



Diffuse

User Manual

Welcome to **Diffuse**



Diffuse is inspired by classic hardware delay and reverb effects from the 1970's and 1980's. It takes a Surreal Machines look at the frontier between delays and reverbs.

Diffuse is an analog/digital hybrid - an analog modelled delay fused with a classic reverb design used in early digital units. In **Diffuse** you get more than the best of both worlds - you can morph between delays and reverbs, and find all kinds of fantastical sounds in between the two! You'll also find plenty of nonlinearities and smooth tape-style delay changes.

In **Diffuse**, all engine parameters are decoupled from the user parameters and simplified into elegant macros to give you complete control over smearing, echoes and damping in the most intuitive way possible.

Welcome to a world of sonic discovery...

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Setup

Installing

Get Diffuse from:

<http://www.surrealmachines.com/product/dub-machines-vstau>

After purchasing you will receive a serial number and download link via email.

Note: Full and demo versions use different installers. After purchasing the full version, you need to download the installer from the link in your email.

Double-click the downloaded file and follow the onscreen instructions.

On **Mac** this will be a file named: **Diffuse Installer.pkg**

On **Windows** this will be a file named: **Diffuse Installer.exe**

Note: These installers will install both the **32bit** and **64bit** versions of the plugins; **Mac**: as universal binaries, **Windows**: as separate files.

Diffuse works inside your host software or DAW, not as a standalone application. It comes in **VST2**, **VST3** and **AU** formats on **OS X**, or in **VST2** and **VST3** formats on **Windows**. On both operating systems each plugin format is available in **32** and **64 bit** versions (on **OS X** as single universal binaries, on **Windows** as separate files).

Authorizing

Once installed, the first time you load **Diffuse** an authorization screen will appear with instructions. You will need to **copy** your serial number, which will look something like this:

START|Your Name|your@email.com|XXXX-XXXX-XXXX-XXXX|END

Then simply **click** on the plugin authorization screen:

Thanks for Purchasing Diffuse!

To authorise, copy your serial from your purchase email from **START|** all the way to the end of **|END** and click this screen.

Your plugin will be registered forever, but hold on to that email just in case.

Note: You must copy the entire serial as it appears in your email, including the words START and END

There is nowhere to paste! Just Click on the screen shown above!

That's it!

Installing the plugin for **multiple users** only:

The above procedure will authorize **Diffuse** for a single user on the computer. This is usually just what you want. However, if you need **Diffuse** available to all user accounts on one computer (for example in a classroom setting) you can either register it using each user account or you can manually move the authorization file to the correct location:

Mac

Move:

~Library/Application Support/Surreal Machines/Diffuse/license.txt

To:

/Library/Application Support/Surreal Machines/Diffuse/license.txt

Note: ~ refers to your HOME folder

Windows

Move:

C:\Users\<user>\AppData\Local\Surreal Machines\Diffuse\license.txt

To:

C:\ProgramData\Surreal Machines\Diffuse\license.txt

Uninstalling

Mac

To uninstall **Diffuse** on OS X, you should manually remove the plugins from the OS X System Library plugin folders that you installed them in.

Windows

On Windows you can run the **Diffuse** uninstaller. You can find a shortcut to it in the Start Menu or by searching on the Start Screen (Windows 8 or later).

Controls

Common Control Features

- **Mouse over** a control to reveal its value
- Adjust values using your **scroll wheel** or by **clicking a value to edit**
- Hold **shift** for **fine adjustments** to dials and sliders whilst mousing
- Use **arrow keys** to **adjust controls** and **move through menu items** that your mouse is over
- All controls can be **reset to default** value by **double-clicking** on them
- Note that some of the controls in **Diffuse** allow for **extreme settings**. **Diffuse** gives you deep control, so be careful when experimenting or with controller mappings!

Quick Start

Diffuse Walkthrough

If you are the type of person who prefers sitting down with someone and being shown what is going on, rather than reading details, give this little walkthrough a try. If not, skip ahead to the **Reference Section** to soothe your inner nerd.

Setup

Load the plugin in your host and feed it a sound.

This is the default preset (recalled by picking Initialise from the preset menu).

Let's change a few things to see how it works.

