

## **AMS Suite: Machinery Health™ Manager v5.51**

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The AMS Machinery Manager version 5.51 release is the result of user input collected during plant visits and documented by our customer support and marketing teams. This release includes enhancements that will simplify the work for users of every experience level.

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## Version 5.51 Features and Enhancements

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While there are numerous enhancements to this release of AMS Machinery Manager, this paper will focus on the major benefits in the following areas:

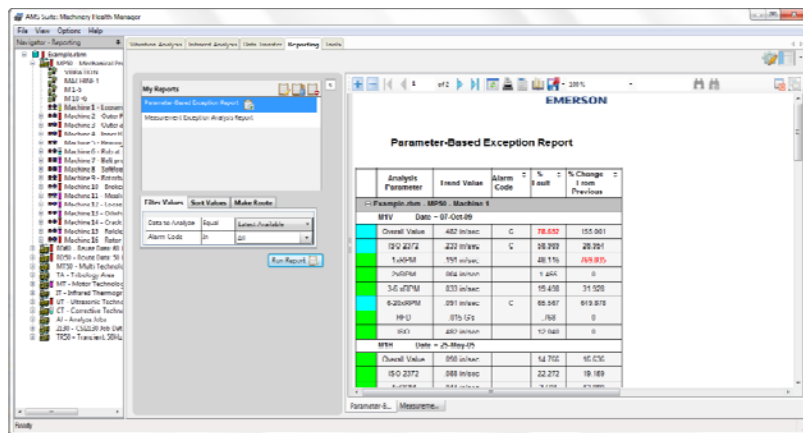
- Reporting capabilities, including a new reporting tool and integrated reporting with the vibration application
- Communication capabilities using a new collaboration tool
- Thermographic capabilities to support Flir camera images
- Vibration analysis and data collection capabilities, including a new route configuration tool that can be accessed directly from the navigator

In addition, AMS Machinery Manager now incorporates support for both 32-bit and 64-bit operating systems.

## Enhanced Reporting Capabilities

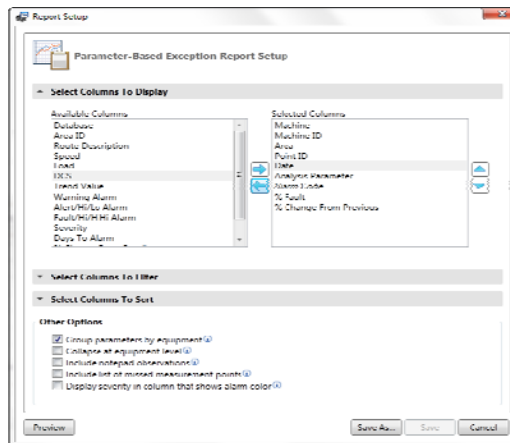
AMS Machinery Manager v5.51 includes a new reporting application that allows the user to generate interactive reports from their database(s). The interactive Report Viewer allows the user to sort, expand, and collapse asset results, and select parameter data to be included in the vibration plot. Reports can be printed or exported to Word, Excel and PDFs for additional editing and sharing. Users can also generate reports based on a selected context in the Navigator. Options for customizing reports allow the user to select the parameters and filtering options to fit their analysis needs, as well as import their company logo.

*The Reporting module includes a Parameter-Based Exception Report.*



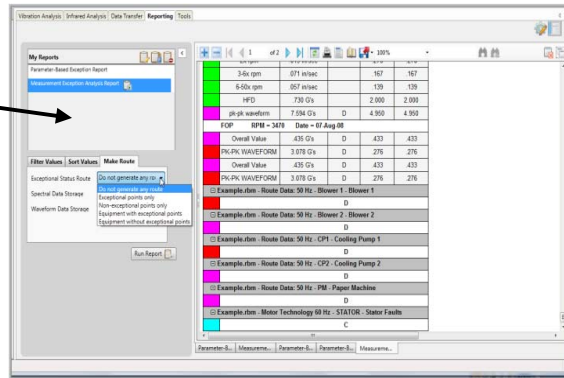
The Report module installs with two default reports that can be used like templates. The user can modify these default reports and save as their own User Reports. Once saved, these reports can be shared and utilized by all users on the system.

*Select filters and columns to create your own reports. Preview the report before saving.*



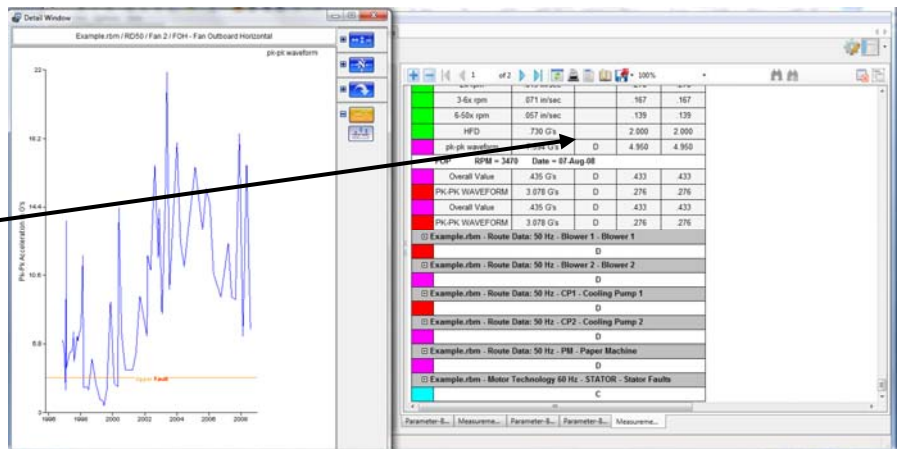
When equipment data exceeds the thresholds set for an alert or alarm or has an unusual measurement, users may want to measure the equipment again. With the new reporting application, they can automatically create customized routes based on the criteria of a report. In this case, the user might create a route of only measurement points that exceeded alert or alarm levels. Only the data required for follow-up will be collected, saving both collection and analysis time.

