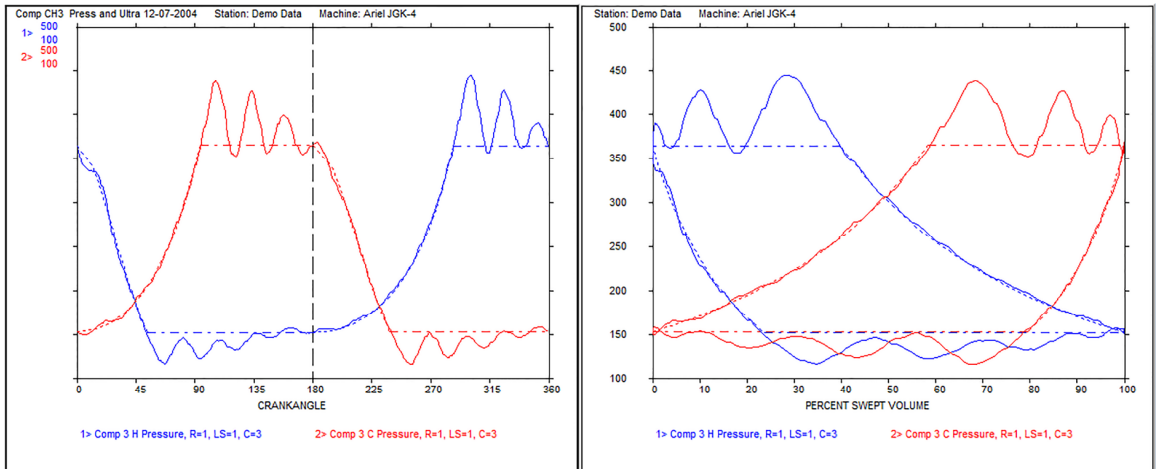
April 2015

PRO TIP: Eliminating Channel Resonance

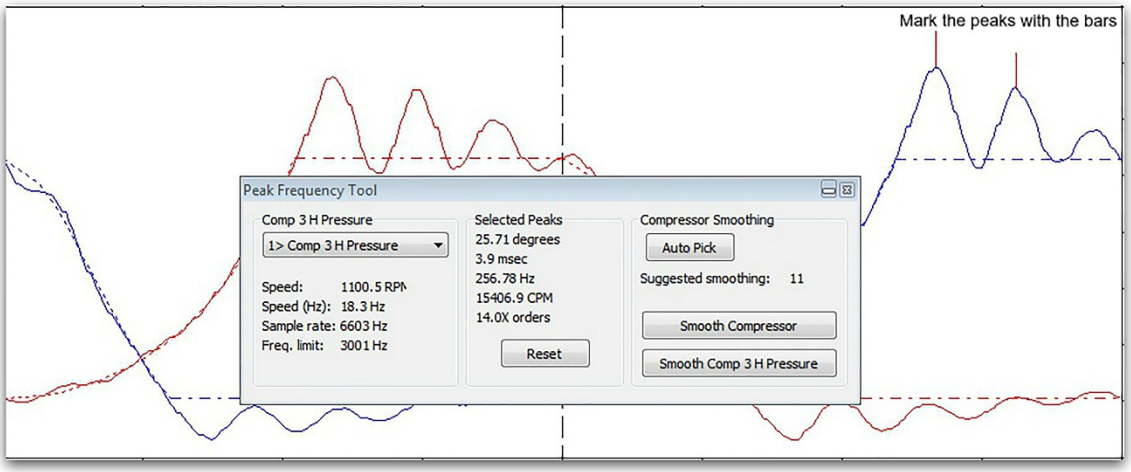
Analysts have long known that channel resonance within a compressor indicator port can lead to distorted pressure curves and inaccurate performance calculations. In order to eliminate channel resonance, Windrock MD software provides a number of tools to "smooth" the curves.



The above pressure-time and pressure-volume traces show high indicator channel resonance which is typical for high-speed compressors. Windrock MD software provides two methods to determine the amount of smoothing required to eliminate this problem.

Method 1

Peak Finder Tool - allows the user to highlight the peaks between two resonance curves and determine the frequency at which the resonance occurs. Peak Finder then recommends the amount of smoothing that should be applied and can even automatically make the correction. In the below example, the head-end resonance peaks are highlighted. The Peak Finder tool identifies the frequency of the resonance as 257 Hz and recommends a smoothing factor of 11.



