High Q SRTD

March 2018 Webinar

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VIBRATION RESEARCH

VR Core Focus

To make the world's most innovative sound and vibration technology tools, enabling our customers to make reliable decisions and trustworthy products

Company Values

Strong & Driven Work Ethic

We do the Right Thing

Capable & Competent

Accountable & Responsible

Collaboration

Innovation

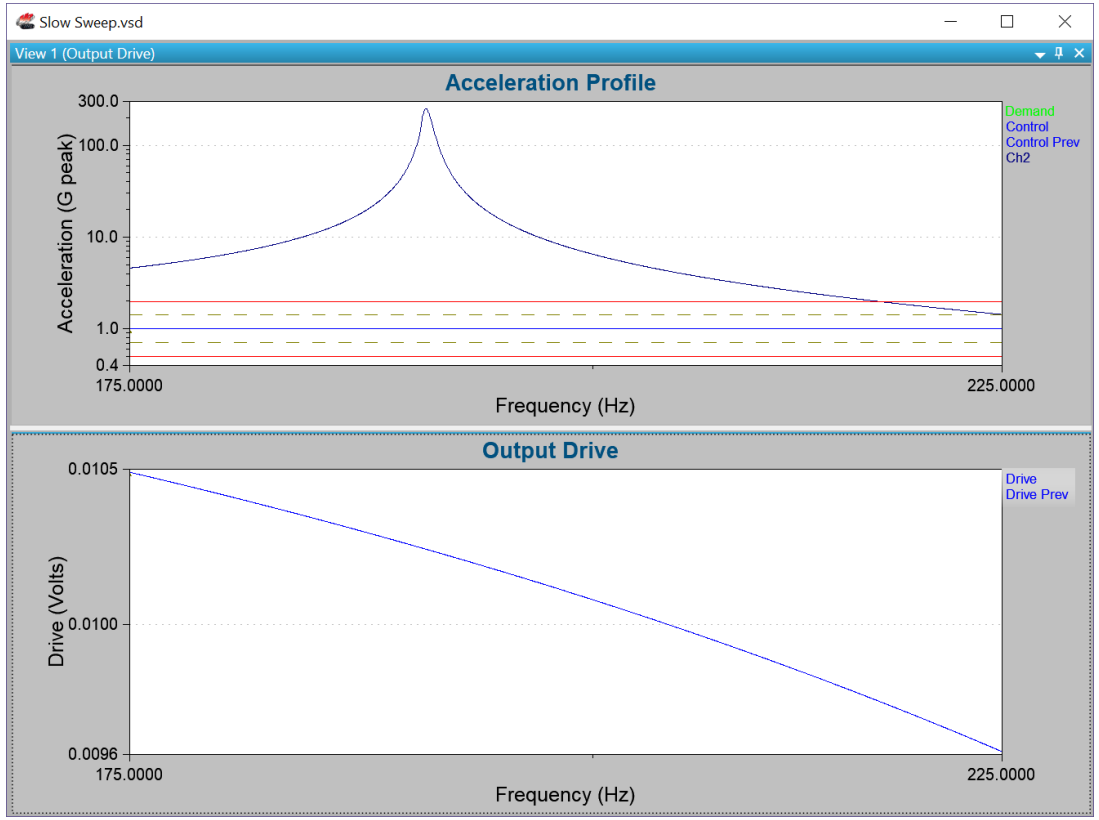
VIBRATION RESEARCH

Agenda

- Physical Characteristics
  - Large amplitude changes with frequency
  - Long ring down time
  - Slow response
  - Location can shift with amplitude
  - Can be non-linear
- Adaptive Feedback
- Automatic Peak Tracking

Large amplitude change with frequency

- Most obvious characteristics of a resonance.
- The system needs to respond quickly when controlling on a resonance.
  - Slew rate
  - Sweep rate



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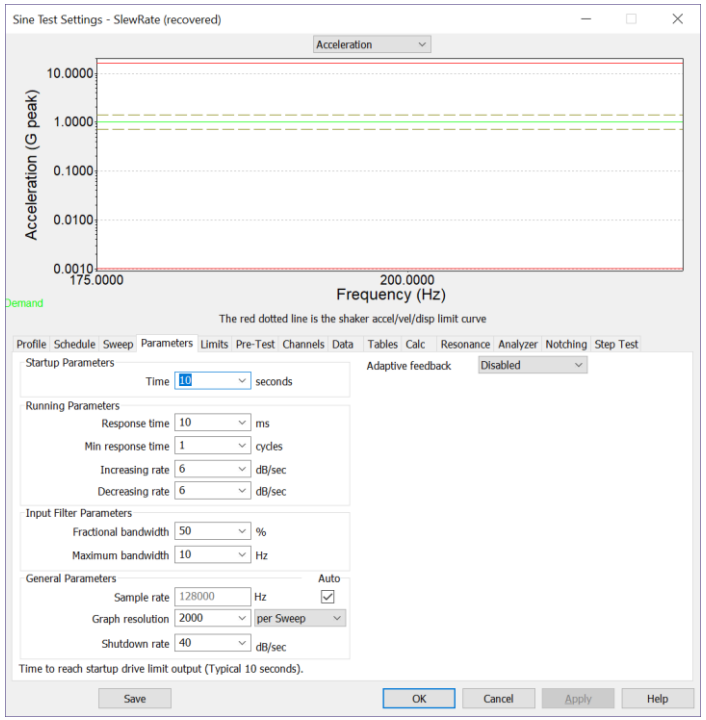
Slew rate

- Slew rate describes how fast the drive output can change.
  - Increasing rate
  - Decreasing rate
- Output Drive vs Time graph can show slew rate issues.
  - Note the units: dB/sec vs dB/min