Create a custom route of data points to be rechecked quickly.



Users can also launch a detailed window from a parameter within the report.

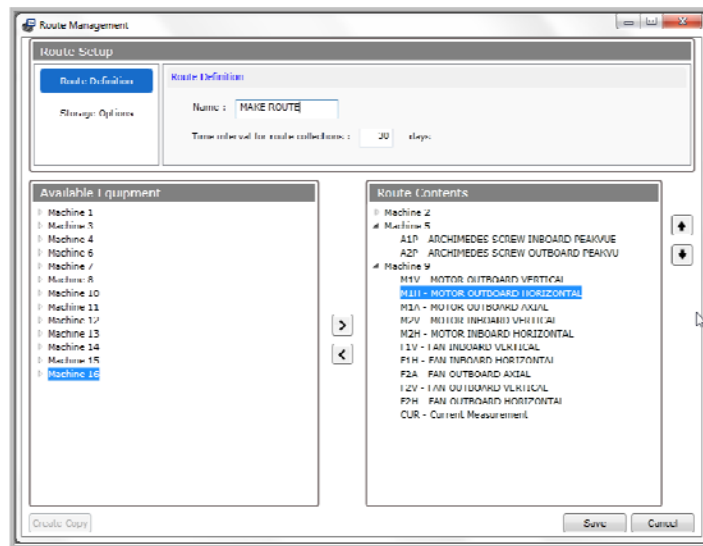
Click on a parameter in alarm and automatically see a detailed window with complete vibration analysis functionality.



## New Route Functionality

Users can now create a route from the navigator without having to launch the legacy route program. Simply right-click on an area or equipment in the navigator and select **Create Route**. The user will be presented with a list of available equipment. Select the desired equipment from the list on the left and the route contents will begin to appear on the right. Storage options for spectra and waveform data are available, as well as new functionality for editing, saving and renaming routes.

*Select available equipment within an area to create a route.*

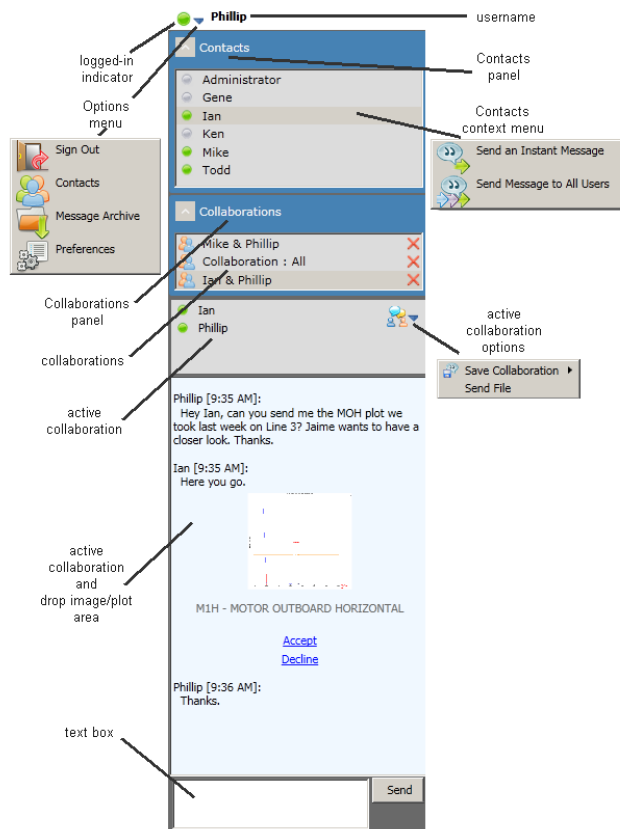


## New Collaboration Tool

AMS Machinery Manager v5.51 includes a new Collaboration Tool for easy communication and file sharing between LAN network users. Once installed, the Collaboration Tool can remain open as a docked window on the right side of the AMS Machinery Manager application. This window displays users currently logged into AMS Machinery Manager and any current conversations between users. Any user logged into AMS Machinery Manager can participate in the conversation or send/receive messages regarding problem assets.