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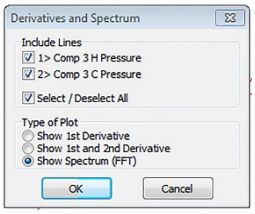
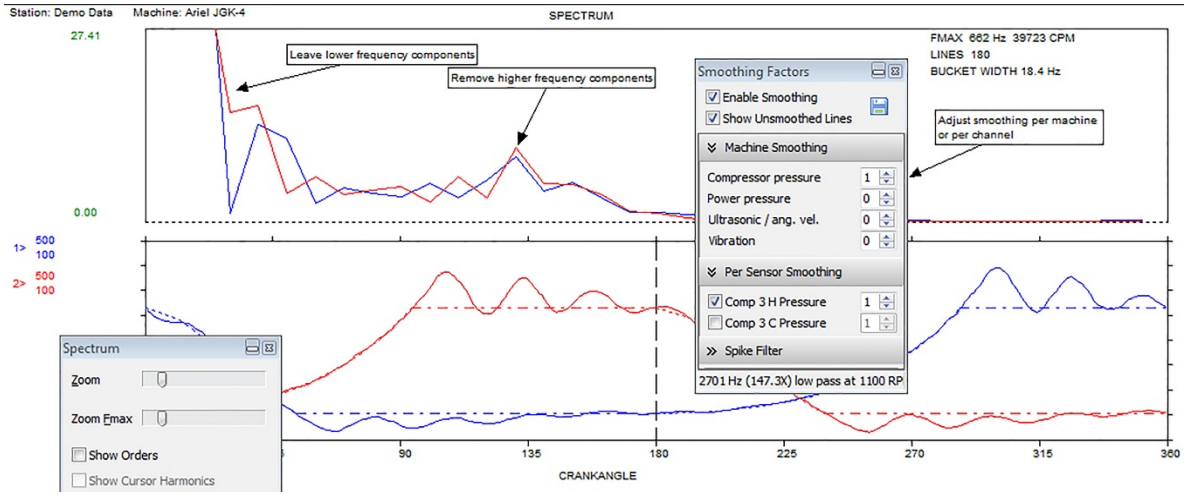
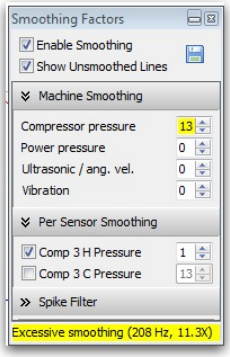
Method 2

Derivative Tool - Another method commonly used to determine the appropriate level of smoothing is through use of the Derivative Tool. To use this feature, select the pressure curves to be smoothed and choose "Show Spectrum (FFT)."



Above the pressure data, a frequency analysis of the pressure signal is provided to the user. By implementing smoothing factors one step at a time, the effect on the pressure FFT is shown. The goal is to reduce the high frequency peaks that are the caused by indicator resonance, but to not affect the lower frequency pressure. As the smoothing factors are increased, the high frequency peaks will drop, as shown below.





If too much smoothing is implemented by the user, the low frequency pressure curves may be affected or new high frequency peaks may appear. Fortunately, Windrock MD provides a warning to the user if excessive smoothing is added.

As smoothing is applied, Windrock MD also allows the user to dynamically watch the effect on the pressure curves and the calculated parameters, such as horsepower, volumetric efficiency, power loss, and leak index.