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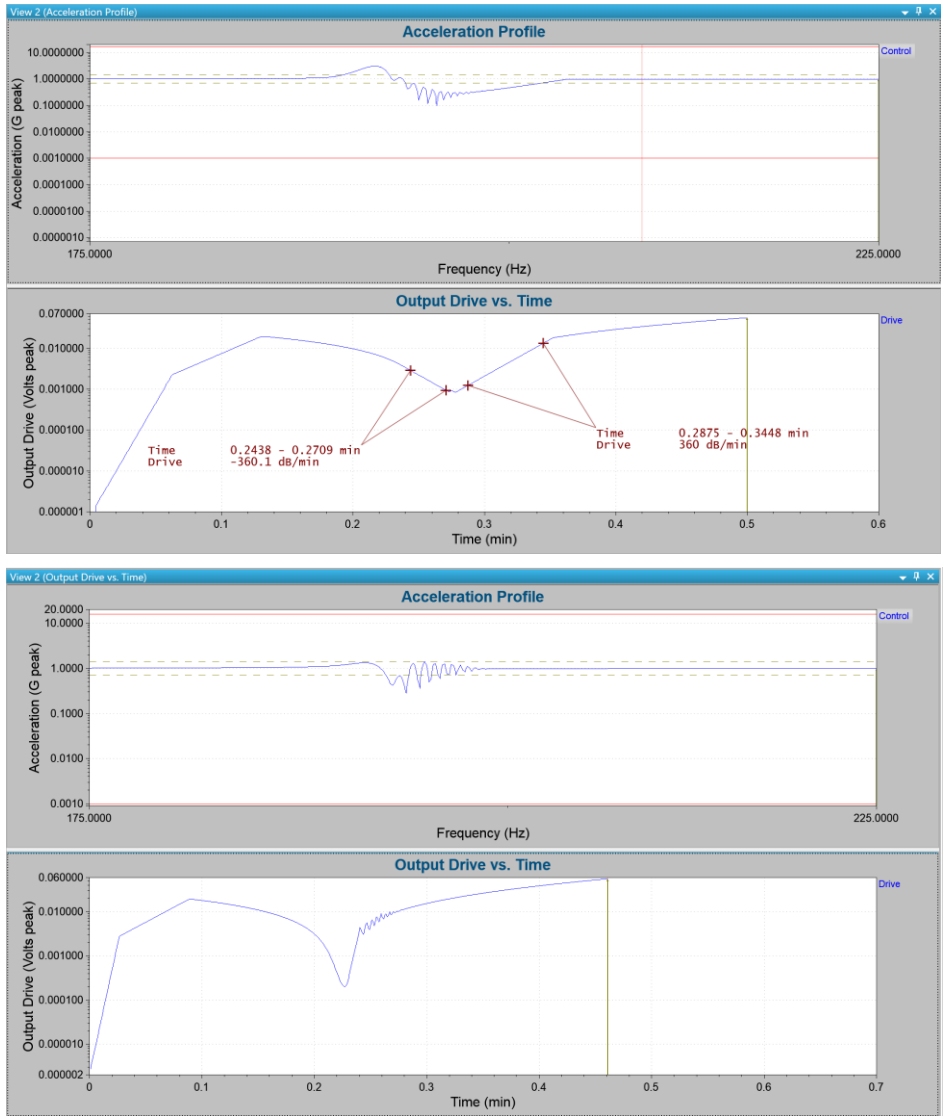

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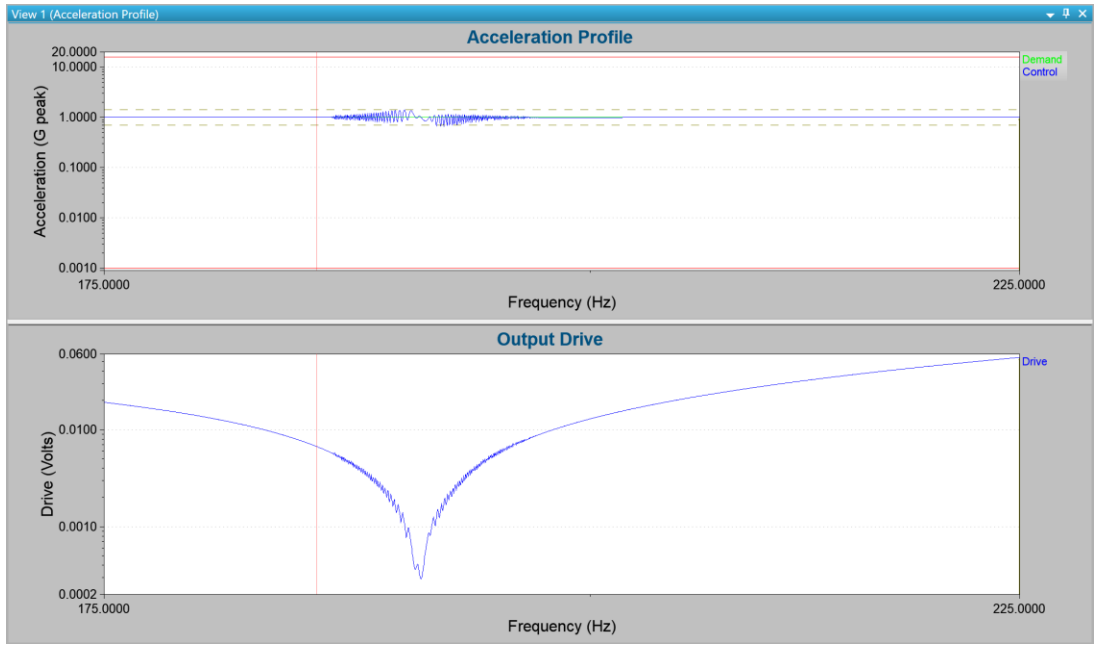
Sweep rate

- The slower a resonance is swept through, the more opportunity there is for control.
- This will result in a more sever test