Make a Delay

*Let's turn this reverby sound into more of an echo. **Turn down** the **Diffuse** dial. Already you can hear that the wet signal is less smeared and more of a ping-pong delay. Adjust the **Regen** dial to **change the feedback** and how long the delay will echo. Try turning it all the way up. Notice how the delay is getting louder and louder! This happens whenever you see some yellow in the dial. It's a cool trick during performances. Quick, **double-click** the dial to **reset** it so that it decays again.*

Get Different Patterns

*We can get different delay patterns from the **drop-down menu under the Input** dial. Try the last one called '**Phasor**'. Notice how it sounds different? Whilst your mouse is over the control, you can **use the QWERTY arrows to go up and down in the list**. Try out a few but **end on 'Outward'**. Note that these patterns all have a totally different effect with different values of the **Size** dial, but try that on your own later.*

Change the Stereo Image

*Let's see how it sounds when we play with the stereo amount. **Decrease** the **Width** dial to 0%. The sound becomes mono. **Increase** the **Width** dial to 100%. The sound gets wider. Now **pull down** the **Spread** dial. Notice how this narrows the stereo image slightly, but the stereo-ness that is present in the input is still there. **Click on the label and type '50'** to reset the value.*

Sync the Delay

*Let's get this delay synced to our tempo. By default, time is set in milliseconds. Press the **ms** button to switch to **Beats** to sync **Diffuse** to your host's tempo. **Repeat** is now adjusted in 32nd notes. Notice how changing the time has analog-style pitch changes.*

Dampen with Tone Controls

The feedback has multiple shelf filters that dampen the signal. You can use these to color the tail of a reverb or echo (or whatever mutant tail you make). Turn up the **Low Damp** dial halfway and hear how more of the low frequencies disappear. You can make the effect stronger by moving the **dB** slider underneath it to the right. This control is super powerful and the range is large so best to adjust it slowly. Even small values can have a big effect.

Make it into a Reverb

Let's make this echo back into a Reverb. **Increase** the **Diffuse** dial until it becomes yellow. Hear how it becomes a reverb? You can make it rougher sounding and less reverb-like with lower **Diffuse** settings.

The **Size** setting is directly tied to the **Diffuse** control. The bigger the **Size** value the more of the blurry part and the less of the echoey part you hear. Try playing around to see what happens. You can make all kinds of experimental delays with a high value for **Diffuse** and a really small **Size**.

Adjust Movement with Modulation

We can control the shimmer of the reverb with the modulation controls. Turn **Mod** to 0%. Put **Spread** to 0% so we can hear what's happening better. Hear how the signal is more static? Double-click **Mod** to reset it.

Now **turn Stereo off**. Hear how the signal gets more straight and less full? Turn it back on again.

Shape it

Let's give the sound some modern flare. **Turn up** the **Pump** dial. Listen to how the **tail disappears** when there is a loud input, then it **fades back up**. The resulting tail might be pretty loud. You can balance this with the **Mix** dial. Let's put **Pump** back to 0% by double-clicking it.

Dub the Input

One the coolest features of **Diffuse** is the **Input** dial. You can use this like an **internal send**, emulating that dub sound! Turning it down will cut out the input and allow you to hear just the echoes of the past. Try slamming it up and then down to hear little bits echo out.

A B Comparison

Let's quickly make a different sound without losing our current settings. Press the **B** button in the preset toolbar. This should sound exactly the same. Turn down the **Diffuse** dial so that we have an echo version of our delay.

We can go back to the sound we were working on by pressing the **A** button. Maybe you liked the echo you had set up on **B** better. You can click **B** to go back. We can compare this sound to other presets, but first, let's use the **Mix**

Lock button in the toolbar to make sure that we keep the same mix setting when changing presets. Now our **Mix** control will stay at 50% even if the preset has a different **Mix** setting.

If **B** is the one we like, then **switch to A**, and press the **arrows next to the preset name** to hear a few of the presets. **Press B** again to hear the good old sound we were working on.

Saving the Preset

Pretend you like what you did (don't worry, we know you were just fooling around). Let's **save** the preset to your own personal library.

From the **preset toolbar** select **Save Preset As** and give it a name. Great! Change a few dials and save again. Now you can switch back and forth between your two homemade presets (or any new ones you make) using the arrow buttons next to the preset name. If you want to go back to the **Factory Presets**, select a factory preset from the **preset drop-down menu**. Going back and forth between personal and factory presets is as easy as jumping between these sub-menus.