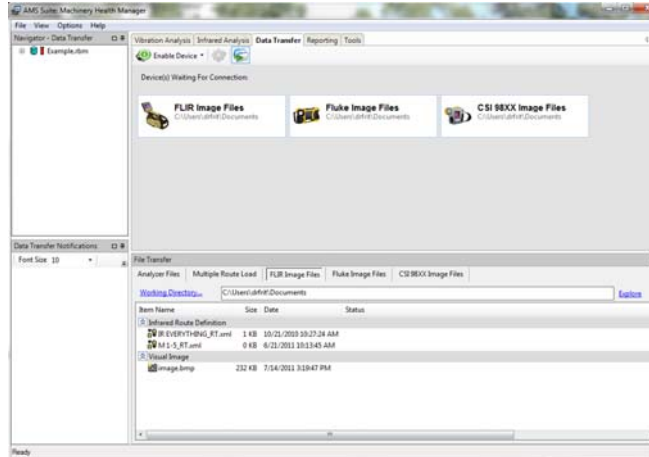
Vibration plots and infrared thermography images can be sent between users via the Collaboration Tool, allowing for a quick second opinion on analysis of the machine. Any annotations noted on the plots are included. Simply click-and-drag the image to the conversation area and select **Send**.

*The Collaboration Tool serves as a live communication center for AMS Machinery Manager v5.5 users logged into a LAN network environment.*

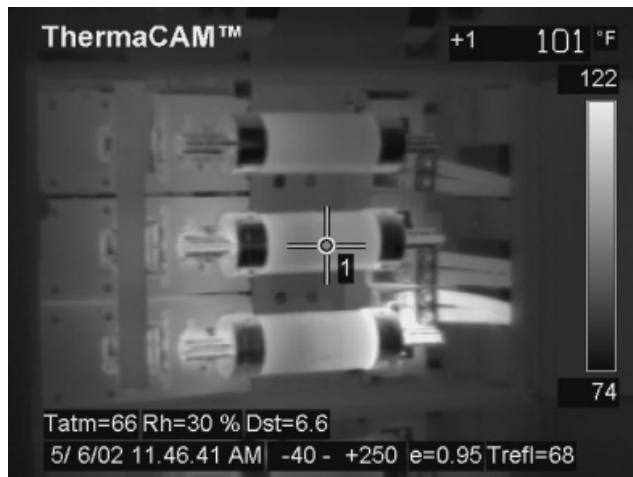


## New Support for Flir Thermal Images

The Infrared Analysis module within AMS Machinery Manager v5.51 and the Data Transfer application now support import and analysis for Flir infrared camera images. The application supports series I, E, E bx, B, T, and P cameras. The Flir-specific palette types Rainbow and Rainbow High contrast have been added, as well as annotation classes to support the polyline annotation type.



*Flir Thermal Images in AMS Machinery Manager enable users to maintain more comprehensive records of machinery condition.*

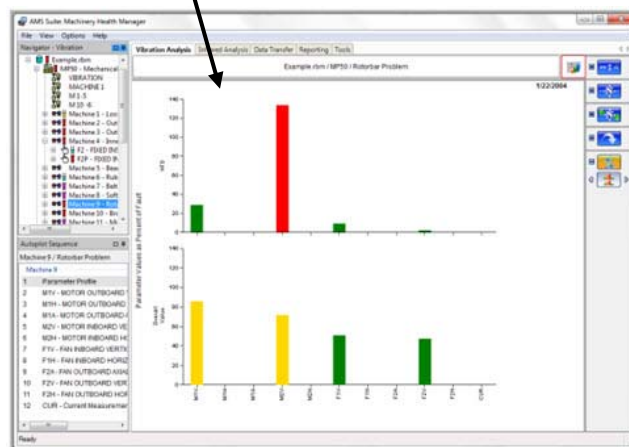
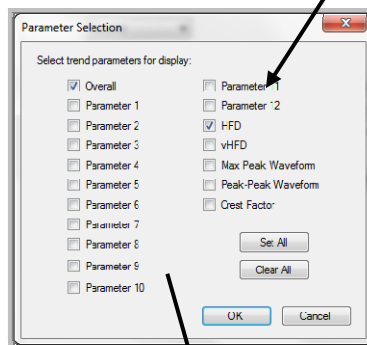
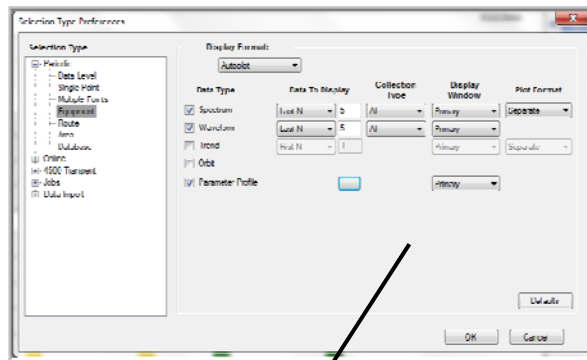


## Vibration Analysis Enhancements

### Filter Selection to Parameters of Interest

With 13 parameters to plot, the Parameter Profile plot can become overwhelming. To minimize the number of parameters plotted and focus only on those of interest to the user, AMS Machinery Manager v5.51 incorporates a Parameter Profile option that allows the user to select the trend parameters to be displayed.

Check the **Parameter Profile** plot option to customize the displayed parameters.