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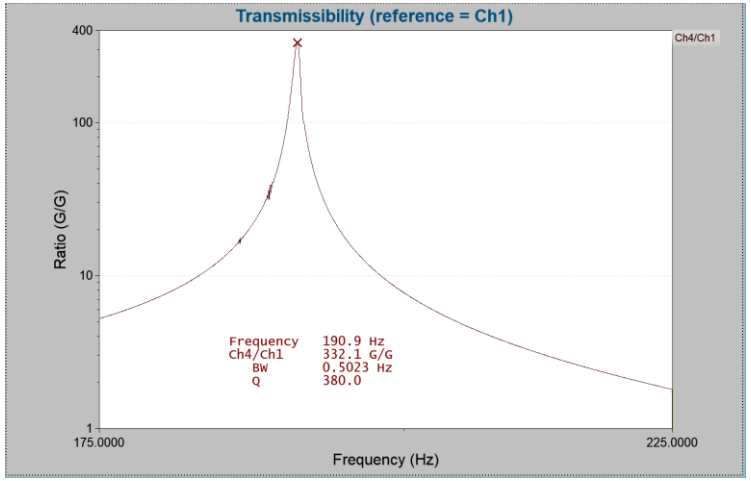
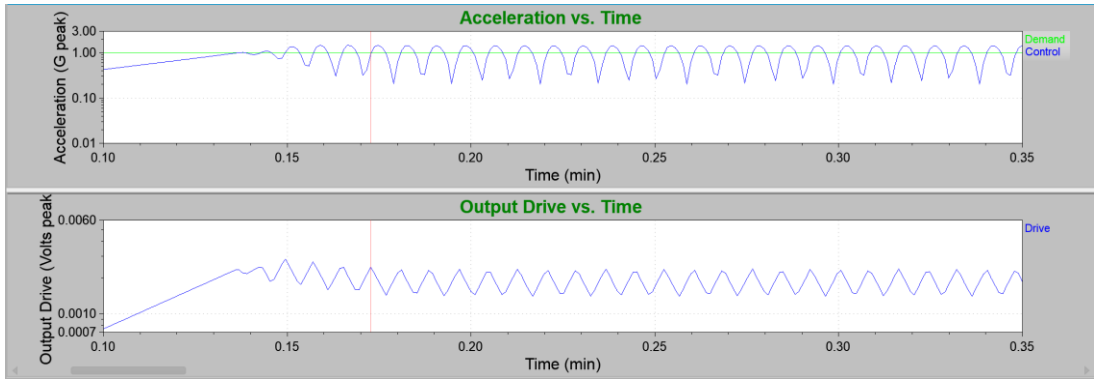
Slow Response Time

- Resonance response is inversely proportional to the bandwidth of the resonance
  - 1/0.5023 Hz = 1.99 sec response time
- Controlling faster then the resonance can change can cause oscillations.
- The response time of the system should be less then the response time of the resonance
- The input filter must also be considered. The response of the filter is inversely proportional to the width.





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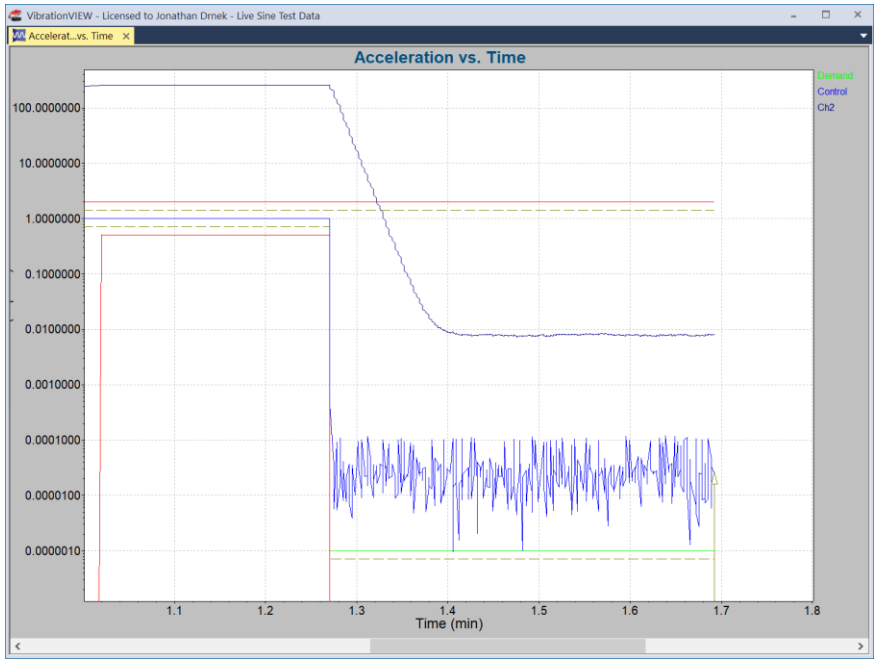
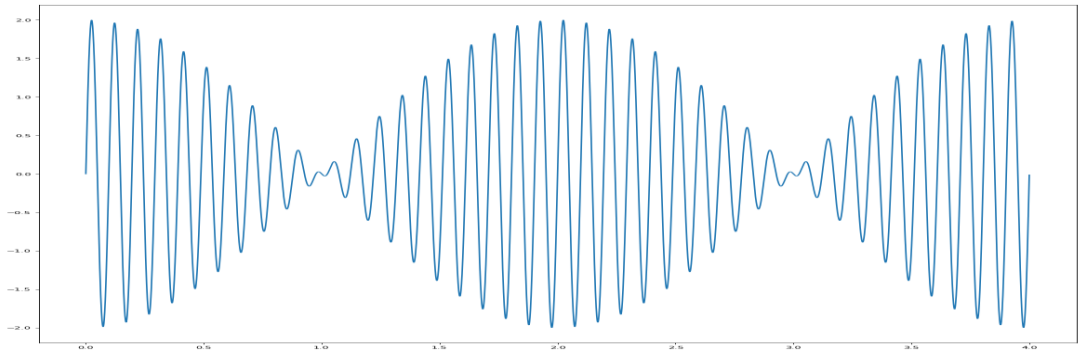
Long ring down time

- Inversely proportional to the resonance bandwidth
  - Think of a bell
- Can cause a beat frequency
  - See the graph of sine(20x) + sine(21x)
- Dictated by physics. All you can do is wait it out.