Let's delete one of those quick examples we made so it doesn't pop-up when we are browsing. **Select Show Preset Folder** from the **drop-down menu**. Now delete whatever you don't want to use again.

Tips and Tricks

- The **Diffuse** plugin is all about the **Size** and **Diffuse** dials. These controls allow you to move between delay-like or reverb-like sounds.
- **Size** at 100% is a good starting point for a reverb and **Diffuse** at 0% is a good setting for delays.
- The nearer the **Size** dial is to **100%** the **more prominent** changes to the **Diffuse** setting become.
- Try **low** values for **Size** and **high** values for **Diffuse** to hear a **rougher** effect, whereas **larger** values for **Size** and **medium** values for **Diffuse** will result in buttery **smoothness**.
- **Input** attenuates input to the wet signal chain. Use it to emulate a dub-style send while the plugin is used as an insert.
- With **Regen** values **above 100%**, turning the **Input all the way down** will leave a **constantly evolving cloud**.
- With **Regen** set to **over 100%** you can achieve intense **screeching and distortion**. The nonlinearities in the feedback loop enable a ravishing self-oscillation.
- Try **moving** the **Repeat** dial in real time for tweaky **pitched sounds**.
- With high **Mod** settings and **Stereo** on, you can get that **1980's digital smearing effect**.
- Use a **higher** frequency for **Low Damp** and a **lower** frequency for **High Damp** points to create a more **lo-fi or dark feel**. How much the sound is colored **depends on** how much **dB** attenuation you apply. All the way to the left on both make great long reverbs.
- There are **lots of Repeat Patterns**. Try switching them whilst using some of your more echoey presets to get a totally different sound.
- Unlike in the **Modnetic** plugin, the **Hold** allows you to play **on top of** the sustained signal **without adding** to the Hold. The Diffuse amount is frozen in the Hold but you can change it for the portion that isn't held.
- Try **low** values for **Mix or Input** alongside **higher** values for **Pump** to create an accentuated dynamic effect.
- To add **crispy inharmonic digital overtones**, pull up the **Rectify** dial. Go easy if you want to keep your harmonies nice and clear, but higher settings sound great on percussion, or if you like to experiment!

Reference Section

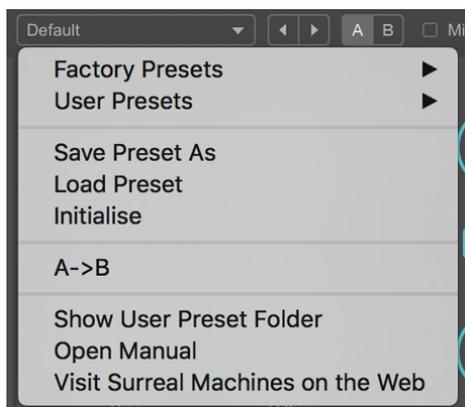


1 Presets Toolbar

This section deals with the preset menu built into **Diffuse**, not the menu that some hosts provide. Refer to your host's documentation for information.



The **Presets** menu at the top of the plugin window shows the name of the currently loaded preset. On plugin load this reads *Default*. Clicking on the menu will reveal the following items:



Factory Presets contains all of the presets that come bundled with **Diffuse**

User Presets contains all of the presets saved in the user preset folder for **Diffuse**

Save Preset As brings up a dialog window to save a new preset - by default the location is the user preset folder for **Diffuse**, although you can choose to save presets anywhere

Load Preset brings up a dialog window to load a preset from anywhere on your computer - for example, a preset that someone has sent to you

Initialise will reset the entire plugin to the default state

A->B or **B->A** will send the A setting to the B setting or vice versa

Show User Preset Folder will open the user preset folder for **Diffuse** in your computer's file browser - useful for finding your presets in order to send them to other people, or for your own file management (e.g. backup)

Open Manual opens this manual in your default PDF reader

Visit Surreal Machines on the Web opens the Surreal Machines website in your default internet browser - here you can login to your Surreal Machines account and manage your plugins, or find more information such as news of software updates or special features and tutorials



The **arrows** to the right of the presets menu cycle through the presets in the currently loaded folder (for example the Factory or User presets folders).

The **AB toggle** to the right of these arrows selects between two different settings for the plugin - an A state and a B state. This means you can create two different sounds and quickly switch between them for easy comparison.