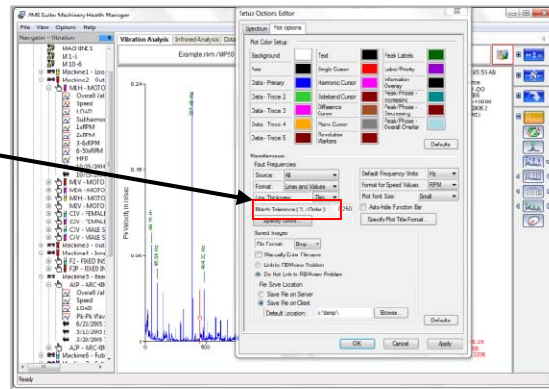




### Matching Fault Frequencies from Spectral Plots

Users can match fault frequencies to cursor-marked peaks listed in the peak list. When the “K” hotkey is selected and a cursor is on top of a peak, all fault frequencies matching peaks within a tolerance range will be displayed. This tolerance option will determine if located peaks are close enough to expected fault frequencies to be considered a match. If no cursors are present, all fault frequencies matching peaks in the peak list will be displayed.

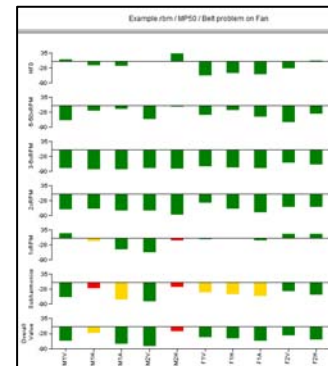
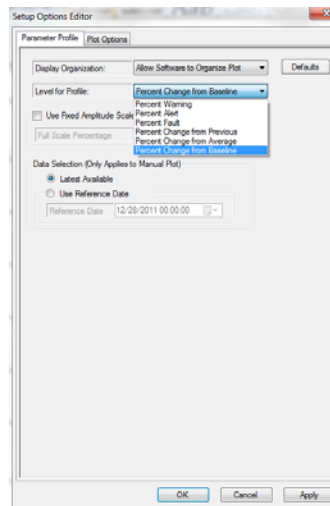
*Match Fault Frequencies within a specified tolerance range setup option.*



### New Parameter Profile Plot Supports Percent of Change from Baseline

A new profile plot option has been added to show the percent change from baseline. The displayed value for each parameter will be calculated by taking the difference between the current value and the baseline value. The difference is then divided by the baseline value for a percent change calculation.

*Display percent change from baseline values in the Parameter Profile Plot*

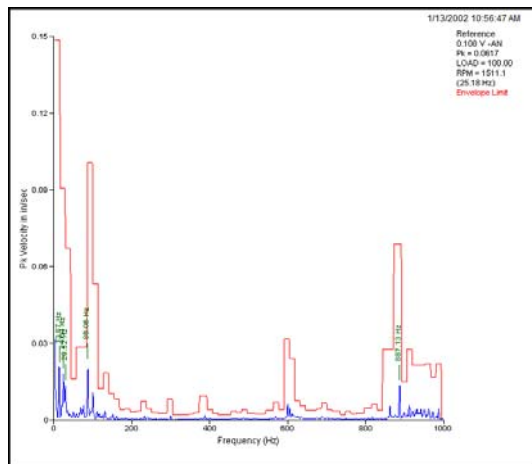


### Showing Envelopes on Single Spectral Plots

Spectral enveloping functionality allows users to display an overlay envelope limit on a single spectrum plot. An envelope is composed of multiple spectral windows, each having their own limit value. The first window begins at the first line of resolution and extends to a specified width. The software continues moving up in frequency, defining envelope windows where each window has its own limit.

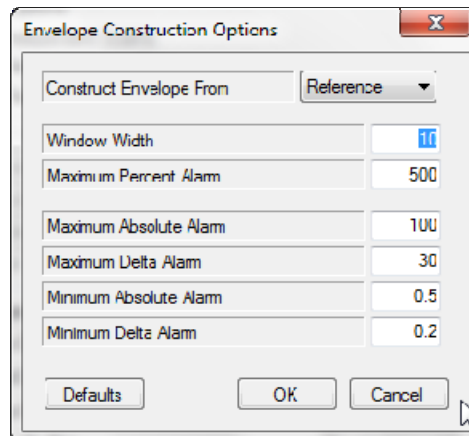
Values for envelope limits are calculated based on the limit assigned to each envelope window as a function of the specified maximum and minimum alarms. The three maximum alarms are calculated and the lowest is selected as the maximum alarm. The two minimum alarms are calculated and the highest is selected as the minimum alarm. The greater of the calculated minimum alarm and maximum alarm is displayed as the envelope limit for each window.

*Vibration spectral plot with envelope.*



Envelope construction options are available in the spectral setup menu and allow the user to configure the envelope. The user has the ability to select whether the envelope alarm will be based on the previous spectrum or the tagged reference spectrum. The window width field defines the width of the frequency windows in terms of the number of lines of resolution of the spectrum. The last five fields allow the user to configure how the three maximum and two minimum alarm levels are calculated for each spectral window.

