accSone

crusher-X

User Manual



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1. Welcome!

Granular synthesis revolutionized Sound Design, Electronic and Experimental Music. crusher-X does advanced granular synthesis on your live input in real-time!

It's more than sound... it's more than music ... it's the crusher!

crusher-X is a granular synthesizer and granulizer effect plug-in for Windows (VST 2.4 32bit and 64bit) and macOS (AU, VST 64bit)

It's powerful algorithm creates very complex sounds, drones and outstanding multichannel effects. crusher-X does distill and transform per-recorded or live-audio input quite radically. crusher-X is a trademark that is known since 1999 as "the" granular effect standard that allows a very deep control of grains and layered grain-streams in real-time. crusher-X is in use by famous sound-designers, composers, musicians and film-makers all over the world. The professional, open-minded and curious "crusher-X community" creates outstanding, unique, multi dimensional sonic pieces and thrilled their enthuses audience in great live-shows.

Features: Around 150 presets, stereo and 10 channel surround outputs (e.g. 5.1, 6.1, 7.1, 8.2, 9.1), Up to 199 grain streams that are processed multi-threaded (Multi-Core CPU support). Advanced parameter editor with physical modeling faders and an unique physical modeling X/Y controller. 3D grain visualization, around 270 free assignable real-time plug-in parameters, real-time MIDI control, morphing system, parameter phase and frequency spread modulations (spreading modulations over several grain stream generators), modulation and grain quantization to host, pitch tracking and autotune system with keyboard input and visualization, long real-time grain lengths, individual grain overdrive, filtering, unique formant, X-crush and Diffuse grain processing. Shadow programs. Unlimited undo/redo and randomize functionalities. 13 adore parameters that do meta parameter modifications. Several granulation live buffer and freeze modes. Automatic triggered grain buffer filling modes. Free editable multi-channel Compressor/Expander/Limiter stabilizes feedback and output level behavior. Smart latency compensation system. MIDI Polyphonic Expression (MPE) support. Comes with hundreds of different tuning scales and MIDI keyboard control of grain effect.

1.1. What changed in version 7.5?

- Adds smart latency compensation button/functionality to ensure beat synchronicity in track/loop based productions
- Adds a multichannel free editable compressor/expander/limiter to the output stage. Has channel linked and non-linked mode
- Adds overall "Morph Modulation Speed to 0Hz" Mode that allows morphing to no vapor modulations back and forth. Allows impressive interactive changes between modulated and static drones
- Adds a "Grain to MIDI" feature that translates the current grain volumes per generator into individual MIDI controller streams. Supports multimedia/light/DMX installations
- Adds global modes for Mixer settings to decouple mixer settings from switching programs
- Adds new MIDI MPE Free mode that allows continuous MPE control without stopping grains on MIDI key off
- Adds a new panning processing that leads to much more distinctive grain panning modulations
- Adds new AR vapor modulation mode that allows modulation from the Attack/Release MIDI section without any velocity impact
- Adds automatic range selection on moving ranged sliders
- Adds disablement of the overload grain protection when host renders offline (enables huge mass grain processing beyond current CPU capacities)
- Adds protection to plug-in parameter assignments in control mapping
- Adds program reset plug-in parameter
- Adds DCO waveform plug-in parameter
- Adds initial patch load after importing a sound package
- Adds a global settings panel
- Adds reset to factory default button in global settings panel
- Adds a reset of the Overdrive spline when resetting the Overdrive modulation
- Optimizes import speed of multiple crusher sheets
- Optimizes Grain View on longer grains
- Optimizes trigger plug-in parameters so that they reflecting the button press state and only trigger on values > 0.5
- Optimizes support for blind / sight impaired musicians for sweep, overdrive and compressor spline editor
- Optimizes spline handle visualization in spline editors
- Optimizes input visualization in spline editors (incl. only one grain at a time sweep spline input visualization)
- Optimizes GUI layout and colors
- Optimizes Volume Left/Light/Surround link behavior
- Optimizes DSP processing
- Fixes issue with random high CPU load in case of high feedback volume
- Fixes issue that sometimes PM-Field background was black
- Fixes issue with Rand S&H modulation if spread >0
- Fixes issue with RandLine modulation
- Fixes Feed.level plug-in parameter bug
- Fixes bug in Process UI-control
- macOS: Fixes seldom crashes on closing the host
- macOS: Fixes crash in case a preference file became corrupt
- macOS: Cleans up unnecessary plug-in resources
- vstwrap: Optimizes ASIO dialog

1.2. What changed in version 7?

- Introduces MPE (MIDI Polyphonic Expression) MIDI mode
- Introduces MPE vapor modulations modes (Channel Pressure and MPE CC74)
- Reworks UI elements and behaviors, touchscreen control on tablet and surface devices
- Introduces a grain formant filter mode with a-e-i-o-u vowels that let the crusher-X "talk"
- Introduces 13 adore parameters that allows meta parameter modification
- Introduces flexible MIDI and plug-in parameter control assignment with non linear, editable mappings
- Introduces DCO waveform adjustment
- Introduces the Physical modeling Generator-Wheel to have a more sensitive adjustment of the amounts of generators
- Introduces a predictive generator mixer
- Adds Modulation Speed values down to 0Hz
- Adds multiple crusher-Sheet import
- Adds additional decimal places at the MIDI Attack and Release edit fields
- Changes that Global Vapor Parameter Mod reset now to 100% instead of 0%
- Changes that Reset All and Random All affects now the Global Vapor Parameter
- Optimizes Spline curve editing
- Optimizes grain processing core
- Optimizes MIDI and parameter control processing speed
- Optimizes Generator synchronicity
- Optimizes MIDI handing in case a high amount of MIDI events coming in (e.g. MPE)
- Optimizes MIDI Key On reaction for longer grains
- Optimizes Grain View update
- Improves 3D grain overview
- Strengthens overdrive modulation
- Streamlines macOS and Windows installer
- Streamlines up/dn modulation modes as they could be achieved by inverse modulation

- Fixes a 5.1 L/R surround mixing bug
- Fixes a surround center level bug
- Fixes several parameter assignment and parameter control bugs
- Fixes crashes under Vienna Ensemble Pro and Blue cat patchwork (running as an VST/AU <-> AAX bridge under Pro Tools)
- Fixes crash on opening if previous closed with global MIDI on
- Adds a stand-alone VST wrapper to the Windows distribution (supports real-time multichannel ASIO input and output, surround recording, midi-input, midi monitoring, fxb bank save/restore and a nice fullscreen mode)
- vstwrap: Adds MIDI output capabilities
- vstwrap: Fixes save on close bug

1.3. What changed in version 6.5?

- Introduces invert vapor modulation processing (supports morphing)
- Introduces invert global modulation (supports morphing)
- Introduces Scan Modes for Spline and Step modulation: Modulation flow can be steered with random generators or the X/Y physical modeling controller
- Introduces several support for blind / sight impaired musicians: Introduce hot keys (<1>-<6>, <q>-<z>) for parameter selection and <o> for loading a wave file into the vapor buffer. Introduce plug-in parameters cursor-X, cursor-Y, SetDelete to edit spline curves or steps sequences
- Improves the behavior of moving from live- to fix vapor buffer mode: When release Auto/Stop trigger button the buffer fill stops immediately
- Adds more than 50 new plug-in parameters
- Fix Random S&H modulation bug
- Fix Spline/Step Editor open bug

1.4. What changed in version 6?

- Introduces pitch tracking and autotune feature
- Introduces additional "Diffuse" Vapor Modulation
- Introduces spline and step editor for Sweep Vapor Modulation
- Enhances and simplifies UI with a centralized Vapor Modulation preview and selection
- Introduces spread modulation: Slightly modulation frequency shifts for each generator
- Introduces additional Randlinefree Vapor Modulation Mode that doesn't sync generators like the Randline modulation
- Enhances Stereo+ and Surround Modes to have Stereo Mixdowns of all generators
- Adds Cubase Surround Modes
- Adds Step editing for each Vapor Modulation
- Adds Host beat synchronization option for each Vapor Modulation
- Adds Random and Reset functionality for each Vapor Modulation
- Adds 9 additional Quantization Beat modes
- Adds automatic setup of Delay Vapor Modulation on loading Grain Buffer so that loaded sound is played
- Adds automatic filter enabling while changing a filter parameter
- Changes floating window editing to embedded editing
- Updates/Adds new plug-in parameters
- Merges crusherX-Studio! and crusherX-Mac! to crusher-X

1.5. crusher-X Innovations

The following unique innovations were launched by accSone with crusher-X:

- Screenless spline and step edit: New plug-in parameter based (cursor-X, cursor-Y, SetDelete) spline and step edit modes for blind / sight impaired musicians. More "offscreen" edit capabilities thru these simple parameter set are likely to come.
- The ***Diffuse*** granular parameter (invented by accSone 2016) is unique in the world of granular synthesis: It mixes a reverb output for each grain generator (from up to 10 parallel independent reverb lines) before the grain window is applied. The "reverb memory" will be taken from one grain to another in the grain series that diffuses the grain content but not the grain output. This leads to very special, non smearing, precise and sharp - though warm - grain diffusion that can't be compared to a simple granulizer feeding a normal reverb processor
- The ***X-Crush*** granular parameter (invented by accSone 2014) is unique in the world of granular synthesis: It adds a special asymmetric ring-modulation transformation feed by the overlap of each grain with its successor. While interacting dynamical with the other vapor parameters X-Crush will lead from subtitle ringing artifacts up to extreme phase shifting and distortion sounds
- The ***Sweep*** granular parameter is outstanding: Normally grains are created out of a standard set of parameters and executed without any modification. But the Sweep parameter is different: It allows sample accurate pitch shifting modulations due to a linear or editable spline or step function. Sweep creates sounds from warm "water drop" like sweeps up to wired pitch modulation ecstasies.
- A ***Overdrive*** wave shaping algorithm generates strange grain overdrive effects that are ideally used together with guitar input sounds. The overdrive curve can be edited via a feature rich spline editor
- A ***Formant*** filter mode, processed on the grain level. It supports modulated vowels (a-e-i-o-u) with adjustable Q factors that control the sharpness of the vowal
- All of the granular parameter modulations can be controlled by a ***Pitch Tracker*** and ***Autotune*** system that tracks the pitch of the input channel in real-time, transform the pitch by a selected scale and modulate a emphasis or compensation towards the grain pitch.
- Innovative ***Tuning*** feature allows creating grain clouds that are tuned. Beside the well tempered standard scale the package contains thousands of historical, experimental, microtonal and exotic non western intonation scales that can be used to manipulate the pitch of the grains. Play crusher-X with your midi keyboard!
- Stoppable live ***grain buffer*** that can also hosts audio files
- Saving the content of the live grain buffer to disk at any time
- Control the grain pitch and volumes with a ***midi keyboard***. Scales can be applied to filter out "wrong" keys.
- Starting and stopping of the grain generation will not create transitions because a smooth small fading is automatically calculated
- A sizable and separated ***Grain view*** window shows the grains in detail
- ***Multi CPU / Core / Thread*** grain generation allows utilization of all available CPU cores of the host system
- The granular engine supports multichannel input processing
- All interface elements can be assigned to controllers through an easy to use midi / plug-in parameter ***control mapping*** and learning function
- Several background assistants ensures quick workflows like grain density editing
- The innovative ***physical modeling faders***, ***physical modeling wheels*** and the unique ***physical modeling X/Y controller*** (invented by accSone 2000) allows smooth and intuitive parameter editing
- Full spline editable ***multichannel surround compressor/expander/limiter*** with flexible channel linking. Allows sophisticated output level and feedback flow control.
- Smart ***latency compensation*** system to ensure live beat synchronicity by determining the "granular audio gravity" of a patch

