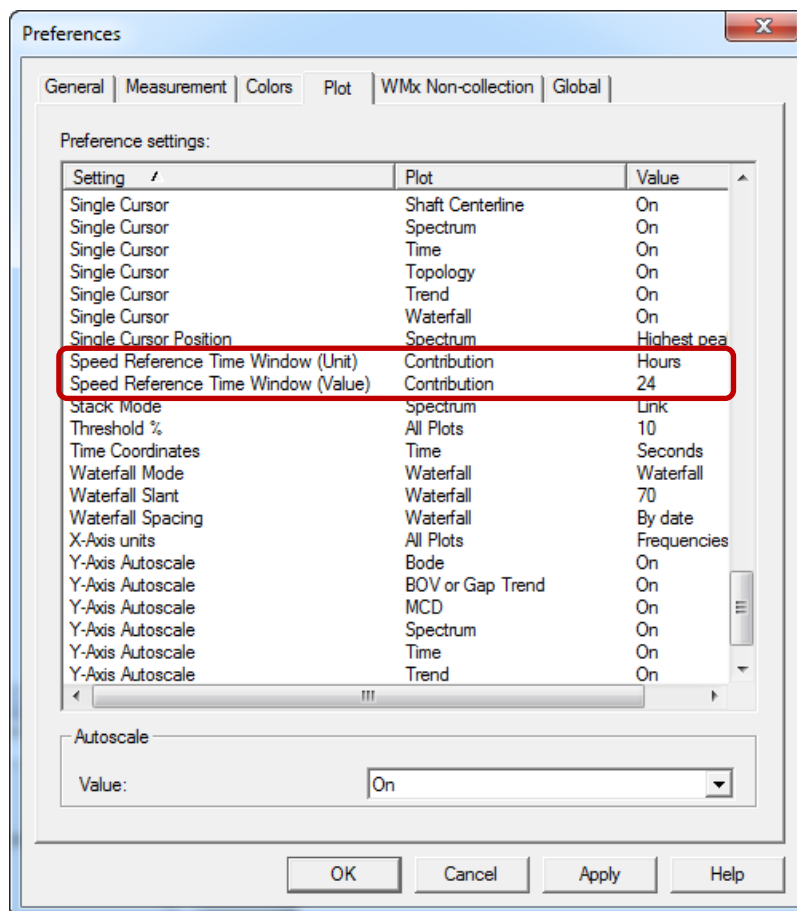


Figure 2 - 13.
Contribution Plot Preferences for Speed Reference Time Window.

You can change the Speed Reference Time Window values from within the Contribution plot by right-clicking to open the context menu. Select **Settings** to open the **Contribution Plot Settings** dialog. The default is 24 hours; the maximum is 48 hours.

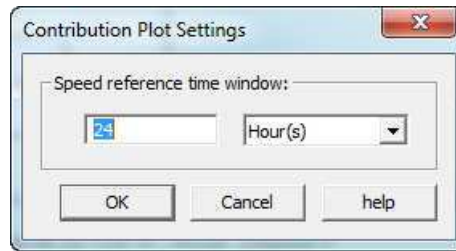


Figure 2 - 14.
Contribution Plot Settings Dialog.

- MAB Export/Import now supports export and import of contribution-related POINT property settings.**

This feature performs for contribution-related POINT property settings in the same manner it does for other settings.

HMI View Configuration Improvements

HMI View Configuration Improvements




As a Senior Vibration Analyst I want an easier way to configure HMI views, so I can quickly and easily build large environments that contain a large number of POINTs. Specifically, I want:

- flexible label positioning
- customize label borders and connectors
- improved alignment of POINTs and labels
- default plot type settings and default element settings

@ptitude Analyst 9.0 offers some configuration improvements to the embedded HMI. The following pages provide greater detail and instruction regarding these configuration improvements.

- The analyst can place each text label anywhere in relation to its corresponding POINT.**

The **Custom** option enables you to move the label text for an element to any position you want.

- Launch the HMI configurator by going to the **View** menu > **HMI Displays...** or select the icon . The **HMI Displays** dialog opens.