*Set up envelope construction options for spectral plotting.*



### **Shaft Animation Plot for Transient Archives of Online Monitoring Data**

The new shaft animation plot shows the actual motion of the shaft around the average shaft position. More specifically, it shows how the shaft is moving inside the bearing. This plot is a combination of average gross scan data with the waveform data, and shows the shaft rotating within the user-specified clearance of the journal. The data source for this plot consists of gross scan DC trend values for each change and a block of waveform data for each channel on the shaft. The animation cycles through the block of waveform data and the average shaft position is the center around which the orbit data is displayed.

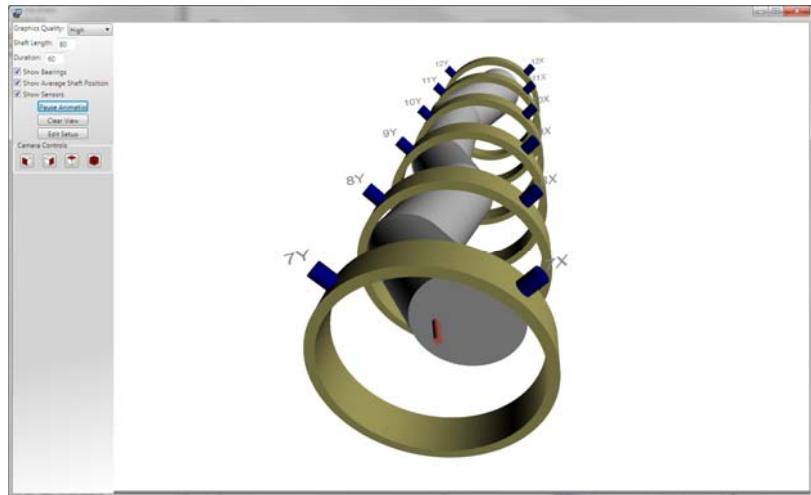
The user can click on the sensors or the bearings shown in the plot to display data. Clicking on a sensor displays detail spectrum, detail waveform, waterfall, or bode/Nyquist plots. Clicking on a bearing displays orbit and shaft centerline plots. Orbit and waveform plots have an animated cursor that updates as the shaft rotates. The user may specify graphic quality and duration of the animation (increasing or decreasing the playing speed). They may also choose whether or not to display the bearings, sensors, and an indication of the average shaft center position.

Users have several options for interaction with the perspective of the plot. The View Controls menu provides four default views (front, side, top, and one that shows a portion of each). Clicking on these buttons changes the view angle. Rotate the view by holding down the left mouse button over the plot and dragging the animation. Holding down the right mouse button and dragging allows the user

to pan across the plot. Mouse wheel rotation changes the distance of the zoom position.

The user can also alter the setup parameters used as the basis for the shaft centerline plots. This includes the resting voltage for each channel and the specified bearing clearance. These settings are key to accurate animations. They can save changes in the archive so that the next time the data is viewed, there is no need to re-enter the setup information.

*In the Shaft Centerline plot, the user can change viewing angles and click on sensors to display detailed spectrum and waveforms, waterfall plots and bode/Nyquist plots.*

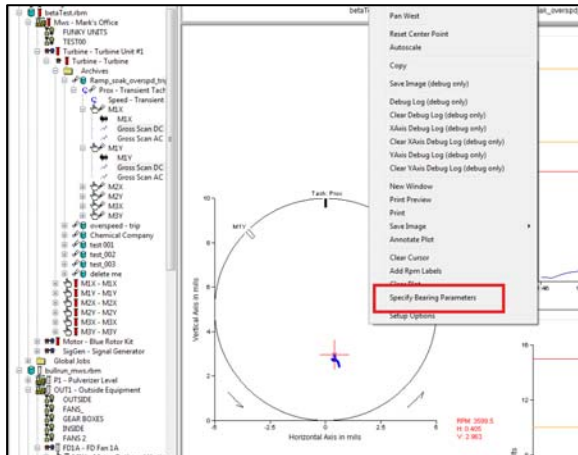


### Shaft Centerline Resting Voltage

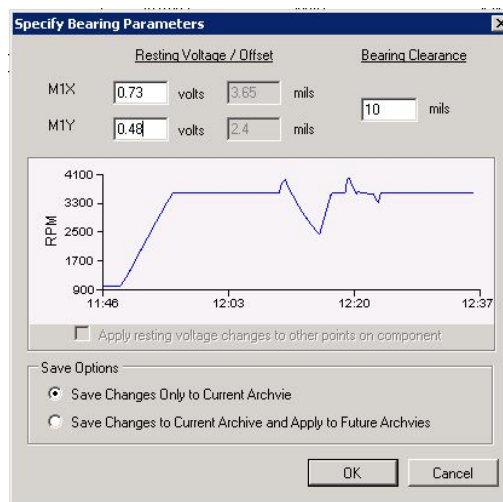
This new functionality sets the resting voltage across an entire component. Resting voltage values are typically taken from data associated with the machine during a slow roll or at-rest state. In this release of AMS Machinery Manager, the trend plot of speed vs. time is provided to specify the context from which the gross scan DC data should be used as the resting offset values.