2. Installing crusher-X

2.1. Requirements



Windows:

- VST 2.4 32bit / 64bit
- Windows7 or higher 32bit / 64bit
- Requires a 32bit / 64bit VST host to run the plug-in

macOS:

- Audio Unit (AU) / 64bit and VST 2.4 / 64bit
- Intel CPU, 1 GB, 2 GHz CPU
- Mac OS X / macOS 10.6. or higher
- Requires a 64bit AU or VST host to run the plug-in

These hosts are tested for compatibility. If your host is not listed, download the free demo and give it a try with your host:

Host-Name:
Ableton Live
Apple Logic Studio
Apple Garageband
Apple Mainstage
Apple auval (Audio Unit Validation)
Samplitude
Cubase
Wavelab
Muzys
AudioMulch
FruityLoops
Renoise
Sonar
MiniHost
Tracktion
Orion
Plogue Bidule
Reaper
Bitwig Studio
Audacity
New Sonic Arts Freestyle
Numerology
Rax
Vienna Ensemble PRO
Blue Cat PatchWork

For information about VST, please visit the Steinberg Homepage
Here you can find more information about Apple Audio Units (AU)

> Note: With Blue Cat PatchWork acting as a VST/AU <-> AAX bridge, one can run crusher-X under AVID ProTools.

2.2. Installation

2.2.1. Install on macOS



Just mount the downloaded dmg file and move the AU components to the Components folder and the VST components to the VST folder below.

Important: Reboot the system after installing the plug-in! Otherwise the plug-in might not show up in your DAW / host.

Be sure that your DAW / host is running in 64bit mode otherwise the plug-ins are not visible and accessible. To change the mode, use Command-I in the Finder with the application selected and uncheck Open in 32-bit mode.

After installation your DAW / host will find the following plug-ins:

- crusher-X VST 64bit component
- crusher-X AU 64bit component

Start your DAW / host in 64bit mode. After loading the desired plug-in and feeding it with some input sound you'll hear your first crusher-X sound! Note: You can't save any plug-in bank or plug-in parameter with the demo version. Please purchase a license if you like the crusher!

2.2.2. Install on Windows



Just unzip the package and move the VST plug-ins (*.dll) into the the VST plug-in search directory of your VST host or DAW.

Please refer to the documentation of your VST host for details about using VST plug-ins.

These crusher-X VST plug-ins are available:

- crusher-X_.dll (for 32bit hosts)
- crusher-X_-64.dll (for 64bit hosts)

Optional you can copy the user manual pdf file to a location of your choice.

If you like to use scala tuning files (not supported in the demo version) you can unzip the scales.zip folder to a location of your choice.

Start your VST host. After loading the desired plug-in and feeding it with some input sound you'll hear your first crusher-X sound.

As an alternative you can use the accSone stand-alone VST wrappers to run crusher-X without a 3rd party host. It supports real-time multichannel ASIO input and output and surround recording. Make sure that you place the wrapper in the same directory where you put the VST plug-ins:

- vstwrap_.exe (32bit stand-alone wrapper)
- vstwrap_-64.exe (64bit stand-alone wrapper)

Note: You can't save any VST bank or VST parameter with the demo version.
Please purchase a license if you like the crusher!

3. Introduction

3.1. Granular Synthesis

"For this purpose the qualification „beautiful" or „ugly" makes no sense for sound, nor for the music that derives from it; the quantity of intelligence carried by the sounds must be the true criterion of the validity of a particular music."

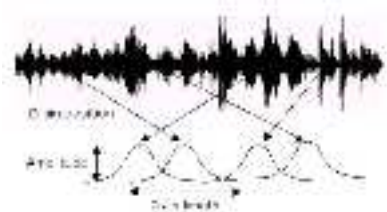
Iannis Xenakis in "Formalized music: Thought and mathematics in composition.", 1963-1992

The crusher-X algorithm is based on the traditional granular synthesis algorithm (Xenakis, Roads, Wilkins) invented in the early 1950s. In granular synthesis, short (e.g. 50 milliseconds) sound fragments, "the grains," come from a fixed file buffer. The starting time, length and silence between the grains can be modulated. More than one grain at a time is possible, so you can create complex sound "clouds" from any sound signal.

„When experimenting with those (length of grains), I have discovered a certain confusion as to what effect one can expect when setting parameters to certain values. Not only it seemed that length and density each had an impact of its own on the character of the granulated sound, but it also appeared that their relational value was highly important."

Leon Zadorin "Composing with Granular Synthesis"

A "window function" blends in and blends out the grains at the begin and end of its live cycle. This function determines the character of the continuum and thus the different perceptions. Xenakis recommended the Gaussian window because of its theoretical considerations. For performance reasons, e.g. Truax realized in its real-time systems simple linear-interpolated envelopes.



„All sound is an integration of grains, of elementary sonic particles, of sonic quanta. Each of these elementary grains has a threefold nature: duration, frequency, and intensity. All sound, even all continuous sonic variation, is conceived as an assemblage of a large number of elementary adequately disposed in time. (...) Hecatombs of pure sounds are necessary for the creation of a complex sound."

Iannis Xenakis in "Formalized music: Thought and mathematics in composition.", 1963-1992

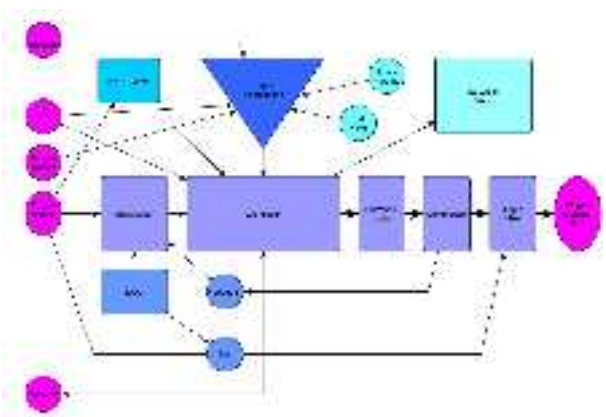
In opposite to the "classic" file based approach, the crusher-X algorithm provides a floating grain buffer which allows real-time input and output. In this floating buffer the grains are created by several generators routed to several outputs (surround modes) or summed up to single outputs (mono and stereo modes). One can apply many unusual parameters to the grains such as pitch, filter, pan, reverse, X-Crush, overdrive and limit - all modulated with independent modulation sources and modulation phases, synchronized or not synchronized to the host. The X-Crush parameter is unique in the world of granular synthesis: It applies a ring modulation between the overlaps of grains follow each other. A feedback loop from the output towards the input gerenates very complex and non-linear sounds.

„ A complex sound may be imagined as a multi-colored firework in which each point of light appears and instantaneously disappears against a black sky. But in this firework there would be such a quantity of points of light organized in such a way that their rapid and teeming succession would create forms and spirals, slowly unfolding, or conversely, brief explosions setting the whole sky aflame. A line of light would be created by a sufficiently large multitude of points appearing and disappearing instantaneously."

Iannis Xenakis in "Formalized music: Thought and mathematics in composition.", 1963-1992

3.2. Getting an overview

The following picture depicts the audio and the control flow through the crusher-X plug-in:



Audio flow:

The plug-in's stereo inputs are routed through the ***Mixer*** towards the ***Granulizer***. The Left input channel (pre fader) is also routed towards the ***Pitch Tracker***. The output of an ***DCO*** and a ***Feedback*** signal is added to the ***Granulizer's*** input via the ***Mixer***. The plug-in's 10 outputs are feed by the Mixer and Compressor's output which gets its input from the Granulizer's ***Generators***. The ***Surround router*** determines the routing from the ***Generators*** towards the ***Output channels***. The ***Dry*** signal can be mixed to each ***Output channel***.

Modulation:

The ***Vapor Modulations*** determines the modulation of the ***Vapor Parameters***. The different ***Vapor Parameters*** determines the grain's generation, live-cycle and processing. Each ***Vapor Parameter*** has an own ***Vapor Modulation***. The ***Global Modulation*** is a global modulator for all ***Vapor Parameters***.

Controlling:

The ***Granulizer*** settings are determined by the ***Vapor*** settings. The ***PM Field*** can be an input of the ***Vapor Modulations***. The ***Vapor Modulation*** settings can be set by a ***Random*** generator. The Grain pitch can be controlled by ***MIDI*** key events. The ***Grain buffer*** filling is controlled by the ***Trigger*** and ***Quant*** settings. All settings can be stored and restored as a ***Program.***

Visualization:

The ***Granulizer's*** status is displayed in the ***Grain view***. The audio levels are visualized in the ***Level view***. The current modulations are visualized in the ***Vapor Modulation overview***.

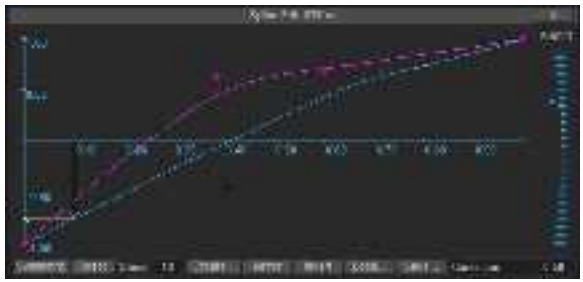
3.3. Screenless control of crusher-X, e.g. for blind / sight impaired musicians

crusher-X can be nearly fully controlled without using the visual editor. Around 270 plug-in parameters can be used to steer each parameter. Inspired by the blind composer David Hindmarch, accSone developed several features to enable blind / sight impaired musicians to control crusher-X:

With the new plug-in parameters cursor-X, cursor-Y, SetDelete you can edit spline curves and step sequences without using a mouse: Change a ***Vapor Parameter*** (e.g. Speed.Mode = 65%) to select the targeted Vapor Parameter. If the mode of the Vapor Parameter is "Spline..." or "Steps..." one can control a virtual cursor on the X- and Y- Axis with the parameters cursor-X and cursor-Y. As long as the parameter SetDelete =0 there will be no edits done. Once you select a position you can set the SetDelete parameter to the positive maximum: If a Spline Point is near to the cursor-X position the Spline Point is "catched" and set to the cursor-X and cursor-Y position. If you press the <Shift> key while moving the SetDelete parameter up, it will insert a ***Knee Point***. If there is no Spline Point near to the cursor-X position, a new point is created and can be moved with the cursor-X and cursor-Y parameter. By moving the SetDelete to the minimum the nearby Spline Point is deleted. Leaving SetDelete to the minimum and moving the cursor-X around will delete all Spline Points that are caught.

