Voxengo CurveEQ User Guide

Version 3.15

https://www.voxengo.com/product/curveeq/

Contents

Introduction

CurveEQ is a spline equalizer for professional music and audio production applications. CurveEQ shows you the actual filter response you are designing by means of a spline (a smooth curvy line), plus it displays the output spectrum, so you can readily see what the EQ is doing with the sound. This, in turn, allows you to get the best from your mix and your tracks. CurveEQ perfectly suits the needs of mastering.

Additionally, CurveEQ implements spectrum matching technology that allows you to transfer spectrum's shape of one recording to another. In other words, this allows you to "copy" frequency balance of existing time-proven mixes so that other mixes that are still in the works may have a chance to sound better. This technology also greatly helps in music mastering since it easily lessens any dramatic differences in the area of frequency balance between various tracks.

CurveEQ's filters can be switched between linear- and minimum-phase modes. CurveEQ also features a deeply-customizable spectrum analyzer like the one found in Voxengo GlissEQ and SPAN plug-ins. You can also display, save, and load static spectrum plots for comparison and matching purposes.

Features

- 3 EQ curves per channel group
- Linear- and minimum-phase filtering
- Spectrum matching
- Freeform EQ curve drawing mode
- CSV file import/export
- Real-time FFT spectrum analyzer
- Stereo and multi-channel processing
- Internal channel routing
- Channel grouping
- Mid/side processing
- 64-bit floating point processing
- Preset manager
- Undo/redo history
- A/B comparisons
- Contextual hint messages
- All sample rates support
- 53 ms compensated processing latency

Compatibility

This audio plug-in can be loaded into any audio host application that conforms to the AAX, AudioUnit, VST, or VST3 plug-in specification.

This plug-in is compatible with Windows (32- and 64-bit Windows XP, Vista, 7, 8, 10 and later versions, if not announced otherwise) and macOS (10.11 and later versions, if not announced otherwise, 64-bit Intel and Apple Silicon processor-based) computers (2.5 GHz dual-core or faster processor with at least 4 GB of system RAM

required). A separate binary distribution file is available for each target computer platform and audio plug-in specification.

User Interface Elements

Note: All Voxengo plug-ins feature a highly consistent user interface. Most interface elements (buttons, labels) located on the top of the user interface are the same in all Voxengo plug-ins. For an in-depth description of these and other standard features and user interface elements please refer to the "Voxengo Primary User Guide".

Equalizer

CurveEQ's display basically consists of only a spline equalizer control surface. For an in-depth description of the equalizer and spectrum analyzer and its settings please refer to the "Voxengo Primary User Guide", including the topic called the "Envelope Editor" that describes features of the envelope (spline) editor.

CurveEQ differs from other equalizers in that you can define up to 3 equalizer curves for every channel group. This can be especially useful when you are using spectrum matching: for example, you may apply a matching EQ curve generated automatically and at the same apply any additional EQ curve you draw manually. Also note that CurveEQ by its design has a lower resolution at the frequencies below 200 Hz – at these frequencies the EQ curve won't always follow the control point positions.

The "Min-Phase" switch enables minimum-phase filtering instead of the linear-phase filtering. Minimum-phase filtering sounds better at steeper EQ slopes since it lacks pre-ringing artifacts present in linear-phase filters.

The "Static & Match" button opens the "Static Spectrum Editor" where you can display static spectrums and perform spectrum matching. Please consult the "Voxengo Primary User Guide" for more details about displaying static spectrums.

The "Hide Points" switch hides the control points allowing you to evaluate the EQ curve more precisely.

The "Freeform" switch enables freeform mode – the mode where you can draw the EQ curve manually by dragging the control surface with the left mouse button. Note that switching from/to the "freeform" mode may be destructive – some EQ curve feature may be lost.

The "Underlay" selector allows you to display any other EQ curve from any other channel group.

Spectrum Matching

Spectrum matching function is accessible via the "Static Spectrum Editor" window (which is opened by the "Static & Match" button on the user interface). Spectrum matching allows you to match spectrum shape of a sound recording to that of another sound recording.

Note that spectrum matching uses parameters specified in the "Spectrum Mode Editor". Only spectrums present in static spectrum slots can be used for matching – the usual real-time primary and secondary spectrums are not used for matching unless "taken" as snapshots by means of the "Take" or "Take 2nd" buttons, respectively.

When you perform spectrum matching it is suggested to switch spectrum type in the "Spectrum Mode Editor" to "Avg" so that average spectrum is used for matching instead of a default real-time spectrum which may give inconsistent matching results. You also need to run the averaging for several seconds until the visible spectrum becomes smooth enough. After achieving the required spectrum shape on the screen you can press the "Take" (or "Take 2nd") button once in the static spectrum slot to store this spectrum for matching purposes. Note that if there is no secondary spectrum available (it was not configured in the "Spectrum Mode Editor"), the "Take 2nd" button will appear dimmed.

You need at least two spectrum snapshots in two slots for matching. The spectrum you would like to equalize and the reference spectrum should be marked with the "Apply To" and "Reference" switches, respectively. You can mark more than one "Apply To" or "Reference" spectrum: in that case spectrums of the same marking will be blended (averaged, mixed) together before matching. For example, you can mix the "Avg" and "Max" reference spectrums this way.

The value of the "Points" parameter specifies how many equidistant points to use for matching. The more points you use the more precise the match will be. However, in many cases "more precise match" does not mean "better sounding match". It is suggested to try several values to choose which one sounds the best.