The **Apply Resting Voltage Changes** text box is used to apply the gross scan DC data as the resting voltage value across the entire component. In other words, if one point is at rest, the entire shaft/component is also at rest, and therefore it is unnecessary to consider the resting voltage for every point or bearing. Once the context (date/time) of the data representing slow roll/at rest is known, that information can be used across the entire component.

*Right-clicking on the Shaft Centerline Plot allows the user to set resting voltage across an entire component.*

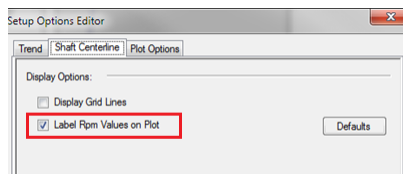


*Setup menu for resting voltage and clearance*

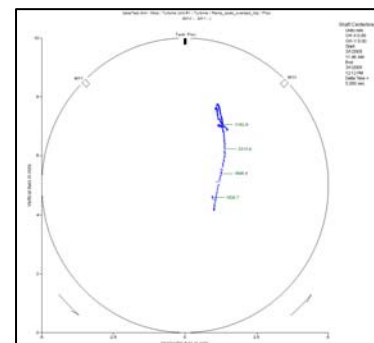


### Shaft Centerline Plot Automatic Annotation of RPM

The shaft centerline plot allows you to display changes in radial rotor position with respect to a stationary bearing over a range of time or speed. Automatically adding the rpm values shows the rpm changes over time and places shaft position in perspective to the rpm/speed.



*Setup menu for automatic labeling of RPM*



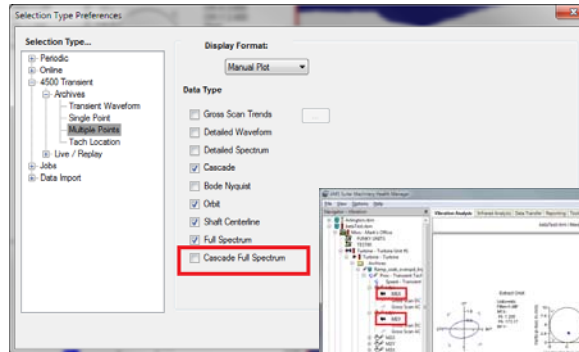
*Example of a Shaft Centerline plot labeled*



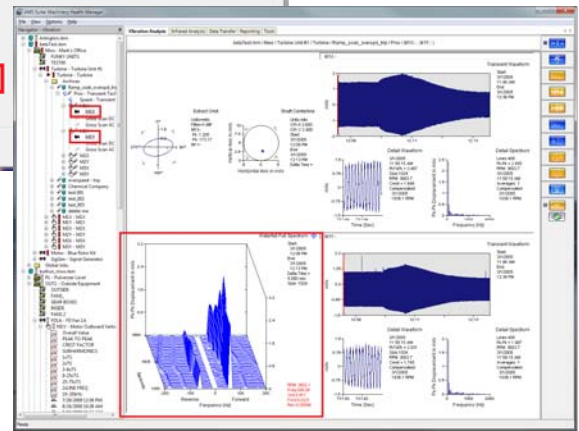
## Cascade Full Spectrum Capability

As with the full spectrum capability, the cascade full spectrum has been added to the Vibration Analysis application. The cascade plot provides a simple way to see how the characteristics of the spectrum change over time.

*Setup for Cascade Full Spectrum*



*Display of a Cascade Full Spectrum*

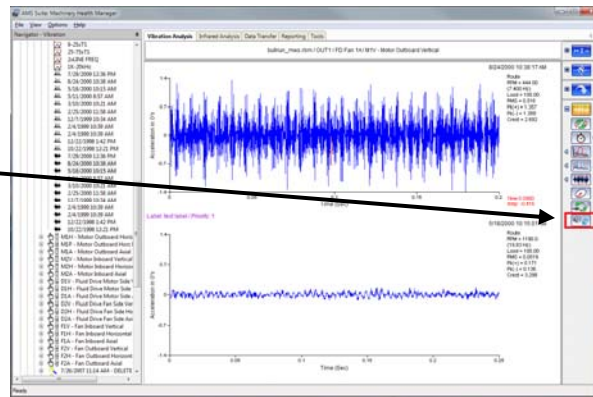


## Waveform Audio Replay

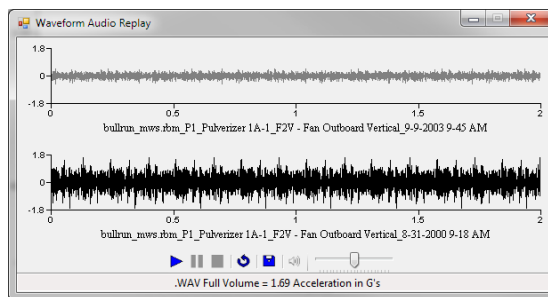
Users can now replay an audio recording from a periodic or online waveform, a transient detailed waveform, or an analyze job waveform. Simply right click on the waveform and select **Play Audio** or click the icon on the function bar to launch the Waveform Audio Player. A loop button allows users to repeat short duration waveforms.