> Tip: The virtual cursor is visualized in the Spline or Step editor as a white cross. This can be used to train the usage of the edit parameters together with a sighted peer.

Some plug-in hosts like e.g. Ableton Live or Reaper allows to edit plug-in parameters while having the plug-in editor open. Some hosts like Ableton Live needs to automate plug-in parameters to setup a plug-in parameter access. To generate a one-shot automation of the cursor-X, cursor-Y and SetDelete parameter, press the <shift-key> and click on the ***Control Mappings*** button in the ***Programs Panel***.



To edit the ***Sweep Mode*** or ***Overdrive*** Splines from the ***Vapor Panel*** just modify a Sweep or Overdrive Vapor Parameter first and don't select the modulation Mode to Spline... or Steps... That will select those both Spline Curves.

To edit the ***Comporessor*** spline use one of the Compressor Parameters first.

If the editor is open and the host supports a key stroke routing towards the plug-in, one can utilize hot keys (<1>-<6>, <q>-<z>) for Vapor Parameter selection and <o> for loading a wave file into the vapor buffer.

4. Vapor Modulations and Parameters

4.1. Vapor Modulations panel

The ***Vapor Modulations*** panel allows the control of the ***Vapor parameter*** modulation. A ***Vapor parameter*** defines the way when a grain is generated (***Delay***, ***Birth***), the grains lifetime (***Length***) and the grains audio processing (***Speed***, ***Sweep***, ***X-Crush***, ***Overdrive***, ***Filter***, ***Volume***, ***Pan***, ***Diffuse***).



Vapor Modulations panel

A ***Vapor Parameter*** applies to all ***Grain Generators***.

To adjust the offset and the modulation of a Vapor Parameter choose the desired Parameter and adjust the sliders.

All Vapor Modulations sharing the same structure:

The ***Offset*** fader sets the general offset of the parameter defined in the left upper corner of the panel.

Depth defines the modulation depth of the parameter oscillator

Speed determines the frequency of the modulation.

Mode sets the oscillator mode. Several types are available:

- Normal modulation forms like: Sin, Triangle, Saw, Rect
- ***Random each Grain***: Every grain will charged by a random value
- ***RandLine Sync***: A random "travel line" floating modulation will be applied on all generators (spread & phase can be applied to sync)
- ***RandLine Free***: A random "travel line" floating modulation will be applied for each generator individually
- ***Rand S&H Sync***: A random "sample and hold" modulation will be applied for all generators (spread & phase can be applied to sync)
- ***Rand S&H Free***: A random "sample and hold" modulation will be applied for each generator individually
- ***X PM-Field***, ***Y PM-Field***: Modulate with the PM-Field
- ***On (100%)***: no modulation with an offset of 100% (can be used together with ***Phase*** to spread an offset over the generators)
- ***Off (50%)***: no modulation with an offset of 50%
- ***Spline***: enables custom spline edit of the modulation
- ***Steps***: enables custom step sequence editor for the modulation
- ***AR (MIDI & MPE)***: ties the modulator to the Attack and Release values that can be changed in the ***MIDI Key*** panel
- ***AR Velocity (MIDI & MPE)***: like above but takes the MIDI Velocity into account
- ***Channel Pressure (MIDI & MPE)***: ties the Modulator to the Channel Pressure MIDI event. In MPE mode (***MIDI Key*** panel) each generator will be steered by the individual MPE channel
- ***MPE CC74 (MIDI & MPE)***: ties the Modulator to the MPE CC74 controller for each MPE channel individually. Works only in MPE mode
- ***Key Aftertouch (MIDI)***: ties the Modulator to the Aftertouch MIDI events.
- ***Follow Tune (Pitch Tracker Tuned, Base Note)***: Modulates with the output of the pitch tracking system by compensating to the selected Scale in the ***MIDI Key*** panel.
- ***Follow Pitch (Pitch Tracker, Base Note)***: Modulates with the output of the pitch tracking system by following the selected Scale in the ***MIDI Key*** panel.

Each modulation is passed through a logarithm to exponent processing. You can adjust the processing curve with the ***Process*** graph. The little graph will show you the resulting processing. Use the mouse to modify. In combination with the modulations sources this function is very useful to generate more "human" modulations. By pressing the small ***-1*** button one can "invert" the ***Process*** processing. Though it is a binary control it will be morphed on larger morph time settings:

> Tip: Use the ***-1*** button together with a morph time set >0. The process graph will display the change of processing. Together with ***Phase*** this generates a smooth forward/back like effect

Use the ***Glob Mod*** slider for adding an additional global modulation. It is useful to add synchronous modulation to different Parameters (e.g. Length and Speed). By pressing the ***-1*** button one can "invert" the global modulation. That allows opposed parameter modulations (e.g. increasing the length and lower the speed with the same global modulation source) . An inversion will be morphed by the morph time settings.

> Tip: Use Global Modulation Phase Fader to change the phase of the modulation. This allow interesting sounds where the parameters are modulated synchronous but with an offset for each generator.

If you like to apply only the global modulation set the parameters ***Depth*** slider to 0.

To define the fader range, use the small buttons above the faders if they are available on the desired parameter.

Use the ***Phase*** fader to define a change of the modulation phase between the individual ***Grain Generators***. Note: Changes between single generators can only be made by using the ***Phase*** slider.

Use the ***Spread*** fader to define a change of the modulation frequency for each ***Grain Generators***. Generator 1 (the lowest) will be modulated with the selected base frequency. The other Generators are modulated by the base frequency multiplied by the Spread factor and the generator numbers.

All modulations can run independent for the host beat in the ***free run*** mode. Choosing a ***beat*** will sync the modulation to the host beat.

For a visual example, look at the ***Grain View*** while running the crusher and change the parameters!

For a visual overview of all applied modulations take a look at the ***modulation overview***.

Pressing the ***<> Button*** between the Length and the Birth selectors will enable a proportional following of the Offset on the Birth parameter if the offset of the Length parameter is changed manually. That feature ensures an easy adjustment of the grain density (you might know that parameter type from other granular synthesizer effects). The link is only unidirectional meaning that you are still able to change the Length/Birth relationship by editing the Birth parameter first.

The ***Random*** and ***Reset*** buttons applies and resets the current selected modulation.

Tip: Use the ***Random*** button together with the ***Undo / Redo*** and the ***Morphing*** System to generate interesting modulation floats

4.2. Delay, Length and Birth parameter

The ***Delay*** parameter defines the delay between the audio input into the buffer and the grain(s) output. It can be seen as an delay line where the read-head is moving. It is defined in msec (1/1000 Second).

Tip: Modulation of the ***Delay*** parameter allows "scrolling" through the audio in the buffer.

Length determines the length of the grain in msec.

Tip: Extreme short (1ms - 20ms) grains sounds like "spikes" or "sparks". Longer overlapping grains (100ms - 500ms) are appropriated for pitch shifting effects. Lengths > 10sec can be used for longer lasting sound moves or sound collages.

Birth determine the time (in msec) the generator waits until a new grain is born. If the birth time is smaller than the Length of the grain the grains will overlap. The generator prevents a decrease of the birth time under 10% of the actual grain length. This prevents to overloading the system. The actual generated numbers of the grains are shown in the ***Grain View***.

The Length and Birth parameter together will determine the ***grain density***. Longer length times and smaller birth times will lead to higher grain density that finally ends up in an overload. Take a look at the Grain views upper right corner to determine the amount of grains running at the same time.

In the ***Grain View*** the grains are represented by the rectangles in a 3D coordinate system. The ***Delay*** is shown in the Z axis and the ***Length*** and ***Birth*** is shown in the X axis. The Y axis shows the different ***Generators***. The grain near the Y axis is the one that is currently generated. The 3 other grains in X direction to the right represents the ones which are already played in the past.

Pressing the ***<> Button*** will enable a proportional following of the Offset on the Birth parameter if the offset of the Length parameter is changed manually.

Tip: To get started understanding the grain generation principles use the program "***to start with***", feed in some audio from your DAW and experiment with the ***Length***, ***Birth*** and ***Delay*** parameter using the ***Offset*** slider. Best to start with is audio material that you know or that have some good observable structures (like e.g. spoken text or reduced drum loops with some melodic elements)

4.3. Speed and Sweep parameter

Speed refers to the pitch of the grain. It is defined as a multiplication factor and ranges from -5 to 5. 1 means no pitch shifting. 2 means a double pitch. Values > 1 scales the pitch up. Values from 1 down to 0 scales the pitch down. Values below 0 represent backwards pitch shifting (-1 without pitch shift, 0 to -1 pitch down, < -1 pitch up).

Depending on the ***Aliasing*** switch (see Vapor panel) a sample rate conversions is made. Pressing the ***Aliasing*** button disables that feature and you hear up- and down-sampling artifacts that makes the crusher sound more aggressive.

Tip: Use the modulation to create scratch effects on longer grains.

Sweep determinate a changing pitch-shifting during the grains live cycle. Positive values increases the speed during the grains lifetime, negative values decrease the speed. The modulation type of the pitch change can also be selected in the ***Vapor*** panel: Linear (normal sweep), Spline and Steps.

Tip: Use this to "wet" the sound! Longer grains will sounds like water drops with Sweep amounts different from 0.

In the ***Grain View*** the ***Speed*** is represented by the color of the grain: blue means 1%, white means 200%, and red is the 100% neutral color. The Direction is shown by a triangle in the middle of the grain. ***Sweep*** is represented by a colored + or - sign. The color of the sign represent the amount.

4.4. X-Crush parameter

X-Crush is a very special vapor parameter that was invented by accSone 2014 and is unique in the world of granular synthesis: It adds a special asymmetric ring-modulation transformation feed by the overlap of each grain with its successor.

Overlapping of grains happens if the grains are longer (defined by Length parameter) than the birth time (defined by the Birth parameter). X-Crush is only applied inside each generator, not across several generator (so to speak, only in X-direction, not in Y-direction – take a look at the ***Grain View***).

If the X-Crush parameter is 0% a normal sum up of the grains outputs is done on each generator stream. But once the X-Crush parameter is >0% (due to offset setting or modulation), the overlapping area is processed with a special asymmetric ring-modulator algorithm. It processes the end part of the previous grain and the beginning part of the current grain. Because grains are normally windowed the effect is faded in and out by each grain window.

> Note: You won't hear any effect of the X-Crush parameter if the grains are shorter than their birth time.