Location can change with Amplitude

- A resonance can shift location with amplitude.
- Has implications when sweeping at a low level and dwelling at a high level
- Mower blade example shows the resonance shifts by 3 Hz.
  - The amplitude at the two frequencies differ by almost 9x

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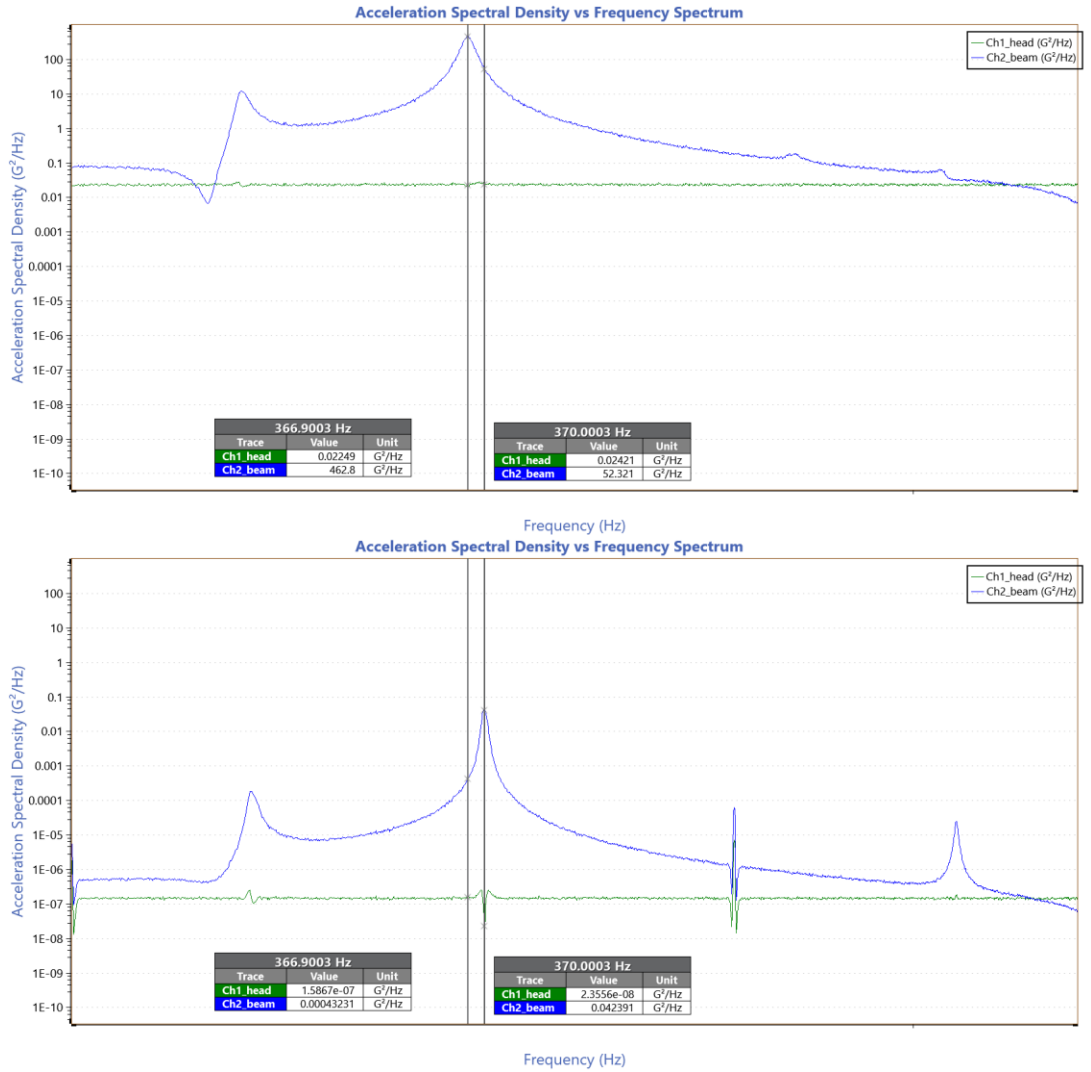

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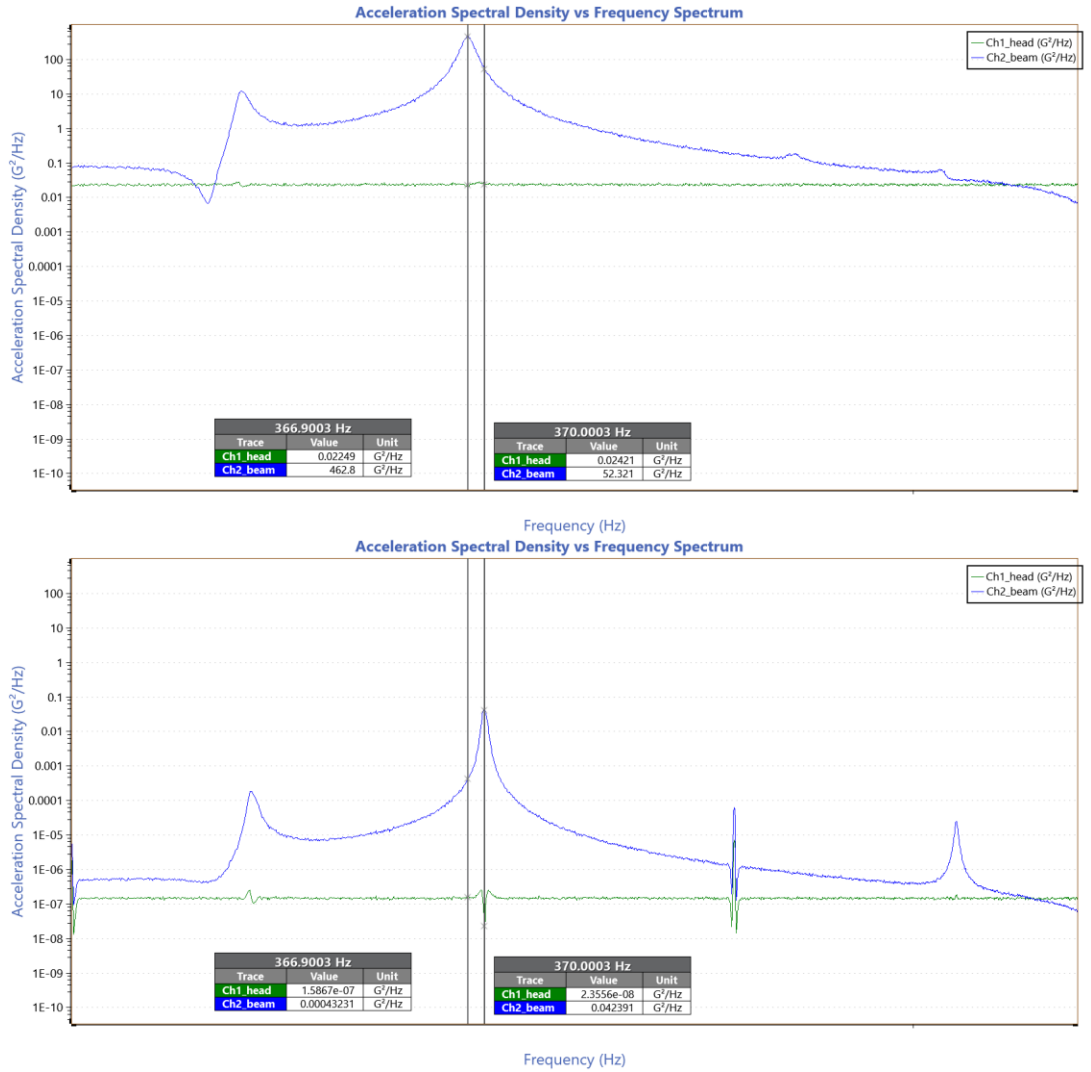
Location can change with amplitude