Users can also compare the audio from two waveforms. For example, a waveform collected from a problem machine will often sound different than a waveform from a similar machine where no fault is present. Much like noticing an unusual noise from your car engine, this sound comparison allows users to hear an audible indication of a problem. The audio output can be saved as a .wav file and attached to reports for sharing.

Simply click on the waveform audio replay button to start a replay session.



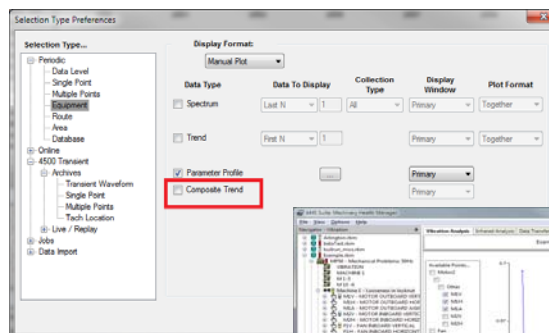
Two waveforms ready for comparison using the Waveform Audio Player



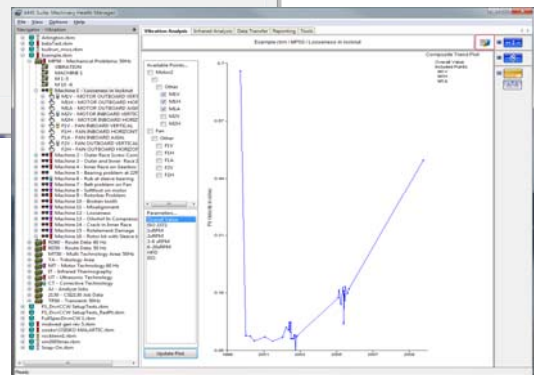
### Composite Trend Plot

The Vibration module includes a new plot that averages the vibration levels for selected parameters across multiple points. For example, users can view the average 1x vibration across a motor or the average peak-to-peak waveform amplitude levels at a given bearing.

Select **Composite Trend** in the **Selection Type Preferences** menu for viewing in the **Vibration Application**.



Example of a Composite Trend – Average Overall across 3 points





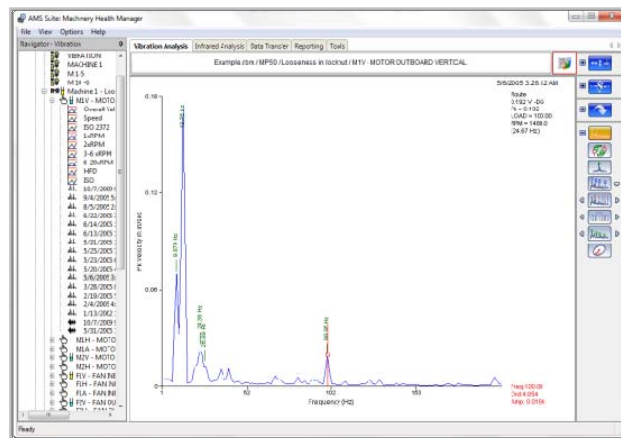
## Export New Spectra and Waveform Data to an XML File

User can export spectral and waveforms to an XML file. This allows the advanced IT user to edit a configuration file that the Data Import server reads to setup the XML export. After setup is complete, new portable and online spectra or waveforms dumped to the database will automatically generate an XML file. The advanced IT user can then take the data from the XML file and import it into other programs. This new capability is available for network users only, and not applicable for single-user licenses. Contact customer support for information on implementing this feature.

## Additional Vibration Analysis Enhancements

- Users can automatically label peaks when a spectrum is displayed. Simply right-click on the spectrum to select the spectrum plot options and specify the number of peaks to be labeled.

*Example of automatic peak labeling of spectral data*

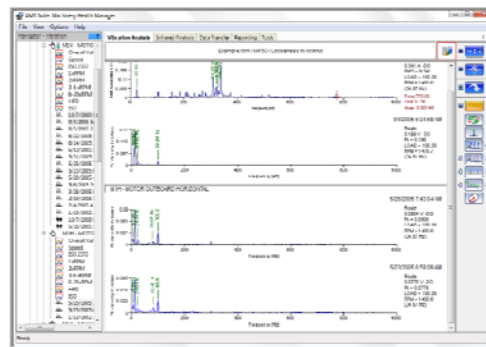


- A new Shift+L hot key keeps a displayed fault frequency selected.
- Each new window launched in the software will be the same size and in the same position as the last window closed.
- Users can change the RPM on all points of a machine using the RPM dialog. This easy, time-saving measure changes the speed of associated data on points having the same reference rpm.
- In single spectrum plots, the calculated overall value of the displayed portion of the spectral data will be

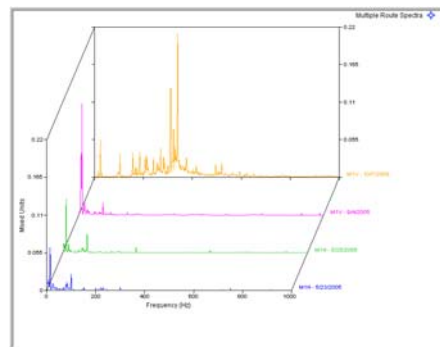
shown on the plot. If the displayed units are the same as the stored units and the full frequency range of the spectrum is displayed, the calculated overall value will usually be close to the analyzer's measured overall value. If the user changes display units or zooms in on the spectrum, the calculated overall will differ from the analyzer's measured overall.