The X-Crush effect various a lot depending on other parameter settings: On static Length/Birth times with no Depth modulation X-Crush sounds like a nonlinear, fixed distortion. Adding Depth/Length/Birth modulation will dramatically change the effect towards ringing and other artifacts. Try to add on top some X-Crush modulation, maybe with a phase between the generators, change the window type…

> The ***X-Crush*** depth is displayed in the ***Grain View*** with a X sign between the grains if they are overlapping

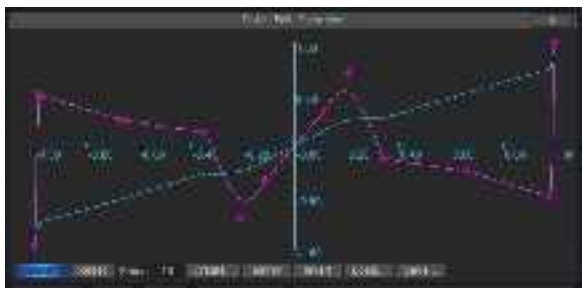
4.5. Overdrive parameter

After processing of the volume and pan section, each sample of a grain is feed thru an ***overdrive*** amplitude modulator.

You can setup the relationship between the input and output level of each sample in the Overdrive Spline Window that can be opened from the vapor panel (This technology is sometimes referred with the term ***Wave-shaping***). The vapor parameters are controlling the amount of modulation of that spline curve.

The modulations ranges from 0% ("linear" - meaning input=output) to 100% (the current spline).

> Tip: By using the ***Phase*** sliders you can assign different modulations to different generators. This will generate a mix of distorted and clean grains.



Overdrive spline editor

In the ***Overdrive spline editor*** the white arrows representing the current input and output sample mirrored on the blue line. It depicts the current applied modulation of the first generator.

> The amount of Overdrive Modulation is displayed in the ***Grain View*** by a saw like top of each grain.

4.6. Filter Freq. and Filter Q. parameter

Each Generator has its own IIR-Filter that can be set up by its ***Filter Freq*** and by its Bandwidth ***Filter Q*** parameter. The ***Filter Mode*** is defined in the ***Vapor*** panel.

> Note: If the ***Filter Mode*** is ***Bypass*** changes of the ***Filter Freq.*** and ***Filter Q***. parameter will not affect the sound.

Changes of the ***Filter Mode*** will be morphed through the ***Morph*** system.

> In the ***Grain View*** the filter's frequency is represented by the brightness of the grain. The Bandwidth Q is represented by the brightness of a horizontal line. A bright line means a high Q and narrower bandwidth.

4.6.1. Formant Filter mode

If the ***Filter Mode*** in the vapor panel is set to ***Formant*** the frequency parameter changes to a formant selection parameter.



Formant Filter mode selection

> Tip: Set the starting vowel with the offset and modulate the parameter with e.g. a S&H modulation. Provide a noise or saw oscillator input sound. The crusher starts to talk!

4.7. Volume and Pan parameter

Each grain can be modulated in its ***Volume*** and ***Pan***.

> In the ***Grain View*** the ***Volume*** of each grain is represented by the height of the grain.

> The ***Grain View*** displays the L/R channel flow for each generator. On the Y-axis the input mix of each generator is displayed and on each grain the left & right mix is visualized with ***L/R*** signs.

> Tip: Using the ***Phase*** fader of the ***Pan*** parameter creates strange panorama shifts

The ***Volume*** and ***Pan p***arameters do also effect the multichannel output levels depending on the ***Surround Mode*** setting in the ***Mixer*** panel.

4.8. Diffuse parameter

The ***Diffus***e granular parameter (invented by accSone 2016) is unique in the world of granular synthesis: It mixes a reverb output for each grain generator (from up to 10 parallel independent reverb lines) before the grain window is applied. The "reverb memory" will be taken from one grain to another in the grain series that diffuses the grain content but not the grain output. This leads to very special, non smearing, precise and sharp - though warm - grain diffusion that can't be compared to a simple granulizer feeding a normal reverb processor.



Diffuse modulation section

4.9. Global modulation

In addition to each parameters individual LFO there is a global Oscillator called ***Global***.



Global modulation section

It can be mixed with the parameters individual modulation by using the ***Glob Mod*** fader for each parameter.

> Tip: Use the ***Depth*** slider of the Gobal modulation to control the overall depth of the global modulation.

Also the Global modulator is passed through the ***Process*** logarithm/exponent processing.

4.10. Modulation Overview & Adore parameters



Vapor Modulation Overview & Adore parameters

In the top row one can observe all ***Vapor Modulations*** at the same time. The active generators are colored. A click on the graphs will select the corresponding ***Vapor parameter***.

A very powerful modulation effect can be achieved by pressing the ***Morph Modulation Speed to 0Hz*** button: Depending on the morph time setting all vapor modulations will decelerated and finally paused until the button is released. The button is mapped to a plug-in parameter called Vapor.Freeze.

> Tip: To use this feature in your live performance map the ***Morph Modulation Speed to 0Hz*** button or the Vapor.Freeze parameter to an external MIDI controller device.

In the bottom row there are 13 so called ***Adore parameters***. These are mapped to corresponding plug-in parameters and can be understood as meta parameters to control several vapor parameters at once with one slide. Each Adore parameter is mapped to several Vapor parameters via a specified set of control mappings (see section Control Mappings below). An Adore parameter modification is treated as normal Vapor parameter modifications, so therefore can be morphed and undone. But due to the nature of being a meta parameter that is only applied once it is received or modified, the position of the Adore parameters are not stored with the patch.

> Tip: You can modify or add more control mappings for each Adore parameter by open the Control Mapping editor (on the Program Panel) and edit the mapping.

5. Editor panels

5.1. Physical Modelling sliders

The editor of the plug-in gives access to all crusher-X parameters. The editor is designed to provide full control over the sound processing features while providing visual feedback of all changes.



crusher-X slider with PM-Wheel

> Tip: Most of the crusher-X's sliders can be also controlled with a physical-modeling "wheel" (***PM-Wheel***) on its right side. Just "push" the wheel with the mouse (holding the left mouse-button down) and observe how the wheel and the fader moves.Same can be achieved on using the mouse-wheel or flip with a finger on a touch screen.

This unique technique that was invented by accSone in 2003 let you control the sliders very smoothly and allows you to adjust finest and fast changes just by pushing the wheel slowly or fast. You can also push the wheel by using the mouse wheel. Just move the mouse over a fader and turn the wheel. The text value inputs can also be controlled by mouse wheel or by mouse dragging.

5.2. Program panel

The plug-in's programs can be changed by selecting one from the ***program list*** or by pressing the **< >** buttons. Each program holds the one full set of parameters. Switching between the programs will change the whole parameter set.

> Tip: Use the program change buttons with higher morph time values (see ***Morph panel***) to morph between the programs



Program panel

After a change of any parameter, the entire status of the crusher is streamed into memory; you can undo each change step by pressing the ***Undo*** button. The ***Redo*** function will redo the change.

After changing a slider a marker inside the slider appears. The markers will disappear after a while, which means that the next memory location of the undo/redo system is enabled. Loading a new program can also be undo.

> Tip: Use the ***Undo / Redo*** buttons with higher morph time values (see ***Morph panel***) to morph between the changes

The ***Latency*** button launches a calculation of a latency compensation for the current patch (or modified patch). See chapter below for further details.

With the ***Import*** and ***Export*** buttons one can import/export crusher-X Sheets (patches) or crusher-X Sound Packages. crusher-X is compatible to former crusherX-Live!, crusherX-Studio! and crusherX-Mac! versions. When more than one crusher-X Sheet is selected all files are imported to the following program slots in sequence. The filename will be used to change the program name.

All new imported or loaded programs are stored in a shadow program "below" the current modified program. Pressing the **Reset** button will reload the underlying shadow program. If no shadow program was imported before, the factory program will be reloaded. The shadow programs are stored into the host's project and are also available after a reload of your project. With that feature you can reset your modifications very fast to a predefined set of programs. This will give you a higher freedom for live modifications. On modifying the program by changing the parameters a * will be displayed in front of the program name and the color of the name changes.

> Tip: For supporting your live performance, import several programs and assign the Reset button to a MIDI-Controller. This enables you to switch back to the initial sound immediately after changing several parameters

The ***Control Map*** button opens the ***Control Mappings editor*** (see chapter Control Mappings). The standard real-time control mappings allows to control program changes via MIDI program changes or plug-in parameters. Every mapping can be modified or more mappings can be added.

The ***Settings*** button will launch the global settings editor.

Find a button in the ***Settings*** panel to restore all patches to the factory defaults.

5.3. Latency compensation system

The ***Latency*** button in ***Program panel*** launches a calculation of a latency compensation for the current patch (or modified patch).

Use this if you want to make sure that your audio generated by the crusher stays in sync with the track that feeds the crusher (e.g. to stay synchronized on a drum-beat). If a patch contains deeper modulations of the Delay, Length, Speed or Sweep parameters the smart latency compensation algorithm will calculate the a "grain gravity compensation" so that the compensation stays meaningful. Though in this cases a full compensation is not desired nor possible. If the current calculated compensation fits to the current patch the button stays blue, if the compensation does not fit, it turns purple (e.g. after a parameter or program change). As every new calculation forces the host to resynchronize its audio processing there are some audio outages noticeable depending on the host if the button is pressed or released. Releasing the button will set the compensation back to 0 samples - Use this for live input sources to ensure a minimum of processing latency in that case. The current latency compensation is stored as a global setting (and not with each program). That enables both: Loading of a initial compensation on loading the host project and smooth morphing between programs.

> Note: The functionality of this feature is highly dependent on ability of the host to take the reported latency compensation from the plug-in into account:
>
> **Live** does a pretty good job as it's cross-blending changes even during playback.
>
> **Logic** has problems with applying the changes during playback. Sometimes clicking the Stop button in the Logic Transport and then clicking the Latency button in crusher-X helps.

5.4. Mixer panel

The ***Mixer*** panel allows full volume control of all relevant inputs and outputs and allows to choose the surround output assignment.



Mixer panel

With the ***In L*** and ***In R*** faders one can adjust the level of the plug-in's stereo inputs that is mixed together with the ***DCO*** and the ***Feedback*** towards the granulizer's input.

> Note: The ***Pitch Tracking*** System gets its audio input from the Left Input Channel (Pre-Fader)

Group the faders together by pressing ***Link*** buttons**.**

> Note: Grouped faders are moving relative to their positions they had before grouping.

The ***Wet*** faders controls the stereo input volume of the granulizer.

The ***Dry LR*** fader mixes the stereo input signal direct to the outputs.

> Note: The ***Wet*** and the ***Dry*** faders are also morphed by the morph system which allows smooth fading and muting - even with a volume change resulting from using the ***Undo/Redo*** function or altering another parameter. This will only be done if the ***Global Mixer*** setting in the global settings is disabled.

The ***Out*** faders determines the volume of the stereo output of the plug-in.The ***O Link*** button links the left and right channel volume and the ***L. SR*** button links the volume of the surround channels.

> Note: The surround channel output volumes and the other volumes can be also controlled in the level panel.