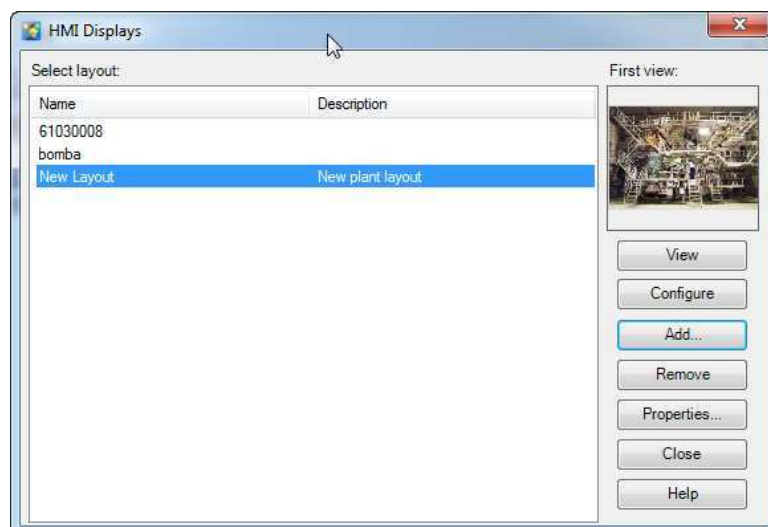


Figure 3 - 1.
HMI Displays Dialog.

- Locate the SET you want to edit by highlighting it in the hierarchy.

- Select the layout you want in the dialog, and then click **Configure** to open the **HMI Configuration** view.
- Drag and drop an item from the hierarchy on to the background image. The element is represented by the marker of a small sphere with a label in black text.



Figure 3 - 2.
Element Dropped in the Configuration Display.

- Right-click the element in the HMI display to open the context menu.

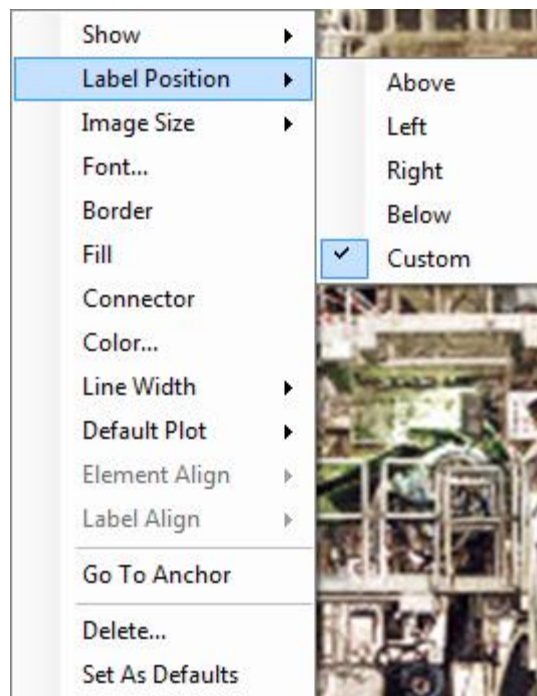


Figure 3 - 3.
HMI Display Context Menu. Label Position.

- Select the **Custom** option.
- Click on the label text and drag and drop it to a new location on the screen. The label appears in bold font while it is being moved. (Previously, only the element marker could be repositioned in this manner.)



Figure 3 - 4.
Example of Customized Label Position.

- You may click the **Save** tool to save any changes you make before continuing.
- The analyst can customize text label borders and connectors to see them more easily.**

The right-click context menu also includes options for **Border**, **Fill** and **Connector**. These options produce visual highlights to the text area to improve visibility against the background image or provide emphasis.

- **Connector** is available only for elements that have **Label Position = Custom**.

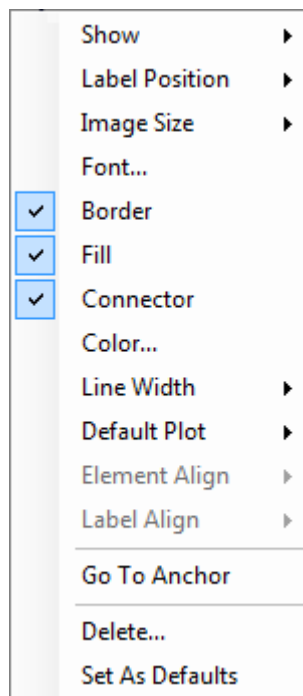


Figure 3 - 5.
Border, **Fill** and **Connector** Menu Options.

- Still in configuration mode, right-click the desired element in the HMI display to open the context menu.
- Check **Border** to enable the drawing of an optional border around the label text. The border will initially be black and 1 pixel wide.
- To change the color of the border, select the **Color...** menu option. The color selector opens for you to select a color and then click **OK**.
- To change the width of the border, select **Line Width**.