- Hold the amplitude of the accel on the resonance constant.
  - Control on the resonance channel
  - Use notching to set a fixed amplitude.
- Start dwelling at a higher frequency and track down into the resonance
- Use the new peak detection option in version 2018.1



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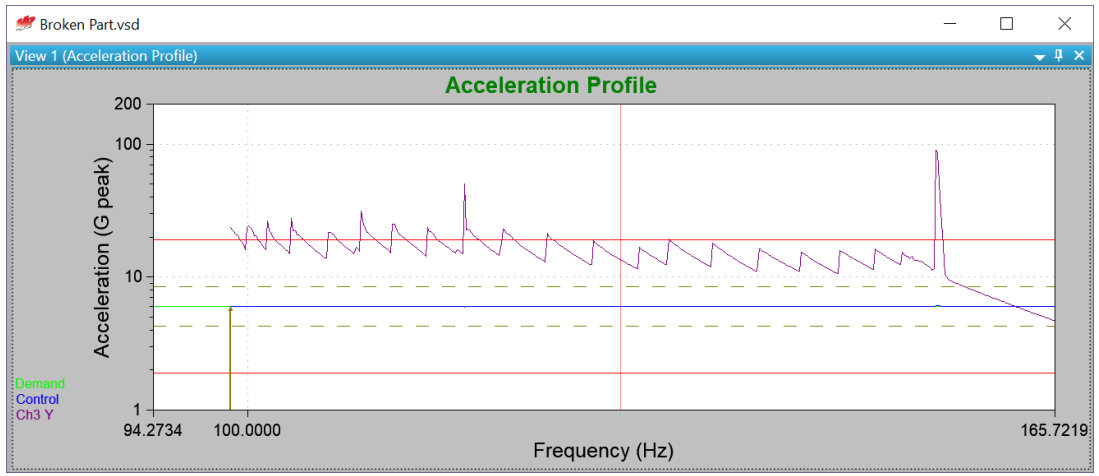
SRTD on a breaking part

- Sawtooth pattern
- As the amplitude rises the part fatigues and the resonance shifts.
- When the resonance shifts, the amplitude drops



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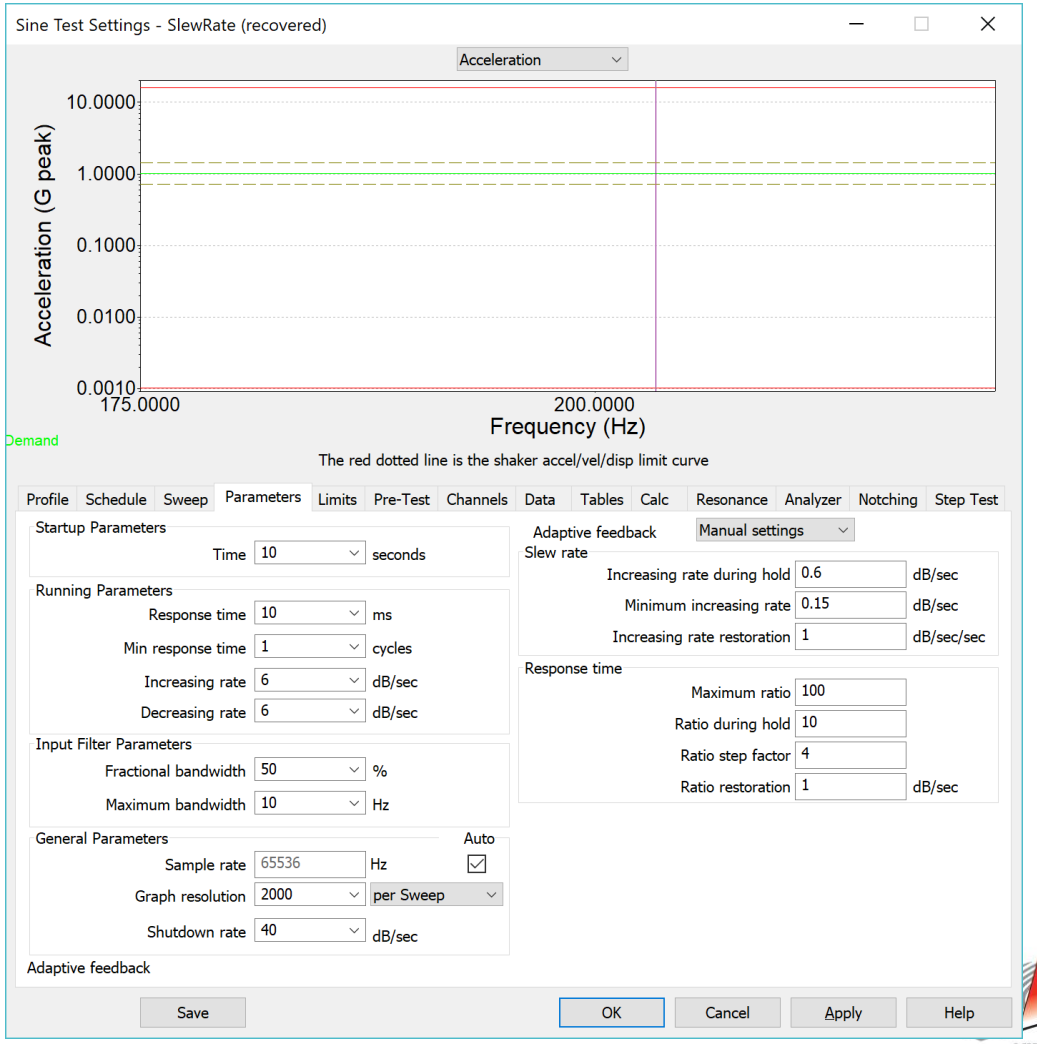
Adaptive Feedback