The ***Comp*** button launches the compressor editor. If the ***C Link*** button is pressed all 10 compressor channels are linked and compressed to the channel with the highest input. If the button is released all channels are compressed individually.

With the ***Surround mode*** selector one can choose several output and surround modes. These modes will not only affect the assignment and labeling of the 10 output channels but also affect the routing of the generator streams towards the outputs and provide sum ups of channels for the ***LFE*** (Low Frequency Effect) channel.

> The assigned routing is displayed left-hand the Y-axis inside ***Grain View*** and as labels on top of the output peak meters.

If the generator count exceeds the active channels, the output of the generators are summed up towards the next available channel (generator rotation). The following modes are available:

Name	Comment	1st generator LR Pan works in Stereo Mode	Generator rotation	Active output channels	Out 1	Out 2	Out 3	Out 4	Out 5	Out 6	Out 7	Out 8	Out 9	Out 10
Stereo +	Normal Stereo assignment, Out 3 starts with 3rd generator	yes	10	10	L	R	L3	R4	L5	R6	L7	R8	L9	R10
Multichannel	Every generator is routed to each output individually	no	10	10	L1	R2	L3	R4	L5	R6	L7	R8	L9	R10
5.1 (ITU 775)	5.1 Stereo Setup, Stereo is routed to L/R, LFE is a sum up of out 1-5	yes	5	6	L	C*	R	Ls	RS	LFE				
5.1	5.1 (rotating, unsymmetrical L/R routing)	no	5	6	1	2	3	4	5	LFE				
5.1 (Cubase)	5.1 (rotating, unsymmetrical L/R routing)	yes	5	6	L	R	C*	LFE	Ls	Rs				
6.0 (Cine)	6.0 Stereo Setup, Stereo is routed to L/R	yes	6	6	L	R	C*	Ls	Rs	Cs*				
6.0 (Music)	6.0 Stereo Setup, Stereo is routed to L/R	yes	6	6	L	R	Ls	Rs	Sl	Sr				
6.1 (ES/EX)	6.1 Stereo Setup, Stereo is routed to L/R, LFE is a sum up of out 1-6	yes	6	7	L	C*	R	Ls	S*	Rs	LFE			

6.1	6.1 (rotating, unsymmetrical L/R routing)	no	6	7	1	2	3	4	5	6	LFE			
7.1 (3/4.1)	7.1 Stereo Setup, Stereo is routed to L/R, LFE is a sum up of out 1-7	yes	7	8	L	C*	R	Lm	Rm	Ls	Rs	LFE		
7.1 (SDDS)	7.1 Stereo Setup, Stereo is routed to L/R, LFE is a sum up of out 1-7	yes	7	8	L	Lc	C*	Rc	R	Ls	Rs	LFE		
7.1	7.1 (rotating, unsymmetrical L/R routing)	no	7	8	1	2	3	4	5	6	7	LFE		
8.1	8.1 (rotating, unsymmetrical L/R routing). This is a typical setup for experimental venues with a surround system, LFE is a sum up of out 1-8	no	8	9	1	2	3	4	5	6	7	8	LFE	
8.2	8.2 (rotating, unsymmetrical L/R routing). Two LFE channels with L/R sum up (L=1,3,5,7,9 R=2,4,6,8,10)	no	8	10	1	2	3	4	5	6	7	8	LFE left	LFE right
9.1 (7.2.1)	9.1 Stereo Setup, Stereo is routed to L/R, LFE is a sum up of out 1-9	yes	9	10	L	C*	R	Lm	Rm	Ls	Rs	LFh	RFh	LFE
9.1	9.1 (rotating, unsymmetrical L/R routing)	no	9	10	1	2	3	4	5	6	7	8	9	LFE

*= no generator panning

5.5. Level panel

In the ***Level*** panel you can observe the input and output levels on several level meters. Dragging with the mouse on the meters is also a way to adjust the levels.



Level panel

> Note that the internal structures allow internal overload close to +40dB! Only the output levels should be under 0dB to prevent distortion.

Next to the ***InL*** and ***InR*** level meters are the trigger level slider. You can set this level also from the ***Trigger*** panel.

5.6. Generators panel

The ***Generators panel*** allows to control the amount of generators and their offset generation.



Generators panel

The ***Generator*** input box and the wheel allows to set the number of generators that generates the grain stream. Each generator adds more generated grains. Each generator receives its input depending on the setting of the ***L/R*** button: If not pressed each generator receives a mix down of all input channels. If ***L/R*** button is pressed the generator input channel depends on the generator number (odd/even) and the setting of the ***Surround Mode*** (***Mixer*** panel)

The ***Generator Offset*** desynchronizes the generators. Each generator starts after the specific offset time.

> Tip: Increase the ***Generator Offset*** to generate strange melody-effects while using longer grains which don't overlap.

5.7. Vapor panel

The ***Vapor panel*** allows to control the global settings of the granulizer.



Vapor panel

The ***Load*** Button loads a WAV or AIFF mono or stereo audio file into the grain buffer. After loading a file to the buffer, the ***Auto*** Button on the ***Trigger*** panel automatically releases.

Note: After successful loading of an audio file into the buffer the ***Delay*** and ***Speed*** Vapor parameters, in special the Delay ***Offset***, the Delay ***Modulation*** and the Delay LFO ***Frequency*** is automatically adjusted such that a non pitched and forward playback on the buffer is ensured. Use this settings to start your granular experiments on fixed buffers. Just press ***Undo*** if you want to revert to your previous Delay settings.

A visual representation of the wave form will appear near the z-axis of the ***Grain view***.

The ***Save*** Button saves the current buffer into a WAV or AIFF sound file. The save area ranges from 0ms up to the maximum delay time (given by the offset and depth) assigned in the ***Vapor Modulations*** panel.

Note: Don't expect that you saves what you hear... The content of the sound buffer is saved not the output from the grain generators!

The ***Grain view*** displays the input channel of each generator left to the Y-axis.

Window Type selects the Grain Window. It is used to prevent noisy switching sounds between grains, each grain is windowed by an envelope. This envelope type can be selected from the ***Window Type*** list.The Window could be also free designed by using the ***Spline*** edit or loading a Mono WAV or AIFF file.

Take a look at the ***Grain View*** to see a graphic representation of the windowing envelope.

Switching/Nasty sounds between the grains can be achieved by selecting a ***SharpRect*** window type. Choosing ***Spline*** from the list brings up the ***Spline Editor.*** In this editor the window envelope can be edit manually.

Tip: Window types with several X-axis crossings will generating ring modulation artifacts. The pitch of that artifacts will depend on the grain ***Length***.

The ***Sweep Mode*** selects the way how the Sweep processing is done. ***Linear*** will do a linear increment (+ modulation value) or decrement (-modulation value) of playback speed during the grain run. ***Spline*** open the Spline Editor for designing a speed curve. ***Steps*** open the step editor to enter a step sequence of pitch changes that is processed during the grain processing

Tip: Using Steps with longer grain lengths will lead to very interesting melodic sequences. The tempo of the sequence is bound to the grain length. Use it in combination with a grain length modulation!

The ***Filter Mode*** selection sets the filter type that is applied during grain generation (see the ***Filter Freq.*** and ***Filter Q.*** parameter in the ***Vapor Modulations*** panel). To disable the filter select ***Bypass***.

Note: Changes of the Filter Mode will be morphed through the Morph system.

The ***Grain Diffuse Room*** Slider selects the size of the Diffuse Room for the Diffuse grain processing. See Diffuse parameter section to learn more about the specialty of the Diffuse processing - it's not a normal reverb!

The ***Aliasing*** button brings back to the harsh pitch shift sound of older crusher-X versions. The ***Aliasing*** function will disable the pitch shift interpolation algorithm.

Tip: You can easily hear the difference of the two modes if you input a sine wave and pitch up/down by using the ***Speed*** parameter in the vapor modulations panel.

The ***Sync Mod*** mode sets all vapor modulations in sync with the scrubber position on the host timeline. This doesn't affect no-oscillation modes like X-Up PMField, OffUp, MIDI or Pitch Tracking modes.

Note: if the host DAW is in stop or pause mode, the oscillator modulation will be stopped too and pause in a reproducible state depending of the timeline scrubber position. Use this feature if you like to create reproducible LFO modulations depending on the scrubber position. If you processing live audio e.g. in combination with a host that runs in a looping mode, it is recommended to release the sync mode.

The ***Edit Overdrive*** button brings up the ***Overdrive Spline*** Editor (see the ***Overdrive*** parameter in the ***Vapor Modulations*** panel)

5.8. Quantization panel

The grain generation process can be synchronized to the bar positions of the host sequencer.



Quant. panel

The ***Mode*** selects the action that is triggered once a quantization point is reached by the host:

- ***None*** (No quantization)
- ***Grain*** (Grains are generated but waiting for a quantization point to become alive)
- ***Trigger*** (The grain buffer filling is triggered only on the quantization mode). ***Auto*** (see ***Trigger*** panel) has to be disabled.
- ***Grain + Trigger*** above two modes combined

The ***Beat*** selects the "speed" of the quantization in bars.

> If grains are suppressed by the quantization they appears without color in the ***Grain view***.

With the ***Intensity*** slider you can control how many per cent of the grains are quantized. 100% means all grains are affected, 0% means no quantization.

You can choose or enter a bar ***Pattern*** for the quantization. Choose one from the list or type in your own rhythm. Use <+> (step on) and <-> (step off) keys.

> Tip: Generate your own "grain beats" by entering complex sequences in the ***Pattern*** text box

5.9. Feed panel

The ***Feed Level*** determines the amount of feedback from the granulizer output towards its input.



Feed panel

> Tip: Use the feedback together with the ***Delay***, ***Speed***, ***Filter*** and ***Sweep*** parameter to create Dub like effects.

5.10. Trigger panel

If the ***Auto/Stop*** button is pressed the grain buffer is continuously updated (live mode). Releasing the ***Auto*** button switch over to a fixed buffer mode (static mode).



Trigger panel

If ***Auto/Stop*** button is off one can trigger the buffer update by either:

- pressing the ***Manual*** button
- Triggering the plug-in parameter Trigger.Manual
- With the ***Quantization*** mode ***Trigger*** or ***Grain+Trigger***
- Real-time input levels. The Trigger level is set with the ***Trigger*** slider. Monitor the level inside the ***Level*** panel.

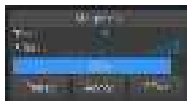
> Tip: Use a Microphone as an input signal and release the Auto button (static mode). Reset the Delay parameter and adjust to small, slightly overlapping grain lengths. Move the Trigger slider down until each time you speak into the microphone the grain buffer is triggered. This will generate robot like sounds and the grain generation will stop with your last spoken word/syllable.

When releasing the ***Auto/Stop*** button, the buffer mode will change immediately to a fixed buffer mode. That means the buffer will no longer being updated by the input signal and the current buffer input is "freezed". The buffer content could be e.g. saved with the ***Save*** button on the ***Vapor*** panel.