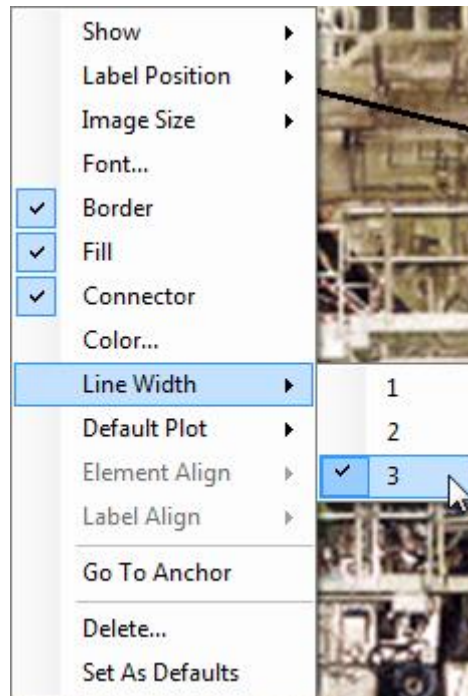


Figure 3 - 6.
Line Width Options.

- **Line Width** options are:
 - **1** (1 pixel wide).
 - **2** (2 pixels wide).
 - **3** (3 pixels wide).
- Check **Fill** in the context menu to enable filling the background rectangle area of the text label with color.
 - A single color selection is applied to the border, the fill and the connector. If you change the color of one, the other visible items change to match.



Figure 3 - 7.
Examples of **Border**, **Line Width** and **Fill**.

- Remove the check mark to disable the display of the **Border**, **Fill** or **Connector**.

If the selected element has **Label Position = Custom**, then the menu option **Connector** is also available.

- Check **Connector** to enable the display of a connecting line between an element and the label text in custom position. The default connecting line is black, 1 pixel wide. If you have already selected another color and line width, the connector will display those selected values. You can change the color and line width of the connector. Recall that any change will be applied to the border and fill, if displayed.

The analyst can easily maintain alignment among elements on the screen.

You can easily align elements and custom labels in the view with the new alignment options.

- The alignment function requires two or more elements to be selected.
- Select two or more elements that you want to align by holding down the **Ctrl** key while performing a left-click on each element. The selected elements will show a small border drawn around the element image.

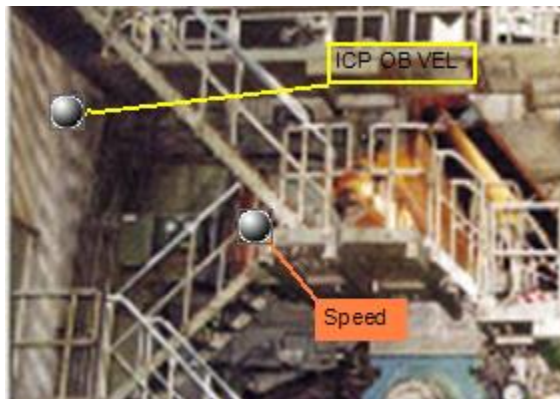


Figure 3 - 8.
Example of Two Elements Selected for Alignment.

- Right-click a selected element in the view to open the context menu.

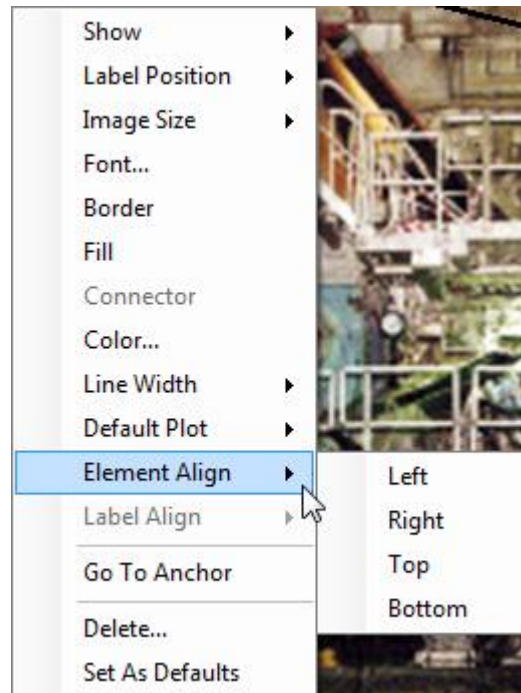


Figure 3 - 9.
Element Align, Alignment Options.

- Select **Element Align**, and then select by check mark the alignment position you want: **Left**, **Right**, **Top** or **Bottom**.
 - Left** – moves all selected elements to match the horizontal position of the leftmost element.
 - Right** – moves all selected elements to match the horizontal position of the rightmost element.
 - Top** – moves all selected elements to match the vertical position of the topmost element.
 - Bottom** – moves all selected elements to match the vertical position of the bottommost element.