- Increasing rate during hold
  - During a hold you can have a slower slew rate since things are not changing as much
- Minimum increasing rate
  - Increasing rate will be limited when leaving the resonance if needed. This is the smallest the increasing rate will be.
- Increasing rate restoration
  - How fast the increasing rate gets set back to the defined value



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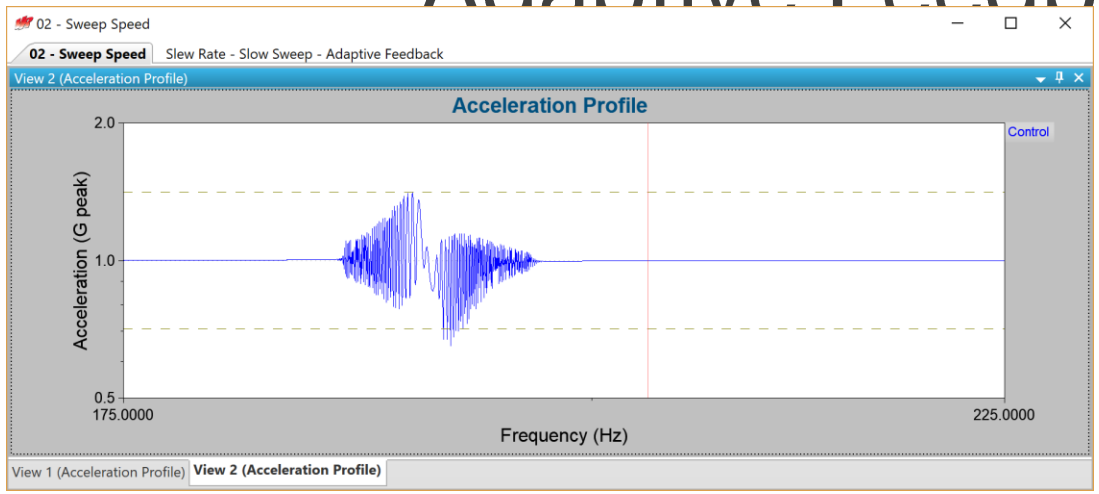
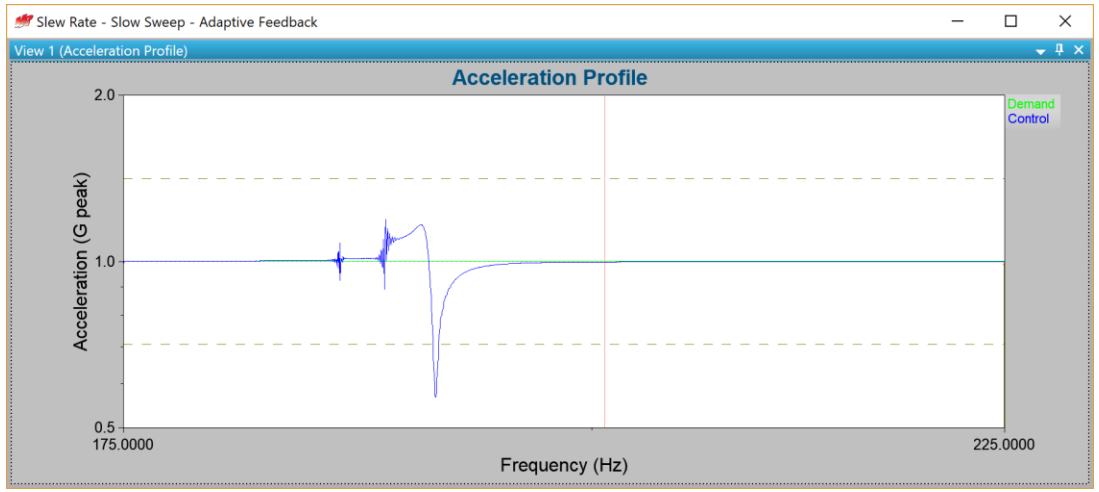
Adaptive Feedback

- These settings allow tighter control during the test but still limit problems in a resonance





