How to Use the Statistical Alarms Wizard in Machine Analyst

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Introduction

The SKF Machine Analyst Suite provides the vibration analyst with a powerful set of tools for maximizing the benefits of a plant reliability program. One of these tools is the **Statistical Alarms Wizard**. This wizard guides the user through the process of quickly and automatically generating accurate overall alarm settings based on historical measurement data, eliminating the need to perform statistical calculations by hand.

Why use statistical alarms?

Overall alarm settings are typically determined using ISO-Standard vibration tables, manufacturer's recommendations, personal experience and/or other professional guidelines. Many times, and especially with new machinery, these settings may be conservative, creating unnecessary margins in the alarm settings.

Vibration levels tend to grow over time, and if the alarm settings are too high, it may take much longer than necessary to detect vibration-related problems. Under normal operating conditions, vibration measurement levels should remain within an alarm threshold window related to the statistical measurement uncertainty. If the measurements exceed the mean plus two or three standard deviations (σ), this should alert the analyst that some conditions have changed and should be monitored more closely.

The Statistical Alarms Wizard gives vibration analysts a way to easily and accurately fine tune the alarm settings for their machines. By lowering alarm settings, the user can detect problems sooner, reducing the likelihood of developing secondary problems that may be initiated by a given root cause. Using the Statistical Alarms Wizard also removes the guesswork from setting alarm levels.

How does it work?

The Statistical Alarms Wizard calculates the mean and standard deviation on a population of existing measurements. To achieve meaningful results for typical scenarios, the data set should represent about six months of data collection (10 or more readings per POINT).

User-defined factors are applied to the resulting standard deviation to generate separate alert level and danger level setpoints. Lowering these factors lowers the alarm settings; raising them raises the settings. Limits can also be set to exclude abnormal measurements from the statistical calculations. The resulting alarm settings automatically apply to the entire set of POINTs included in the calculations.

This process is a considerable improvement over what PRISM4 required to achieve similar results. In PRISM4, the Last Measurement report provided the mean and the standard deviation for a selected set of trend measurements. The overall alarms were then manually set for each POINT (i.e., ALERT level = mean + 2σ and DANGER level = mean + 3σ).

Another way to do this in PRISM4 is to first export the data, separate the overall measurements from the rest of the data and then calculate the standard deviation. Regardless of the method used, the user had to manually enter the new alarm settings for each POINT, which is a tedious process even for a few POINTs.

How to use the wizard

The Statistical Alarms Wizard requires that all the measurements to be analyzed for new alarm settings be in an active Workspace window. Before starting the wizard:

1 Create an active Workspace in Machine Analyst. The wizard only operates on an active Workspace window; it does not function on the standard hierarchy.

To create a Workspace:

- Select the **View** menu's **Workspace** option and click **Add**. Enter a name and description, and click **OK**.
- Populate the workspace window by copying measurements on which you wish to run the wizard from the Hierarchy window to the Workspace window using drag–and–drop operations.

Note: Measurement data records that have been "excluded" from trends (typically due to inconsistent data collection conditions) will not be included in the statistical alarms calculations. If you wish to include a previously "excluded" data record in the wizard's calculations, you must disable its **Exclude Measurement** option in its Measurement Properties dialog.

2 To check Measurement Properties:

- From the Hierarchy or Workspace view, right-click the data record and select **Properties**. The Measurement Properties dialog displays.
- Disable the **Exclude Measurement** option to include the data record in the statistical alarms calculations.
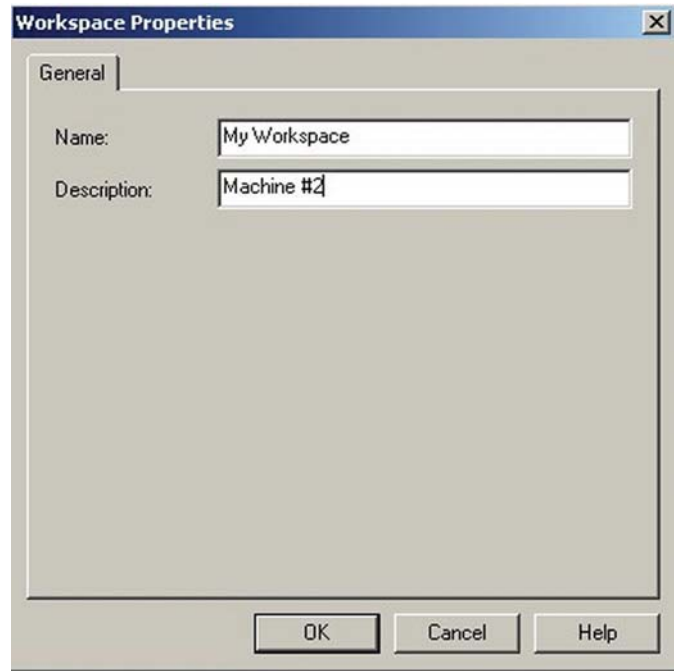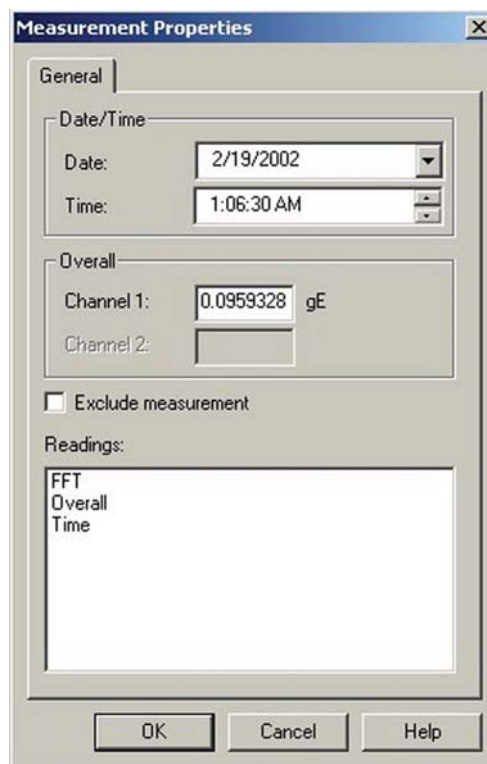