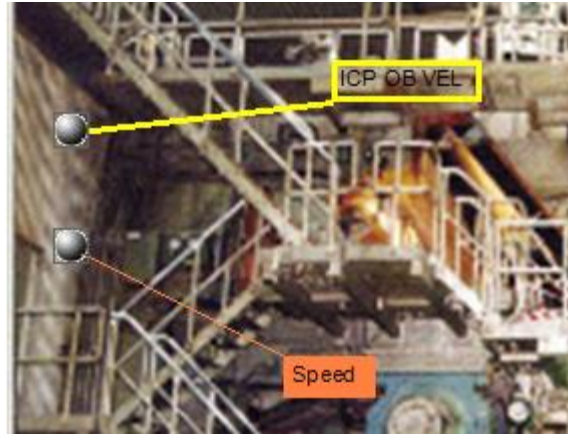


Figure 3 - 10.
Example of the Two Selected Elements Aligned to the Left.

Label Align becomes available when two or more elements with **Label Position = Custom** are selected. The label alignment options are **Left, Right, Top** and **Bottom**.

- Be careful that an aligned label does not hide or obscure another existing label.

- The analyst can now set, per POINT, one of the supported plot types as the default plot to be opened when that POINT is selected.**

You can configure a specific plot type to display when you click on a POINT element in the HMI view. This feature supports many types of plots.

To configure a POINT element for a default plot type, right-click on the element to open the context menu.

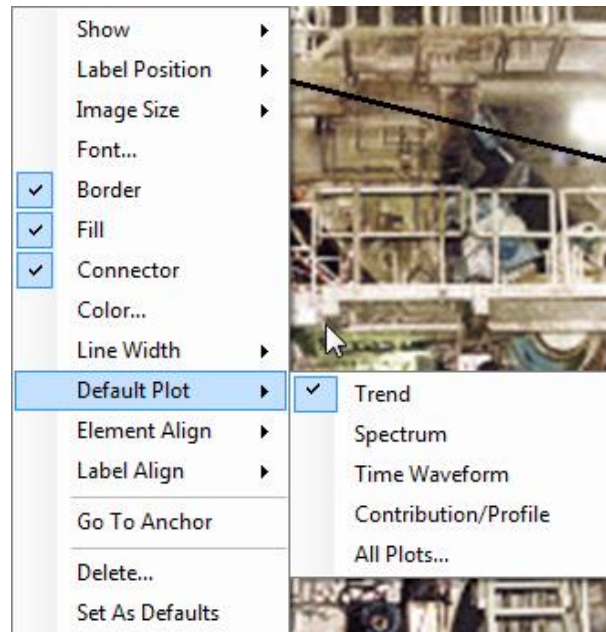


Figure 3 - 11.
Default Plot, Plot Type Options.

- Click the **Default Plot** menu item.
- Select by check mark one of the plot types visible or select **All Plots...**

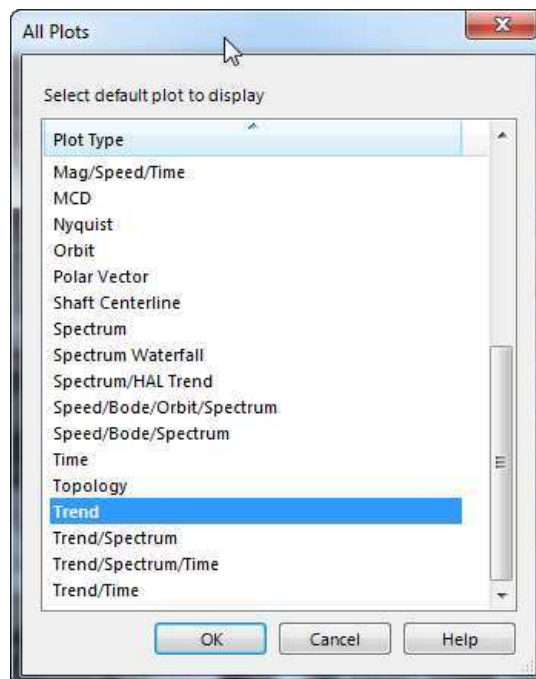


Figure 3 - 12.
Default Plot, All Plots.

- In the **All Plots** dialog, select the plot type you want to display when you single-click on the POINT element in view mode, and then click **OK**.

- ☑ **The analyst can establish the configured values of an existing element to be the default values of new elements added to the view.**

In order to improve the speed and efficiency of configuring multiple HMI elements for viewing, you can take the configuration settings of an existing element and define them to be the default settings for new elements in the view.