Also note that the static spectrum's gain shift has no effect on the matching process.

The EQ curve present on the screen affects the spectrum averaging process, so the EQ curve should be flat (reset) when spectrum data is being collected.

Load CSV/Save CSV

These functions allow you to load and save the currently selected EQ curve to textual file, readable by spreadsheet software. The EQ curve is stored as series of "frequency, gain" pairs, one per line, in this form:

20.00,3.00
400.00,2.51
1000.00,1.45 # comment
5000.00,3.40
20000.00,1.05

Each pair defines position of a single control point on CurveEQ's control surface. Note that decimal point should be written as a period, not a comma. Comments can be written in any position of the file, starting with a hash character.

The "Load CSV" function permits you to load a previously saved CSV file or any externally-generated EQ curve specification (e.g. room correction, RIAA phono correction). Frequencies defined in the file should lie in the range 20 to 20000 Hz inclusive.

Credits

DSP algorithms, internal signal routing code, user interface layout by Aleksey Vaneev.

Graphics user interface code by Vladimir Stolypko. Graphics elements by Vladimir Stolypko and Scott Kane.

This plug-in is implemented in multi-platform C++ code form and uses "zlib" compression library (written by Jean-loup Gailly and Mark Adler), "base64" code by Jouni Malinen, FFT algorithm by Takuya Ooura, FLAC audio decoder by David Reid, filter design equations by Magnus Jonsson and Robert Bristow-Johnson, VST plug-in technology by Steinberg, AudioUnit plug-in SDK by Apple, Inc., AAX plug-in SDK by Avid Technology, Inc., Intel IPP and run-time library by Intel Corporation (used under the corresponding licenses granted by these parties).

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Questions and Answers

Q. While adjusting control points, the plug-in issues CPU usage bursts.

A. This is normal since after the control point has changed its position, the frequency response must be recalculated, and this recalculation is a rather CPU-consumptive operation. After recalculation is complete, the CPU usage will return to normal. To reduce the bursts, please increase the audio buffer size.

Q. Why would using 60 points for spectrum matching be worse than 30 points?

A. When using 60 points this may create extreme "dips" and "peaks" that may sound a bit hollow, unnatural. With lesser number of points the matching curve you get is smoother and thus usually sounds better. The exact number of points you should use depends on the material you are processing: while music may benefit from a lower number of points, individual sounds may sound good with a larger number of spectrum matching points.

Q. I'm trying to use CurveEQ for real-time sound equalizing, but I get a noticeable latency. Is this to be expected?

A. Audible latency is to be expected as linear-phase equalizers all have delay, small or large. To put it short, linear-phase equalizers usually cannot be used for real-time equalization.

Q. I understand how to capture the first spectrum by playing the track back, waiting for the spectrum to stabilize and then pressing the "Take" button. What I can't figure out is how to capture the second spectrum. The display does not update when I play back the second track. I still just see the average spectrum of the first one.

A. After taking the first spectrum you can reset the spectrum by clicking with the left mouse button on the equalizer control surface once.

Q. Does having the "Min-Phase" mode enabled affect how CurveEQ collects spectrum data?

A. The "Min-Phase" mode does not affect the spectrum data.

Q. When doing spectrum matching is it important that the two files be close to the same volume in order to get a good representation of the difference between their spectrums?

A. No, the relative loudness of the files is not important for spectrum matching.

Q. I would like to import a "golden" spectrum curve I've come up with. How can this be done?

A. This can be done this way:

1. Create a textual CSV file with equalizer points that duplicate the desired spectrum curve and then load this file into CurveEQ. You should see your desired "golden" spectrum curve expressed as equalizer curve.

2. Set the spectrum mode to "Average".

3. Process a wave file that contains white noise for 20-30 seconds.

4. Capture the resulting spectrum in the "Static & Match" window. You will get an equalized white noise spectrum that resembles your "golden" curve. You can then save this spectrum to a file for later use.

Q. I am trying CurveEQ to do a spectrum matching between a song I have recorded and another artist's song that sounds good. Does it matter that the general volume is much stronger on the song I am using as a reference? Will it make the volume be boosted on all frequencies on my song because of that?

A. The general volume is not a factor during spectrum matching. CurveEQ will not boost the overall volume as it performs equalizing relative to the 0 dB line: some frequencies will be boosted while some will be lowered.

Q. Is there any way to adjust the slope of the EQ at a certain frequency like in parametric equalizer?

A. CurveEQ has no concept of "slope", the EQ curve is defined continuously, point by point. To make a narrow cut or boost you may add adjacent points to the frequency you are adjusting.

Q. Is there any way to get the EQ frequencies on the "standard" points of an octave-band EQ (31.5/63/125/250/etc)? It seems like the frequencies on the "30 point" and "40 point" settings are kind of arbitrary and don't conform to any kind of standard.

A. Spectrum matching does not use any standard EQ points, because following some standard is unimportant for high-quality spectrum matching.

Q. Have you figured out at what point the linear- and minimum-phase modes make a difference?

A. The difference becomes more evident at slopes of more than 6 dB per octave.

Q. Is it possible to save frequency curves created in CurveEQ for export and subsequent import into GlissEQ?

A. This isn't possible as these equalizers use different approaches to the EQ curve specification – GlissEQ uses parametric filters whereas CurveEQ uses a continuous EQ curve.

Happy Equalizing!