- The ability to change the spectral display from a combined plot to separate plots has been updated to include spectral displays from different measurement points.

*Plot shows data from two different points displayed separately.*

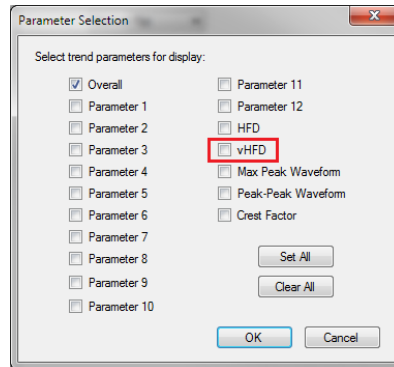


*Plot shows data from two different points displayed on the same plot.*



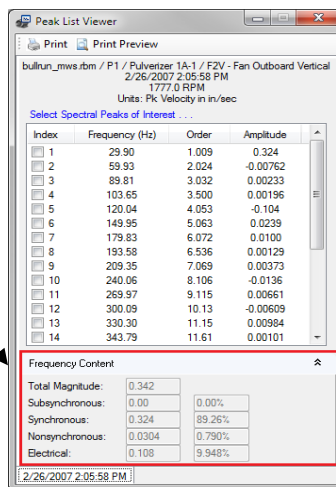
- By selecting **vHFD** on the **Parameter Selection** menu, users can now define the frequency range of vHFD. For example, for machines with fault frequencies or running speeds over the 5 kHz range, vHFD allows you to adjust the range above that frequency.

*Setting up vHFD*



- Frequency Content breakdown of the spectral peaks is available in a collapsible region within the Peak List Viewer. Categories in the breakdown include total peak magnitude, sub synchronous, synchronous, non-synchronous, and electrical content.

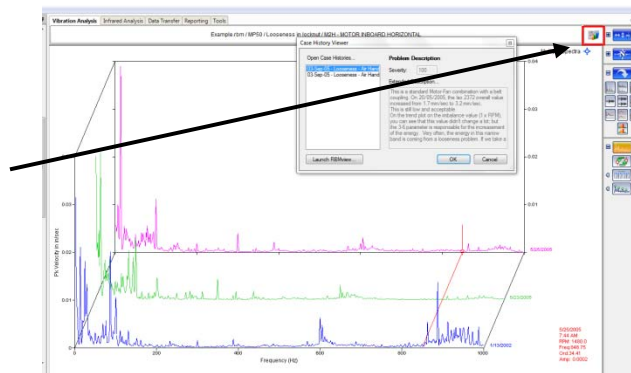
*Example of Frequency Content breakdown*



- Save images typically stored in RBMview Case History to either a local or network location. Simply identify the location on a mapped network drive or local hard drive by specifying `custdata\[database name]\images`.

- Display normalized multiple trend plots against percent alert, percent fault, and percent change from mean.
- Perform standard spectral averaging in transient archives and jobs.
- When displaying multiple trends on one plot, use the function bar to request a parameter correlation plot.
- A Case History Severity Indicator, located on the plotting workspace, displays the highest severity of all open case histories for the piece of equipment being analyzed. Clicking on the icon will open a listing of case histories on the equipment.

*Case History Severity Indicator with a view into the Case History.*



## Support for New Products

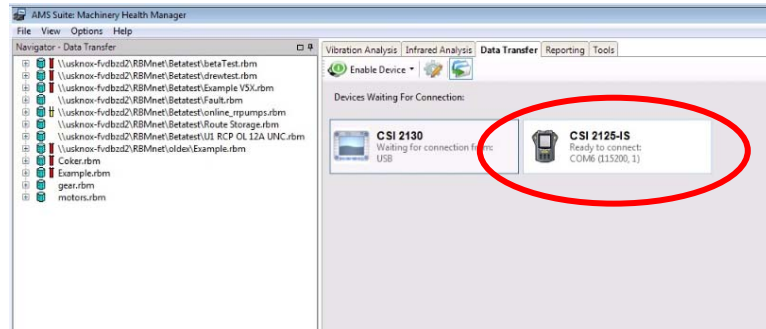
### CSI 6500 Machinery Health Monitor for reciprocating compressors

AMS Machinery Manager now supports the new A6210 thrust/differential expansion module, extending coverage beyond rotating machinery to include reciprocating compressors. This module incorporates rod drop monitoring, making Emerson's CSI 6500 fully compliant with API 670 and API 618 with regards to reciprocating compressors. In addition to providing early indication of piston rider band wear, the CSI 6500 uses PeakVue technology for early detection of valve health issues, and rod position monitoring using transient analysis for early indication of pressure packing damage, rod bending and excessive rod movement.

## Data Transfer Support for the CSI 2125-IS Machinery Health Analyzer

Route transfer for the newly released, intrinsically safe CSI 2125-IS has been incorporated into the Data Transfer Module.

*Data Transfer incorporates route communications for the CSI 2125-IS.*



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