> Note: Without saving the buffer the content will be lost if e.g. one changes to a patch that switches to ***Auto*** mode and therefore triggers a refill of the buffer. If you want to have a certain buffer sound associated to a patch you have to save the buffer.

5.11. Morphing panel

One of the very special features of crusher-X is the morphing system. Each time you change one or more parameters (e.g. via loading, from the interface, using MIDI) the Morph system will try to find a smooth transition between parameter changes. With the ***Time*** slider one can determine the time between the changes (from 1ms up to 1 hour).



Morphing panel

> Tip: Click on the value field to enter morph times longer than 60s.

During morphing the following buttons can control the morphing process:

Pause:
Pauses the morphing process until you press the button again.

Apply: Transfers the actual morphing parameters to the Interface and stops the morphing. Use this button if you like the actual sound and want to save it.

Fast Forward:
Stops the morphing process and sets the destination parameters immediately.

> Tip: Using the Morphing System together with Program changes, ***Undo/Redo***, ***Reset*** or ***Random*** buttons.

> Note: Morphing does also occur if one changes single parameters with the sliders. Use smaller morph times if you like to have a faster reaction to your changes.

5.12. DCO panel

The DCO can be used as an internal test generator or as a source to generate complex granulizer input sounds. Turn the DCO on by increasing the ***Level*** .

The ~ button switches the wave form of the DCO in the following sequence: Sine, Saw, Triangle, Rectangle, Random, Spline, Noise

> Tip: Use a Saw or Noise generator together with the ***Formant*** filter to generate human like sounds

Press the ***Random*** button to create unusual FM sounds. Release the ***Random*** button to switch back to a simple sine wave generation.The ***Freq*** slider determine the frequency of the DCO.



DCO panel

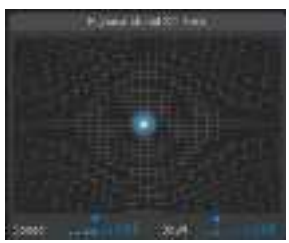
> Tip: Use the ***Random*** button together with longer ***Morph*** times to generate strange FM sequences. Use the ***Dry*** faders in the Mix panel to hear the origin DCO sound.

The sound is added to the live input. Choose the desired frequency with the fader.

A click on the "Freq" label resets the frequency of the DCO to 440 Hz.

5.13. PM-Field

Every ***Vapor Modulations*** parameter and the ***Global*** modulator can be steered from the X or Y coordinates of the PM-Field.



Physical Model X/Y-Field

This enables you to control complex modulations manually. If one of the ***PM-Field*** Modes is chosen and the ***Depth*** parameter is not 0, the light on the ***PM-Field*** turns on.

Move and "throw" the light with the mouse.

The ***PM-Field*** is not a normal X/Y controller: It is a physical model of a ball in a cave or a bowl. The left slider controls the speed of the ball and the right slider will turn the field into a bowl enabling an auto centered system.

Fast movements of the mouse will make fast movements of the light. You can use the MouseWheel or the Magic Mouse (Mac version) to increase and decrease the balls speed.

> Tip: You can use MIDI-events or plug-in parameters to control the light.

This X/Y PM-Controller was invented by accSone 2001.

5.14. MIDI Modes, MPE and Scales

The Virtual-Keyboard can be played by clicking the keys on the screen. Hold down the Shift-Key to generate multiple keyboard on events. The MIDI-Keyboard receiving and the Virtual-Keyboard is only enabled if Midi-Mode is not "Off". Each time a MIDI-Keyboard signal is received it will be mapped to the Virtual-Keyboard.



MIDI panel

> If a MIDI note is assigned to a grain it will be displayed in the ***Grain view*** between square brackets (e.g. [C5] , [F#3], [D#4])

Midi-Mode:

There are several Midi-Modes that determine how the granular engine will be modified by the Midikeyboard events:

- ***Off***
  No Midi-Keyboard event processing. Speed and Velocity are only set via the ***Vapor modulations***.
- ***Poly Free*** Each generator runs continuously and the speed of each generator has an individual offset that maps to the keyboard events defined by the current tuning map.
- ***Poly Free Velocity*** Like Poly Free plus the velocity of the keyboard event will offset the Volume of each generator individual
- ***Poly Gated***
  Like Poly Free but the generators only run if a keyboard event is on (keyboard key is pressed)
- ***Poly Gated Velocity***
  Like Poly Gated plus the velocity of the keyboard event will offset the Volume of each generator individual
- ***Unisono Free***
  Each generator runs continuously and the speed of all generators have the same keyboard event offset.
- ***Unisono Free Velocity***
  Like Unisono Free plus the velocity of the keyboard event will offset the Volume
- ***Unisono Gated***
  Like Unisono Free but the generators only run if a keyboard event is on
- ***Unisono Gated Velocity*** Like Unisono Gated plus the velocity of the keyboard event will offset the Volume
- ***MPE (MIDI Polyphonic Expression)*** Like Poly Gated Velocity but each generator reacts to a different MPE MIDI channel. Depending on the amount of MPE channels needed the number of generators will be created automatically. Generators are pitched in stereo pairs (except for Center Channels in Surround modes). Use this mode together with an MPE capable MIDI controller. Together with the MPE ***Vapor modulations*** modes this allows very sensitive performances
- ***MPE Free*** Like Poly Free but with extended MPE functionality (see MPE mode above)

> Note: The voices of the "synth" are the grain generators. That means you can determine the maximum of used voices by setting the generator count in the vapor panel. In MPE mode the amount of needed generators are set automatically.

In all non gated modes the tuning assignments to the generators are saved with the saving of an crusher-sheet or an plug preset. Meaning the tuned sound is restored on loading the preset (Storing is not available in the demo version).

Global or local Midi Settings:

In the ***Global settings*** you can choose whether the MIDI settings are stored global (on each plug-in instance) or on each preset.

Setting the Base-Key:

While holding down the Ctrl-Key on clicking on the Virtual-Keyboard you can set the Base-Key. On the Base-Key there will be no speed offset change.

> Tip: If MIDI Mode is Off the Base-Key can be selected without pressing the Ctrl-Key!

Scale:

You can select a couple of scales that filters out keys that are not part of the scale. The filtered keys are painted gray. The Base of the scale is set by the ***Base-Key***. The selected Scale is also used to determine the ***Autotune*** pitch correction.

Scala tunings:

In addition you can load a Scala file (*scl) or AnaMark tuning files (*.tun) by using the combo box "Insert File..." entry. On clicking on the ***Delete*** button you can remove the selected file from the list. The whole list is saved on the current preset. (The file loading support is not available in the demo version).

Scala was created by Manuel Op de Coul in the Netherlands. crusher-X comes with thousands of predefined tunings. And you can edit your own tuning by simple add or edit a Scala file (it's a simple text file). Please visit Homepage to learn more about Scala and update your tuning archive: http://www.huygens-fokker.org/scala/).

Additional you can load AnaMark tuning files (*.tun). Please refer to http://www.mark-henning.de/eternity/tuningspecs.html to learn more about AnaMark tunings designed by Mark Henning.

> Tip: Also Scala tunings are used by the ***Autotune*** pitch correction. With that features you can create very sophisticated Autotune pitch corrections that goes beyond any standard tuning. Create your own Tuning by create your own Scala file and load it in.

Attack & Release:

With the two sliders you can adjust the attack and release time in all ***Gated Velocity*** Midi-Modes. This timings are also used to generate the Velocity Ramp for the Velocity Ramp modulation Mode in the Vapor Panels.

Scala Archive:

Here you find a list of all installed Scala files:scalesdir.txt

5.15. Pitch Tracker and Autotune

The ***Pitchtracker*** analysis the audio of the Left input channel before the ***Input L*** fader. The analyzed frequency is displayed. If the pitch matches exactly (-/+ 10%) of the selected Scale it is displayed in red. If it is not possible to detect a pitch (e.g. on noisy input) last detected frequency is displayed in grey. The graph shows the history of the detected pitches. The result of the analysis can be used to steer the ***Speed*** of the grain run. It depends on the selected Autotune mode how the result is applied. In any case the analysis result can be used as a modulation source in each ***Vapor Modulation***.



Pitchtracker and Autotune System

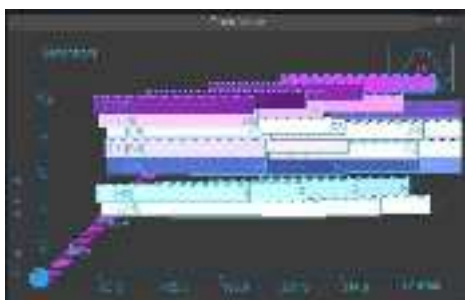
There are several ***Autotune*** Modes available:

- ***Off***: No pitch correction is applied. Though it is possible to select the analysis result as a modulation source in each ***Vapor Modulation***.
- ***Tune correction*** (based on selected scale): Based on the selected Scale a pitch correction is applied to the Speed of each grain.
- ***Force to Base Key***: A very special modus: The pitch correction is steered so that in any case the grains are generated with the target pitch defined by the ***Base Key***
- ***Generate MIDI Notes***: No pitch correction is applied but MIDI Note events are generated from the analysis result. The MIDI events will steer the Speed of the grain processing like it is described in the ***MIDI Modes*** section.

> Tip: Combine the Autotune system with additional MIDI events or Speed modulations to create chorus effects or tuned Accords. Add small Sweep modulations to create "living crowd" chorus or "Darth Vader" effects. Also deep tuned Force to Base Key effects are very impressive.

5.16. Grain view

The ***Grain View*** depicts all Vapor Modulations and grain generations. Pressing the **^** button the Grain view will be opened in a floating window.



Grain View

> Tip: To change the perspective, hold the left mouse button and drag the mouse over the window. To switch the mouse mode to **Zoom**, **Move** or **Rotate**, press the right mouse button. The actual mode is indicated by the mouse cursor.

At the bottom left, you will find a representation of the grain buffer filling. Depending of the ***Auto*** mode setting (see Trigger panel) this pie diagram indicates the filling sequence of the grain buffer.

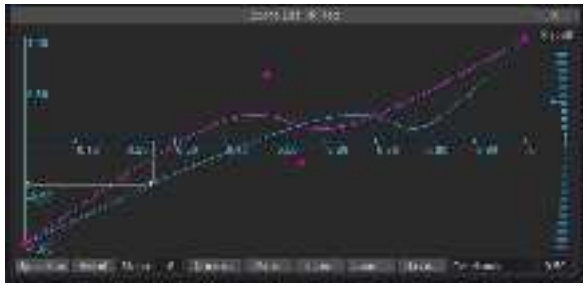
At the top right, you find a representation of the current ***Window Type*** setting including a CPU load indicator. The small number gives the actual number of the generated grains at this time.

Grains are represented by the colored rectangles. Newest generation (the grains you currently hear) on the left side, followed by 3 older "dead grain" generations.

A description of the grain representation in the ***Grain View*** is given in the ***Vapor Modulations*** chapters.