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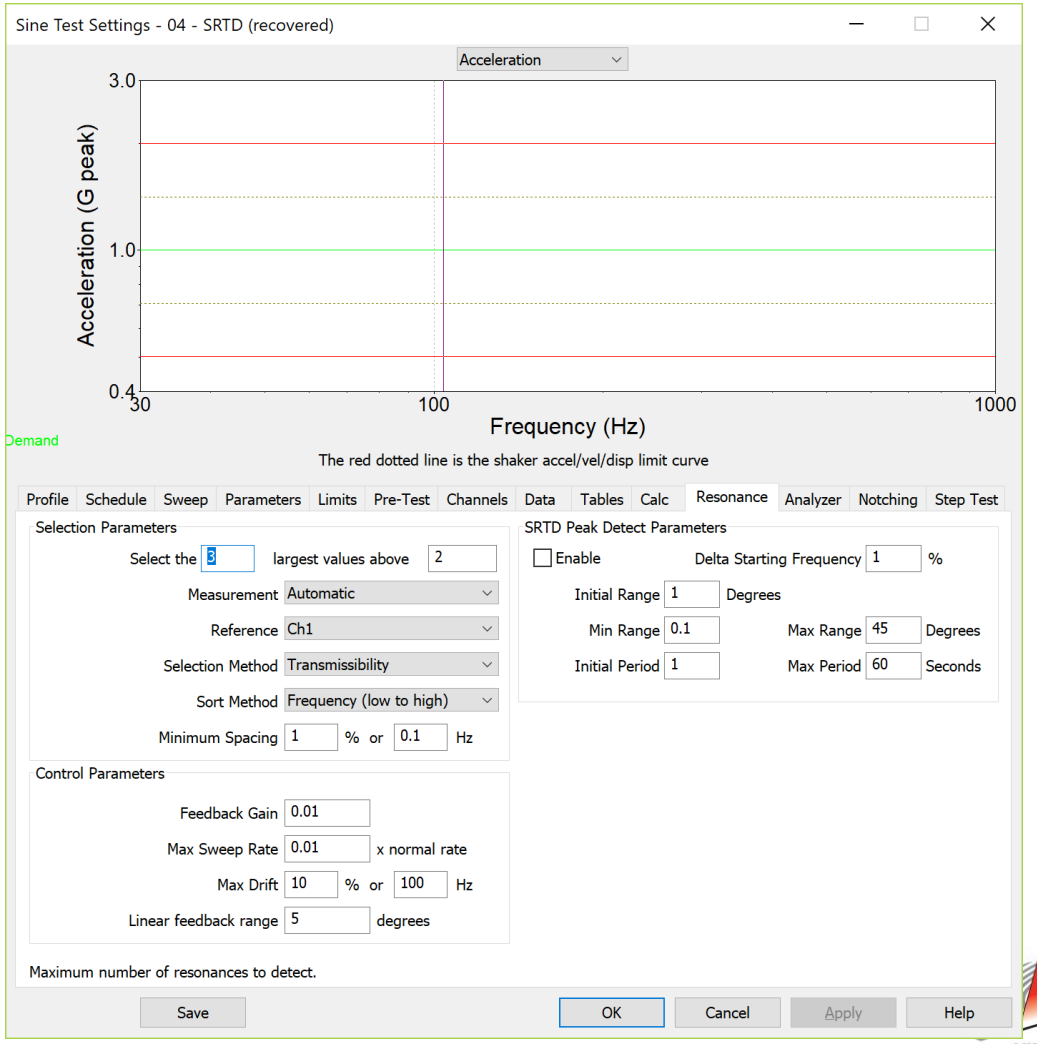
SRTD

- Ensure that the Resonance settings are not to fast.
- Use the SRTD Control Buttons to find the phase with the peak transmissibility
  - Turn off Auto-Direction
  - Adjust Demand Phase
- Look for a peak in the Transmissibility vs Phase graph



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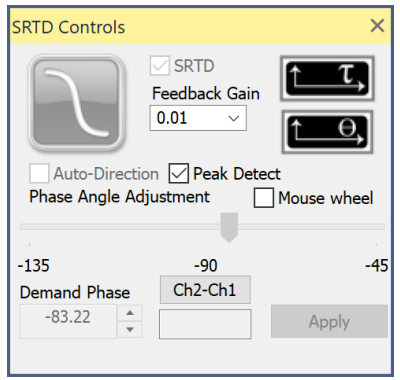

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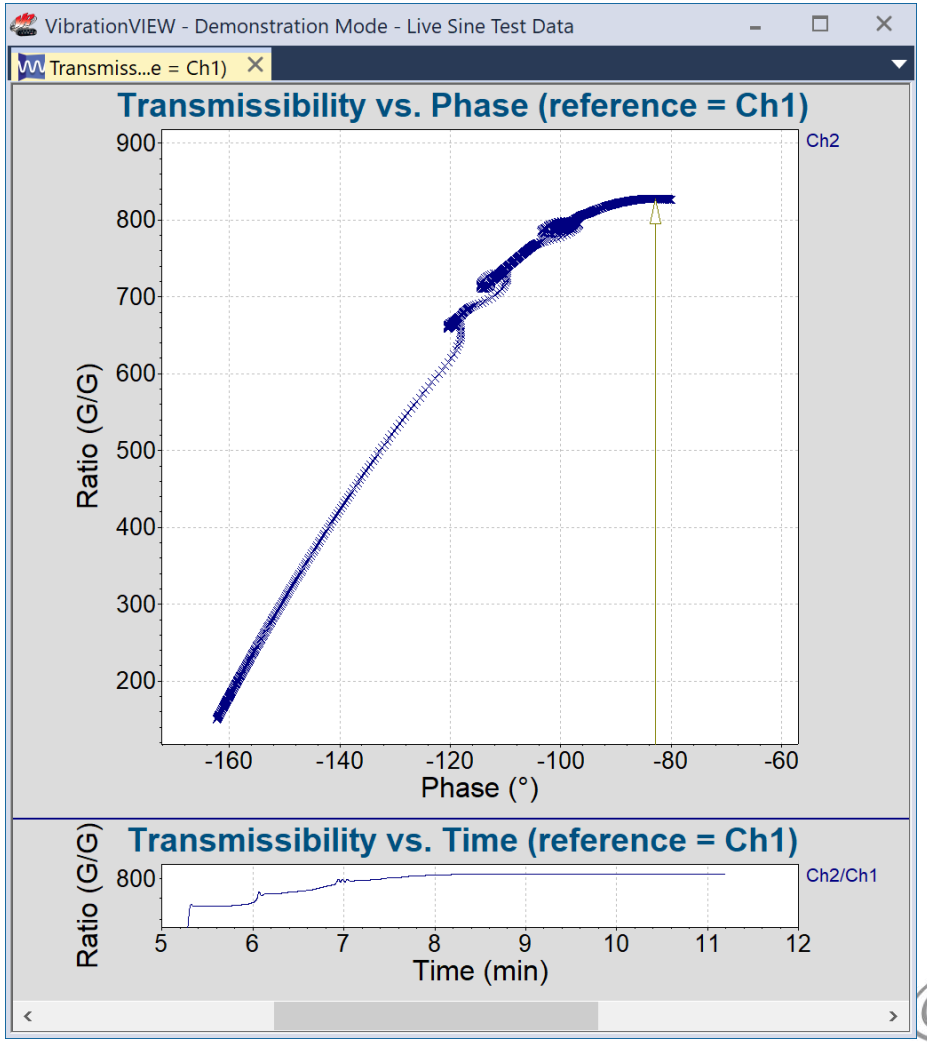
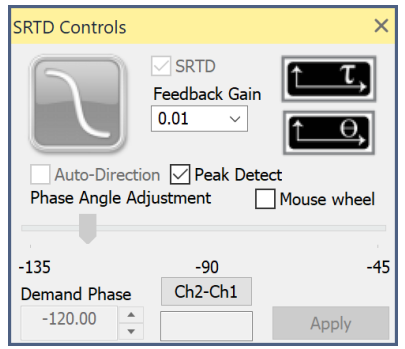