To the right of the **AB toggle** is the **Mix Lock button**. This is designed to lock the Mix setting, allowing you to switch presets without it changing. This is useful when previewing different presets in context. When the Mix Lock is activated a small padlock icon appears next to the **Mix** dial.



Note: A and B have separate Mix amounts. Even if **Mix Lock** is on, you can change the setting for A independent of B.

Finally, at the top right of the plugin window next to the licensee name, you can click on the Surreal Machines **logo** to read the all important credits screen and find the plugin's version number.

2 Repeat Control

Repeat - sets the overall delay time. This determines the length of time between each large-scale repeat. The audible clarity of each large-scale repeat depends on the settings of the **Size** and **Diffuse** controls (see below).

The **ms / Beats** switch to the right of the **Repeat** dial switches operation between setting the delay time in milliseconds, or 32nds synced to your host.

The longest base delay is fixed at one second, *even when in beats mode*. In beats mode the **Repeat** dial is scaled according to the host tempo. If the number of divisions requested in this mode is longer than one second (due to automation or change of tempo) the dial indicator will turn red and the time display will show the value actually used in brackets after the requested value.

3 Regen Control

Regen - sets the global feedback level. At low settings the decay is clearer, with individual delay taps more audible. Increasing the control will achieve a denser sound with longer sustain.

Note that the Regen control has a range of 0-150%. Above 100% (where the dial indicator is yellow) the effect can sustain indefinitely. Non-linearities in the feedback path tame the effect from continuously growing in volume, producing a rich saturation that is apparent when using the highest settings.

4 Size and Diffuse Controls

The **Size** and **Diffuse** dials are at the heart of **Diffuse**. Together they control the relationship between the delay and reverb components, and thus determine the overall character of the effect. These are the dials to use when you want to move towards a more reverb- or delay-like sound.

In **Diffuse** a single delay is followed by a complex set of blurry delay taps (the *diffuse* or reverb-like part). These both take place within the overall delay time set by the **Repeat** dial, but this is divided into two distinct parts. The exact set of timings of the delay taps in the *diffuse* part is controlled by the **Repeat Pattern** (see below).

Size - sets the percentage of the **Repeat** time that is dedicated to the later *diffuse* part of the repeat (and conversely the percentage dedicated to the delay part). At 0% the effect is closest to a straight delay, with a minimum amount of *diffusion*. At 100% the complex delay taps are distributed across the entire length of the **Repeat** time and the sound is entirely *diffused*. Setting **Size** in between the two extremes allows you to dial in the exact delay- or reverb-like character you desire.

Diffuse - controls the feedback within the delay network used for the *diffuse* part of the effect only. Between 0% and 80% raising this value will increasingly blur the individual echoes of the *diffuse* part of the sound, resulting in a smoother, more blended tail. However, due to the precise nature of the feedback algorithm, above 80% (where the dial indicator is yellow) individual taps become clearer and the effect takes on a unique phasey quality.

For the smoothest and most dense reverberation possible you should set the **Size** dial to 100% and the **Diffuse** dial to around 80%. However, all kinds of

different results are possible by adjusting these two controls in combination. It might take a little experimentation to get used to the way they interact in detail. Have fun!

5 Spread Control

Spread - adds different pre-delays to each side of the effect. At 0% both left and right pre-delays are equal, but increasing the control moves them further apart, broadening the stereo field of the output. Note that this effect may be inaudible if the **Width** control is set very low.

6 Modulation Controls

Mod - controls the amount of modulation applied to delay times within the plugin's feedback network. When the dial is set above 0% the delay times are subtly adjusted over time in order to create a less static sound. Higher values will produce the chorus-like sound associated with 1980's reverb effects. Lower settings can be used to add a little life to a delay/reverb tail.

Stereo - selects between applying exactly the same modulation to the left and right channels simultaneously (**Stereo** off) and applying differently-timed modulation to left and right channels independently (**Stereo** on).

7 Tone Controls

High Damp and **Low Damp** dials and sliders - used to control the attenuation of low or high frequencies in the feedback path. When damping is engaged the affected frequencies are reduced in level on each repeat, leading to increased coloration of the sound as the tail evolves.

The **dials** set the frequencies in Hz at which damping comes into effect at each end of the spectrum.