5.17. Spline Editor

The ***Spline editor*** is use to edit a spline curve e.g. for ***Vapor Modulation*** Modes, ***Window Type*** Modes or ***Overdrive*** settings.



Spline editor

You can add, move and edit ***Knee*** and ***Spline*** Points by using the mouse and the keyboard modifiers:

- Left Mouse Button: Insert Spline Point
- Left Mouse Button + Shift Key: Insert Knee Point
- Drag Point left or right out of Window: Delete
- Drag First or Last Point + Ctrl Key: Set same Y value
- Drag Point + Ctrl Key: Set only Y value
- Drag Point + Alt Key: Match X,Y to Grid
- Right Mouse Button: Zoom -> Scroll -> Normal Mode
- DblClick: Reset ViewMouse Wheel: Zoom

The button row allows you to modify or generate the curve:

- ***Symetric***: The curve will be symmetric on X/Y axis. No unsymmetrical editing is allowed
- ***Reset***: The curve is cleared to the defaultSteps: Enter the amount of creation steps
- ***Create***: Choose different spline generators
- ***Mirror***: Mirror the curve at the Y axis
- ***Invert***: Invert the curve at the X axisLoad: Load a spline definition from a *.spi file
- ***Save***: Store the current spline in a *.spi file

Note: The spline editing is fully integrated into the crushers ***Undo/Redo*** system.

In some Modes a ***X-shift*** slider is visible. It allows to “modulate” the current spline curve. The blue curve displays the resulting spline that is actually applied.

Tip: You can control the spline modulation fader by MIDI events or plug-in parameter changes. Use the learn functionality on the fader.

If the ***Scan Mode*** selector is visible the "scan" of the curve can be controlled by several modes:

- ***Continous***:The modulation is steered by frequency or host beat (regarding to the vapor parameter settings)
- ***Random***: Random selection of a curve segment steered by frequency or host beat
- ***X Up PM-Field***: X-Axis position of PM-Field ball
- ***X Dn PM-Field***: X-Axis position of PM-Field ball (reverse)
- ***Y Up PM-Field***: Y-Axis position of PM-Field ball
- ***Y Dn PM-Field***: Y-Axis position of PM-Field ball (reverse)

Tip: Use the PM-Field Scan Modes to steer a speed modulation so that a small "melody" or "gesture" can be controlled just with the move of the ball (or with MIDI controllers)

The Spline curve can be also edited "screenless", see section "Screenless control of crusher-X, e.g. for blind / sight impaired musicians".

5.18. Step Editor

The ***Step editor*** is use to edit steps for ***Vapor Modulation*** Modes or ***Sweep*** settings.



Step editor

Select the desired amount of steps with the ***Steps*** edit box. Steps can run in free run mode or depending on the Vapor Modulation ***Mode*** setting bound to the host beat.

The button row allows you to modify or generate the curve:

- ***Reset***: All steps are cleared
- ***Create***: Choose different steps generators
- ***Mirror***: Mirror the curve at the Y axis
- ***Invert***: Invert the curve at the X axisLoad: Load a steps definition from a *.stp file
- ***Save***: Store the steps definition in a *.stp file

Note: The steps editing is fully integrated into the crushers ***Undo/Redo*** system.

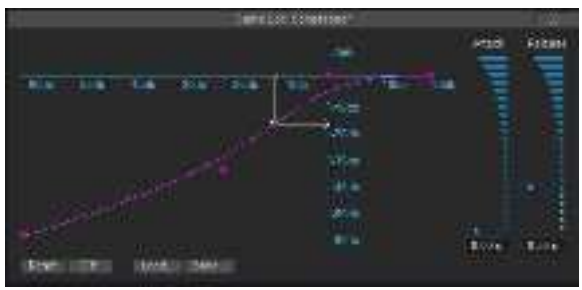
Tip: Use several steps modulations with slightly different step counts to create repetitive but dancing modulations.

If the ***Scan Mode*** selector is visible the "scan" of the curve can be controlled by several modes (see Spline editor above)

Steps can be also edited "screenless", see section "Screenless control of crusher-X, e.g. for blind / sight impaired musicians".

5.19. Compressor/Expander/Limiter Editor

The ***Compressor/Expander/Limiter editor*** is use to edit a level compensation spline curve for the compressor/expander/limiter



Compressor/Expander/Limiter editor

The X-Axis represents the input level (in dB) and the Y-Axis the target output level (in dB). Depending on the spline curve compressor, limiter, expander behaviors or combinations of these can be achieved. Adjust the ***Attack*** and ***Release*** timing of the level analyzer with the corresponding controls on the right.

The ***Global Compressor*** button in the ***global settings*** determines whether the Compressor settings (incl. the spline curve) are stored global (on each plug-in instance) (pressed) or on each preset (released).

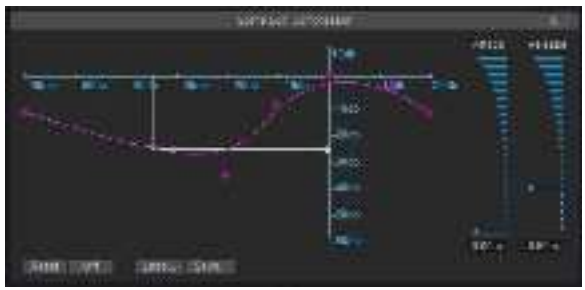


Expander setup



Limiter setup

Tip: As the relationship between input and output level can be completely free defined by the spline curve, very special (incl. inverse) channel level behaviors that can be programmed in ***Feedback*** scenarios: Pumping and swelling drones. Play also with longer Attack and Release times!



Special Feedback setup

6. Control Mappings

6.1. Remote control or automate crusher-X

The Control Mapping editor is opened by pressing the ***Control Mappings*** button in the Program panel or in the context menu of each UI element. The Control Mappings defines the connections between the control inputs and the UI elements. This is needed for remote control or automate crusher-X parameters.

The mapping in/out relationship can be defined with the mapping x/y table. Spline and Knee points are available to define the input and output mapping value relationships.



Control Mapping editor

Each time crusher-X receives MIDI or detects a plug-in parameter change it will be displayed in the ***Learn control*** panel.

Alternatively you can choose a default controller by pressing the ***Choose*** button. Depending on the type of controller one or several properties of this controller can be adjusted by entering them with the channel or value fields.

> Note: regarding MIDI NoteOn/NoteOff: You can easily select the range by pressing one key and while holding down this key pressing another key on the keyboard. Releasing the first key will end up in setting a note range.

For each mapping you can choose the direction of the mapping.

Receive pressed: A controller that is received controls the target UI element.

Send pressed: On manipulating an UI element in the editor the target controller will be send out (MIDI-Out, plug-in parameter change).

Each time you touch an UI element the changed value will appear in the ***Learn Message*** panel. This happens e.g. during slider movements, button pressing or value entering. The slider on the right of the panel will be mapped temporary to the UI element. Depending on the type of the message you are able to assign a control range via a minimal and maximal value. Only this range will be mapped to a controller.

You can “learn” a range by pressing ***Learn range*** button and edit the UI element or the mapped slider.

The ***Connection list*** holds all “controllers to message” mappings. It will be saved globally with your plug-in program.

You can edit the list by using the buttons on the right.

On selection of a list entry the list entry is copied to the learn controller and learn message panel. Now modifying is possible in these panels (including learning controller or/and messages). To keep the changes, press ***Change*** button.

Use the ***Save*** button to save the Connection list to a file.

The ***Load*** button will clear the whole list and load the Connection list from a file.

The ***Import*** button will not clear the list and adds the imports new Connections from a file.

> Tip: Organize your mappings by grouping them into different files. This allows to setup different mappings by using ***Import***.

7. Global settings



Global settings editor

These settings are stored global within the plug-ins storage of the plug-in host. To reset, reload the plug-in in your host.

The ***Grain to MIDI*** button will enable the generation of MIDI controller streams according to the generator grain flow

The ***Global MIDI, Tuning, Autotune*** button determines whether the MIDI settings are stored global (on each plug-in instance) (pressed) or on each preset (released).

The ***Global Compressor*** button determines whether the Compressor settings (incl. the spline curve) are stored global (on each plug-in instance) (pressed) or on each preset (released).

The ***Global Mixer*** button determines whether the Mixer settings (the levels) are stored global (on each plug-in instance) (pressed) or on each preset (released).

The ***Reset programs to factory defaults*** button resets the programs without the need of reloading the plug-in

The ***Go online / check for new version*** button will opens the crusher-X online resource web page. It automatically checks your version and connects you to other crusher-X users. Get video tutorials, exchange patches and learn more about crusher-X, get more tips, tricks and secrets.

7.1. Grain to MIDI

Grain to MIDI: Once enabled crusher-X will create MIDI controller events from the current grains and generators following the Volume parameter modulation and the Grain Window volume control. You can route these MIDI events via your host to e.g. other MIDI controllable devices like e.g. a DMX Light controller, mixers, instruments etc. This supports advanced multimedia installations where one want to let a MIDI controlled setup follows the current grain-flow. The Controllers are generated for as many generators as set by the ***MIDI Controller count*** staring with the ***1st MIDI Controller No*** . When the function is enabled the current generated control value is displayed in the ***Grain View*** left to the Y-Axis.



Grain View with enabled "Grain to MIDI" function

8. Tutorial - MPE with crusher-X

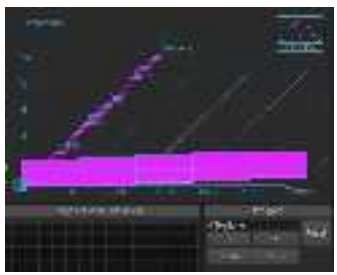


Steer the live grains with your fingertip? Let a drone take off by moving your fingers to the top of the keyboard? Let the grain drone drift left or right by sliding your fingers? This is what you can do with MPE (MIDI Polyphonic Expression) and the MPE feature set of crusher-X!

Step 1: Connect your MPE keyboard

Connect a MPE ready keyboard to your host that has to be "MPE ready". “MPE ready” means that the host should not suppress the MIDI channel information when it passes the MIDI data towards the plug-in. Under Windows you can also use the "MPE ready" stand-alone VST host that comes with the crusher-X Windows installation package. Make sure that your keyboard is set to MPE mode.

Step 2: Select testtone patch



Select the "Testtone" patch in the Program Panel. You will hear a simple 440Hz tone that is generated from the DCO. If that sounds to boring you can mute the DCO in the DCO panel and feed the crusher with a live input sound. The grains are set to overlap themselves by 50% that results in a continuous grain generation without any major sound modification.

Step 3: Set crusher-X to MPE MIDI mode



In the MIDI panel, set the MIDI Mode to MPE. In this mode each generator will be bound to one of the MPE MIDI channels. On the first receive of a MPE MIDI event the amount of generators needed will be created automatically. (Except for the Center Channels in Surround mode, the Generators will be pitched in stereo pairs). If no key is pressed all generators are muted. (Actually MPE mode behaves like the "Poly Gated Velocity" Mode where the grains are generated as long as the keys are pressed and until the "Release" time is expired.