Peak detect

- Version 2018 can detect the peak phase automatically.
- Enable Peak Detect on the SRTD buttons.
- The system will automatically adjust the phase until the peak transmissibility is found.
- The phase will be continually adjusted for the duration of the test to always stay on peak.



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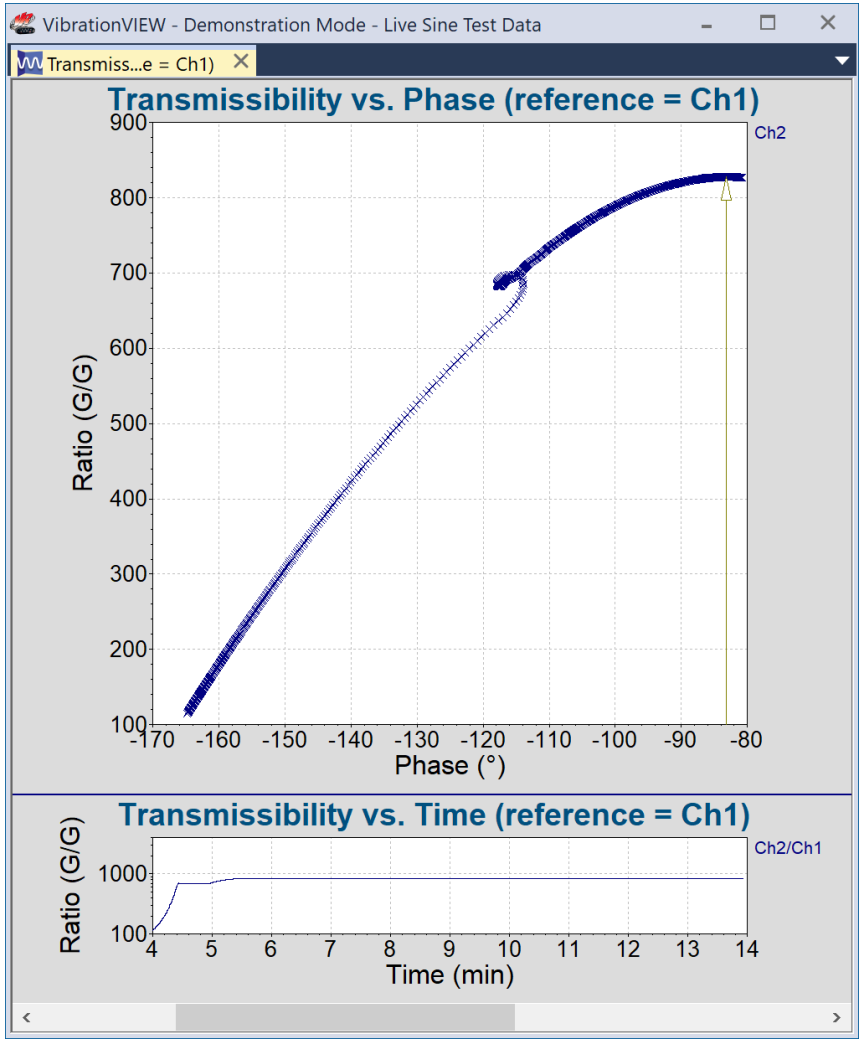

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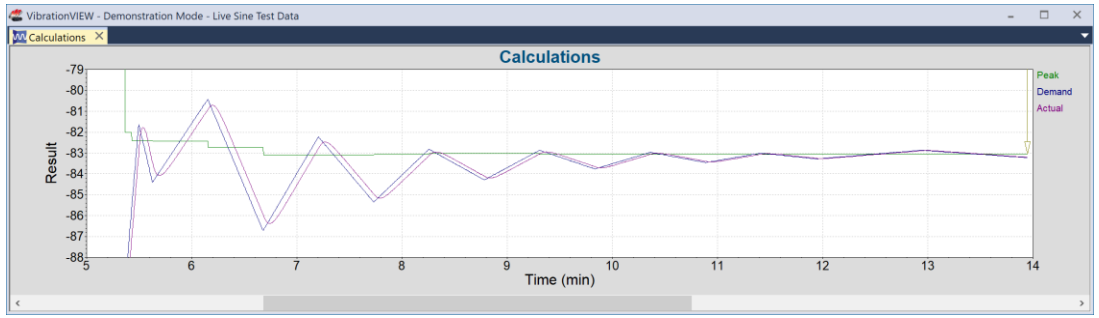

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[PARAM:SrtdControlsPhaseDisplay]

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Any
Questions

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THANK YOU
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Grazie
Спасибо
Gracias
Takk
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Kiitos