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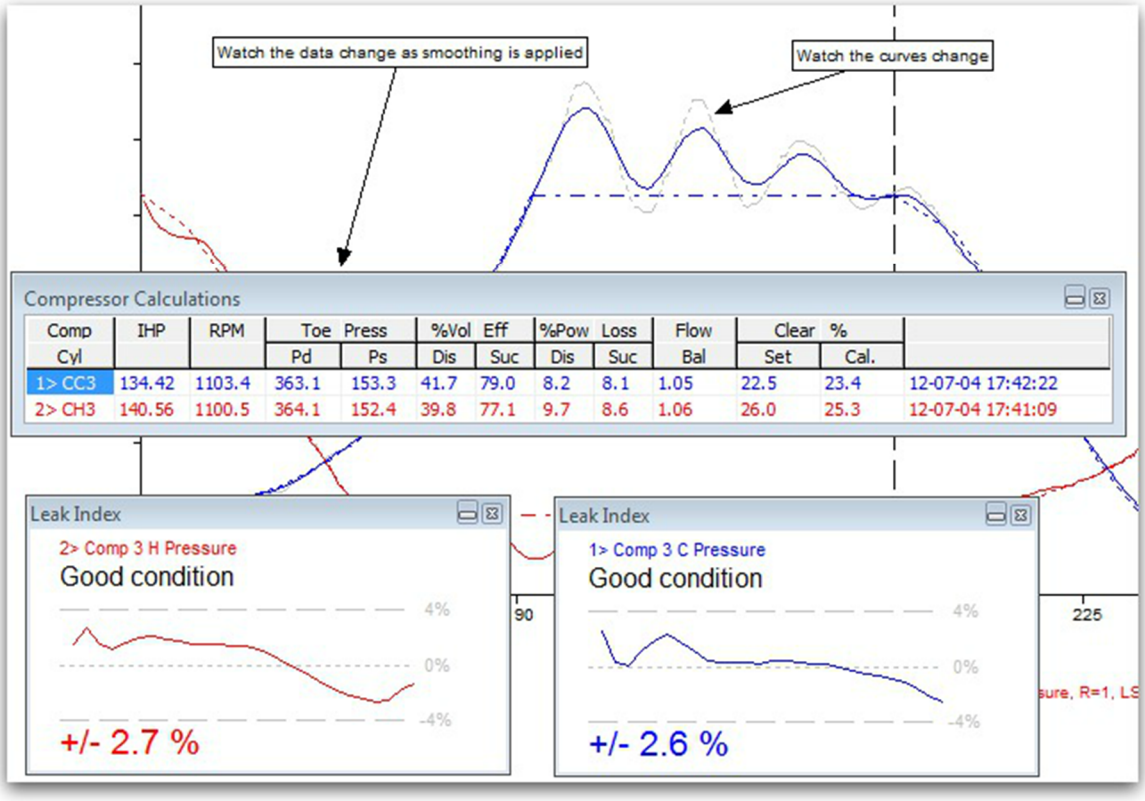
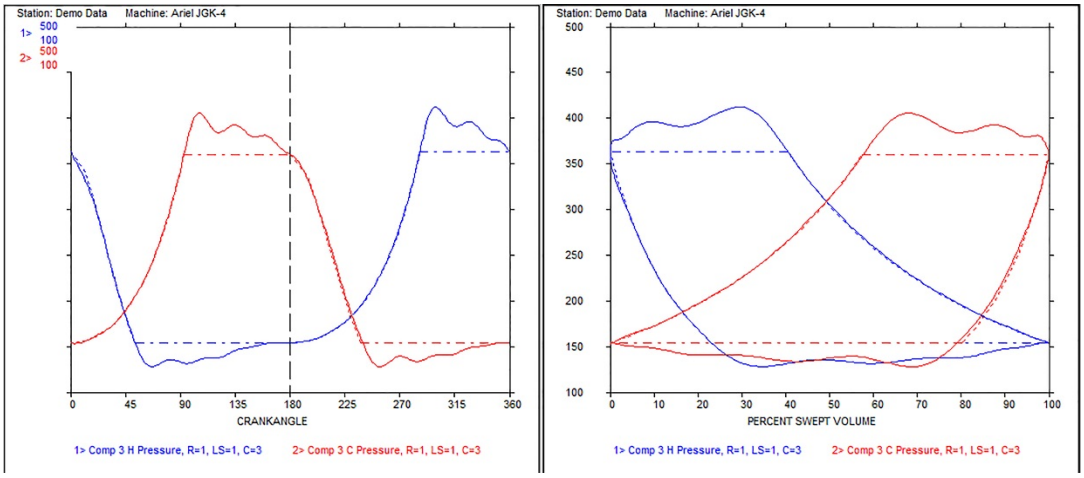


Once the appropriate smoothing is determined and implemented, it can be turned on and off using the smoothing factors button. Using these tools, the user is able to eliminate the influence of channel resonance and ensure clean pressure curves and reliable calculations.



If you have more questions about channel resonance or would like information about another topic, please email sales@windrock.com.

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