- Configure an element with the appearance and settings you want, as described above.
- Right-click that element to open the context menu.

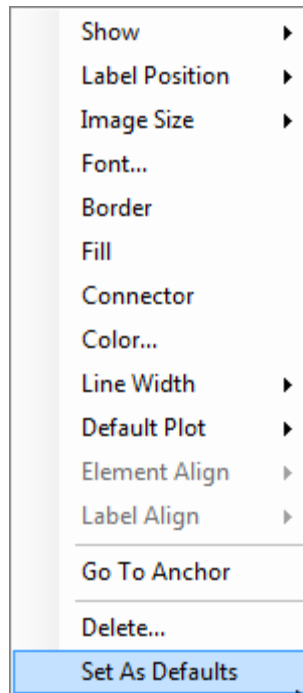


Figure 3 - 13.
Set As Defaults Menu Option.

- Click **Set As Defaults**, and then **Save**.

Any new element you add to the current view will share the configured values as default values for all of the following items:

- Show name
- Show value
- Show time stamp
- Label position
- Image size
- Font
- Show border

HMI View Configuration Improvements
HMI View Configuration Improvements

- Show connector
- Color
- Line width
- Default plot type

Miscellaneous Enhancements and Defect Fixes

2151

The **Test** button function on the Configuration Tool's Microlog Service configuration screen was enhanced to provide more informative prompts for successful or failed connection. Connect to the Microlog Service, then click **Test**. If the response message is in the form of UR or BUSY packet type, a "connection successful" prompt is returned to the user.

8882

A new checkbox was added to the Compliance Report: **Exclude interval-based POINTs**. When setting up Report Criteria for a compliance report in the Report Editor, you can specify to list all missed or out of compliance POINTs for the specified ROUTEs and to exclude interval-based POINTs.

9287

Multiple WMx services running on separate servers and connecting to one Analyst client (a single database) now show separate status bar indicators for each service.

9845

For WMx firmware version 2.05.03 or later, Analyst now logs a message into the event log when the WiVibServer reports an error message regarding critical battery and ICP ADP Failure in a WMx device. (These error messages are separate from Channel overload, Trigger timeout and other error tags.)

Battery critical is reported in the event log as: "Critical Battery Notification for WMX {0}. Please replace batteries immediately or WMx will stop collecting data soon. Please also verify the alert and danger levels of the Battery Level POINT."

ICP ADC Failure is reported in the event log as: "Severe hardware error (ADC failure) detected for WMx {0}. Please contact a local SKF Service representative for assistance." The event log does not report when device status ICP ADC failure is cleared.

12640

If you intend to use Microlog Analyzers, you must also install Microsoft's Windows Mobile Device Center. Windows Mobile Device Center offers device management and data synchronization between a Windows Mobile-based device and a computer software for synchronizing devices. Windows Mobile Device Center is compatible with Windows Vista, Windows 7 and Windows 8. You can download Windows Mobile Device Center from the Microsoft website. Go to <https://support.microsoft.com/en-us/kb/931937> for detailed information about Windows Mobile Device Center and which version you should download.

You may find that this program has already been installed on your system as part of the Windows 7 or Windows 8 installation.

If you run Windows XP or an earlier version of Windows, you must download Microsoft ActiveSync instead.

12879

Previously, only WMx speed POINTs displayed the **Pulse per revolution** setting in the Point Properties > Setup tab. Now, **Pulse per revolution** also displays for dynamic WMx POINTs under the Tacho Number field. If the tacho is enabled and pulse per rev is valid, speed is updated using the calculation: $speed = speed/pulses \text{ per rev}$.

12905

You can now create an IMx / General / DC point to trend the Gap value for a channel. This was done so that the Gap can be output to OPC or Modbus. Follow the steps below:

Create an IMx.

Set Channel 1 to Displacement Probe.

Create a IMx point in Hierarchy, set it to IMx/General/DC with units of Vdc.

On the Setup tab, map it to the IMx created earlier(channel 1) and the ECP channel.

This is now allowed.

13023

Pulse Per Rev is now editable for WMx dynamic and speed POINTs for the purposes of Modify by Attribute. Go to Modify by Attribute > FFT Settings > Pulses per rev find and edit the setting.

13335

WMx should not allow entry of Trigger Timeout = 0. If 0 is entered for **Trigger Timeout** on the **WMx Device Setup** screen, Analyst presents the message "Timeout must be 1 to 60".

- Previously, the system would allow the entry of Trigger Timeout = 0, but would then default the entry to 5.