Now play the MPE Keyboard. Each keyboard touch will be routed to the dedicated set of generators and the generators are pitched according to the selected scale. The same happens on receiving MPE Pitch data. You can hold the keys and swipe them to the left/right to create individual sweeps of the dedicated grain generator.

Note: If all generator starts to enable themselves on a single key-press, your Keyboard or Host is not set to MPE Mode!

Step 4: Control Other Parameters with MPE Expressions



Now let's control the Grain Density of each generator with the pressure of your finger: Select Birth in the Vapor Modulations, increase the modulation depth (e.g. to 200ms) and select Mode "Channel Pressure (MIDI & MPE)". The amount of pressure you choose for each finger will now control the Birth Vapor Parameter.



And let's control the amount of distortion with the Y-position of your finger: Select Overdrive in the Vapor Modulations, increase the modulation depth (e.g. to 100%) and select Mode "MPE CC74 (MIDI & MPE)". The Y-Position of your finger will now control the Overdrive Vapor Parameter.

STEP 5: Create your own MPE patches

Provide some input sound to become granulized within crusher-X. Modulate other Vapor parameters with the Channel Pressure or MPE C74 Modes like Filter or Sweep. In case you have a surround setup try to modulate the grain volume e.g. with MPE CC74 to let the grains sound from different directions depending of the Y-Position of your finger!

Enjoy!

9. FAQ

9.1. Why I need the save button in vapor panel?

Tell me more about the use case behind that button. **What is the use case?**

You start doing a live performance with crusher-X and at a certain point you decide to switch to manual trigger mode by releasing the Auto button in the trigger panel. From now on you are “offline” and the grains are generated out of the fixed buffer. Maybe you are so satisfied with the result you hear (while modulating or playing modulations on the keyboard) that you want to freeze that result. This is the moment you press save on the vapor panel. The buffer is dumped to the file and you can reload it and save your program. Done.

What else can I do with the saved file?

Load it back for e.g. in another program. The reference to this file is stored together within the program.

Why the saved file is 32bit floating format?

The vapor buffer needs headroom, much headroom. Meaning a 16bit format would not hold the information needed for reproducing the buffer situation.

What area of the buffer is saved?

There have to be a decision what area of the buffer is needed to save. The buffer size is flexible and can have the following maximal size.

Max file size: Delay max offset + Delay max depth modulation + Length max offset + Length max depth modulation.

This is quite big and no body wants to store the whole buffer. For that an “intelligent” mechanism decides what part of the buffer has to be saved. So on loading the buffer back, you are save that the sound you need for reproducing the program is captured. In general the rule is: The more Delay offset/modulation plus the longer the Length offset/modulation the larger the file is.

9.2. How to control crusher-X with MIDI events in Live?

Problem: Normal audio tracks in Live don't receive MIDI events. Normally crusher-X is loaded as an audio effect in an audio track. So it can't be controlled via MIDI without a trick. Here is the solution:

Step 1

Create a new project, select crusher in section plug-in devices...



Step 2

... and add it to an audio track.



Step 3

Select MIDI track...



Step 4

... and select External Instrument in section Live Devices and add it to the MIDI track.



Step 5

Go to the Ext. Instrument window. In the MIDI To section select the target Audio track and the target crusher-X effect:



Step 6

Make sure MIDI will be received in Live by selecting your MIDI device.



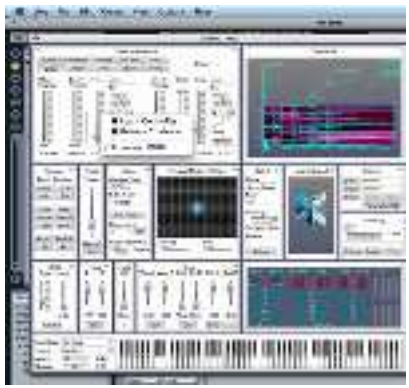
Step 7

Open crushers editor, press Control Mapping button in Program panel to open the Control Mappings editor. Send an MIDI event to Live and see the MIDI event appearing in the top/left section (Learn control). Turn a knob on the crusher-X UI and press Add to assign the control. Or do the following shortcut...



Step 8

Rightclick on a element in the editor and click Learn Controller. Then send a MIDI event to Live. The mapping will be automatically added to the Control Mapping List.



9.3. How to control crusher-X with MIDI events in Cubase?

Problem: Normal audio tracks in Cubase don't receive MIDI events. But a MIDI track can be used to receive or record MIDI events and send them towards an audio track and therefore towards the crusher-X effect. Here is the solution:

Step 1

Create new project and create a new Audio and MIDI track. Insert the crusher VST plug-in in the inserts of the Audio track.



Step 2

Route the MIDI Out of the MIDI track to the Audio track (see red arrow below)



Step 3

The audio track will now receive live MIDI events from the MIDI track. If you like you can record MIDI events in the MIDI track so that crusher-X is automatically fed with the recorded events.



9.4. How to control crusher-X with MIDI events in Logic?

Problem: Normal audio tracks in Logic don't receive MIDI events. But the crusher can be loaded into a Software Instrument Track so that it receives MIDI and fed with audio via the side chain inputs. Here is the solution:

Step 1

Create new project and create a new Software Instrument Track.



Step 2

Select IO Slot and...



Step 3

...insert a crusher out of the AU MIDI-controlled Effects section.



Step 4

Open crushers editor and select an live input or an other track as a side chain:



9.5. Where are the Presets in Live?

I can't find a way to access the presets in Live.

Unlike other hosts the presets in Live are not shown around the plug-in editor window. But for VST plug-ins you can find them in the control rectangle of the plug-in the bottom effect area of the Live application (Frame with the caption "Drop Audio Effect Here"). Here is the point to access parameters or the presets and save/load banks of each plug-in.

Only for Mac version: For AU plugs an other click is needed: Click the little "two arrows" icon next to the save icon on the plug-in rectangles header and you will get the library open with the presets.

9.6. How to freeze sounds with crusher-X?

How to freeze the sound buffer:

1. Choose Reset Preset
2. Provide crusher input with ongoing sound (e.g. loop the host)
3. Vapor Modulations, Tab delay: Increase Depth to e.g. 1000ms (1 second buffer).
4. Choose Mode: Y Up PM-Field, now you can “scan” through the buffer by moving the PM-Field up/down
5. Turn the Grain View display a bit, to get a better view on the Delay axis
6. At some point release button Auto in Trigger panel: Sound buffer will no longer be filled
7. Scan through the buffer by moving PM-Field



Advance triggering:

1. Use other crusher options (e.g. Tab speed) to modify the type of scanning
2. Automate scanning by increasing trigger level fader (fill the buffer, if input level is higher than trigger level
3. Use Quantization Mode Trigger in Quant. Panel. Choose Beat, e.g. ¼ . Start Host playback. You will get an new fill of a buffer each beat

9.7. What is "vapor" synthesis?

"Vapor synthesis" is not a well-defined term regarding granular synthesis. But on crusher-X it means a special combination of features to generate grains. Don't mix it up with the term "Vaporware" ;-) crusher-X is real and on the market since 1999 !

A floating audio buffer is used to derive grain streams from independent ***Generators***. The Generators are assigned to different outputs. ***LFO*** and manual modulations (not only random modulation like one can find in common granular synthesis systems) are done for each generator with a given ***Phase*** (modulation delay for each generator) and ***Spread*** (frequency shift for each generator). This leads to "inherited" modulations on each generator and - in combination with surround sound - may produce a notion of "vapor" ...

9.8. Where is the app?

Just installed crusher-X, but can't find an crusher-X app on my HD...

You won't find any crusher-X stand alone application in the application folder because crusher-X is a VST and AU plug-in. Meaning: You have to launch a host application like Garageband, Logic or Live, create an audio track and choose the crusher-X plug-in as an audio effect.

As an alternative under Windows you can use the light-weight, ASIO host ***VSTWrap*** that comes with the Windows crusher-X package.

crusher-X is not a synth plug-in. It is an MIDI controlled effect that can be controlled by MIDI events or with assigned plug-in parameters. See other FAQs for more details on that.

10. About the full version

The full version of crusher-X provides the following:

- External control via plug-in parameters of the Adore parameters
- Save/load all programs, banks and the grain buffer
- No nag dialog and no silent mode during editing
- Read and write plug-in parameters
- Add unlimited amount of entries in the Control Mapping List
- Save the Control Mapping List
- Import/export crusher-X patches!
- Save/load splines, steps, overdrive curves and envelopes
- Loading and using of tuning files
- Up to 199 generators
- Full 10-channel surround sound
- You will get the latest bugfixes and updates free of charge
- Special upgrade/crossgrade offers
- You will have secure enhanced technical support!

Find your crusher-X offer at the accSone shop



http://shop.accsone.com

11. crusher-X Soundpacks

Get more out of your crusher? Here some suggestions for you:

11.1. crushed Guitars



120 crusher-X patches. Granulize your licks!

120 excellent designed sounds and effects (crusher-sheets). The ideal starting point for guitarists and sound designers to get deeper in the unlimited world of granular synthesis. The source material for these finest crusher effects could be any kind of electric guitars. But also human voices can be extremely modified and granulized. The effects ranges from smooth doubler effects up to very strange crushed and granulized sounds.

A must for advanced sound orientated designers and guitarist!

11.2. crushed with the 28" Wind Gong



Push the grains to the next level: Dedicated to the real sound experimentalists!

120 extreme designed surround sounds and effects (crusher-sheets) for crusher-X. Based on over 40 high quality sound recordings of a 28" Wuhan Wind Gong this sound packages pushes you to the next level of grain experience! And yes, it is dedicated to all of you who are interested in strange, unconventional, extreme and cool surround sounds. The effect ranges from never ending tuned gong phrase environments over barking explosions to extreme percussion eruptions around the listeners head.

A must for advanced sound orientated designers and percussionists!

11.3. Going Down The Grain



Going Down The Grain - DJ/Dance/Trance/Techno/MPE - Granulize your Tracks!

148 exquisite effects (crusher-sheets) for DJs, Dance, Trance, Techno and MPE performers. Each patch is available as an interactive or MPE (MIDI Polyphonic Expression) version. From crusher-X 7 version up the MPE patches can be directly live performed with your MPE keyboard.

Give your track the grain!

Find all crusher-X soundpacks at the accSone shop

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12. Appendix

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12.2. Credits & Copyrights

crusher-X Credits & Copyrights

12.2.1. Credits

- Thanks to Jan, Sven, Nina and Anke for supporting this strange project over the last decades.
- Thanks to Ulrich Müller for continuous motivation to start and continue the development.
- TobyBear for tuning file support.
- Scala was created by Manuel Op de Coul in the Netherlands. Scale Archive is exceptionally licensed for a distribution with crusher-X, Thank you!
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- Thanks to the whole crusher-X developing and beta testing team and all the people who send us comments and suggestions!

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