Figure 1. Naming the workspace.

Figure 2. Enabling a measurement for inclusion in the Statistical Alarms Wizard.

Fig. 3 illustrates the Machine Analyst environment with both the Workspace and Hierarchy windows opened and tiled vertically.

Once the measurements have copied to the Workspace, the wizard can be applied.

To run the Statistical Alarms Wizard:

- Click to make the Workspace window the active window.
- Select the **Customize** menu's **Statistical Alarms** option and click either **Overall Alarms** or **MCD Alarms**.
- Follow the wizard's prompts as it guides you through the statistical alarms process. At the end of the process, the wizard prompts you to either discard or accept the new alarm values, and to apply them to the POINTs. Reference the *Machine Analyst User Manual* for details on each step in the Statistical Alarms Wizard.
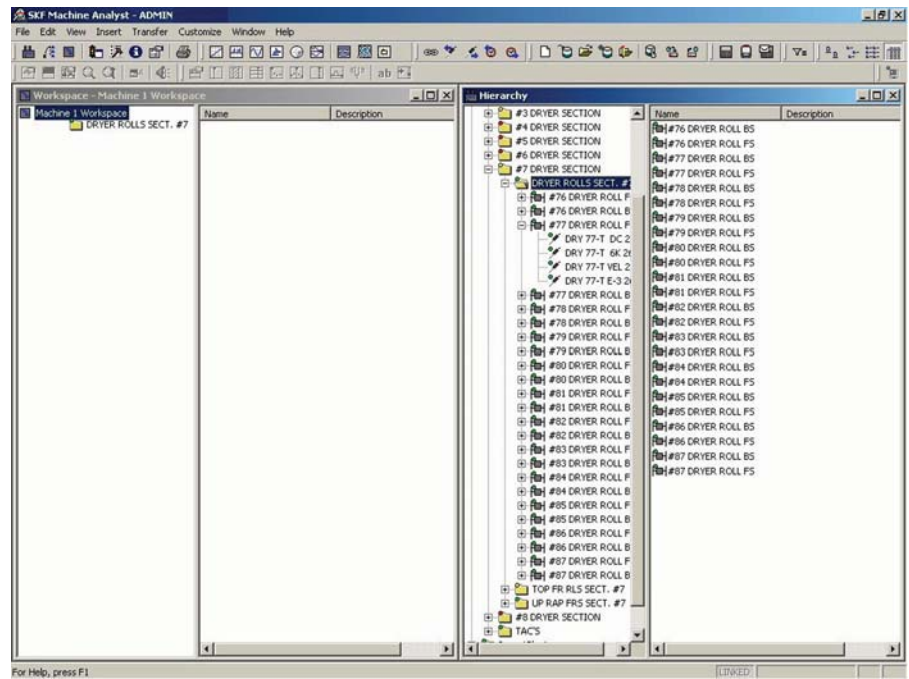
Note: If using the SKF Microlog, once the Machine Analyst database is updated with the new overall alarm values, the ROUTEs on the SKF Microlog must be cleared and then reloaded for the new settings to take effect on the SKF Microlog.

Figure 3. Example showing both Workspace and Hierarchy views, tiled vertically.

Conclusion

The Statistical Alarms Wizard provides a proven and consistent mathematical method for accurately determining overall alarm settings based on historical measurement data. This tool is a considerable improvement over previous methods for creating new alarm levels, and saves the user significant time by automatically calculating and updating new, accurate alarm settings for selected POINTs.
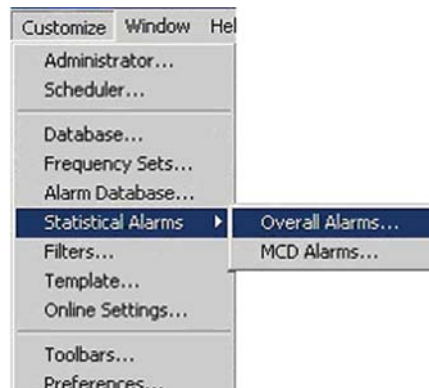

Figure 4. Starting the Statistical Alarms Wizard.