The **sliders** control the amount of attenuation applied. When set to 0 dB (no attenuation), the Hz dial above each slider has no effect.

In practice this means that one can, for example, make a lo-fi delay by narrowing the frequencies (a telephone-like effect), tweak the color of a reverb to emulate a particular sounding space, or tame the excessive bass or treble that can occur in heavily regenerated reverb sounds.

8 Additional Controls

Repeat Pattern - this is set by the drop-down menu under the **Input** dial. Nine different patterns are included, each with a unique set of internal parameters that affect the timing, volume and stereo position of individual taps in the

plugin's feedback delay network. The most noticeable changes come from the different timings or *pattern* of the individual delay taps within the *diffuse* part of the effect. Think of these as different flavours of the effect, each with a recognisable sound best understood through listening!

Input - attenuates the input to the wet signal chain only, leaving the dry signal intact. This dial is designed to emulate a dub-style send when using the plugin as an insert. This way you can choose exactly which musical lines or phrases to send to the delay/reverb effect, by increasing the dial towards 0 dB when you want to apply the effect, and then backing it off towards -70 dB when you want to hear only echoes of the earlier input.

Rectify - makes use of a peculiar digital algorithm to create some unusual sonic sizzle. It can be used to add strong (and inharmonic) overtones to your sound. At 0% the rectification circuit is inactive, but as you increase the dial to 100% you will hear a noticeably crunchier sound coming out of the plugin.

Width - this dial controls the stereo image of the wet signal only. At 0% the effect will be entirely in mono, but the more you increase the control towards 100% the wider the image becomes, giving a more open and present sound.

Hold - engaging this button will freeze the feedback in a never-ending loop. However, you will still hear incoming audio going through the plugin normally over the top of the frozen portion. Changing the **Repeat** dial will change the length and pitch of the frozen portion, but none of the other delay, modulation or tone controls will affect the held loop.

9 Output Controls

Pump - add dynamics processing to the output that boosts the wet signal when no dry signal is present and lowers the wet signal when louder dry signals come in. At 0%, no dynamic shaping is applied. With higher settings, the more dramatic changes in volume will be. This can be used to duck the delay out of the way of the dry signal so as not to get in the way of the music, but then to pull it back up once the input dies away, so you still hear long exposed tails.

Mix - controls the balance between the incoming signal at 0% and the effected signal at 100%.

Note: The dry signal always travels through the plugin's custom preamp, so even the dry sound is 'Diffuse-ified' in tone.

Parameter Listing

Parameter Name	GUI Element	Value
Repeat Time	Repeat dial in ms	56 ms to 1000 ms
Repeat Beats	Repeat dial in 32nds	1 to 16 (clipped to 1000 ms)
Sync	ms/Beats button	Off / On
Regeneration	Regen dial	0% to 150%
Diffuse Size	Size dial	0% to 100%
Diffuse Amount	Diffuse dial	0% to 100%
Hi Damp Freq	High Damp dial	1900 Hz to 15000 Hz
Hi Damp Gain	High Damp slider	-24 dB to 0 dB
Lo Damp Freq	Low Damp dial	45 Hz to 300 Hz
Lo Damp Gain	Low Damp slider	-24 dB to 0 dB
Mod Amount	Mod dial	0% to 100%
Mod Spread	Spread dial	0% to 100%
Mod Stereo	Stereo button	Off / On
Repeat Pattern	Menu below Input dial	<ul style="list-style-type: none"> • Ping Pong • Outward • Wonky • Distant • Circle • Oval • Ellipsis • Gallop • Phasor
Hold	Hold button	Off / On
Pump	Pump dial	0% to 100%
Input	Input dial	-70 dB to 0 dB
Rectify	Rectify dial	0% to 100%
Stereo Width	Width dial	0% to 100%
Mix	Mix dial	0% to 100%
Mix Lock	Mix Lock button	Off / On

Technical Information

System Requirements

Diffuse has been tested in most of the compatible plugin hosting digital audio software for Windows and Mac OS X.

If you find a bug please contact support@surrealmachines.com.

Mac

OS X Lion (10.7) or higher

32 bit or 64 bit VST 2.4, VST 3 or Audio Unit host

Minimum Intel i5 CPU and 4GB RAM or more recommended

Windows

Windows 7, 8 or 10

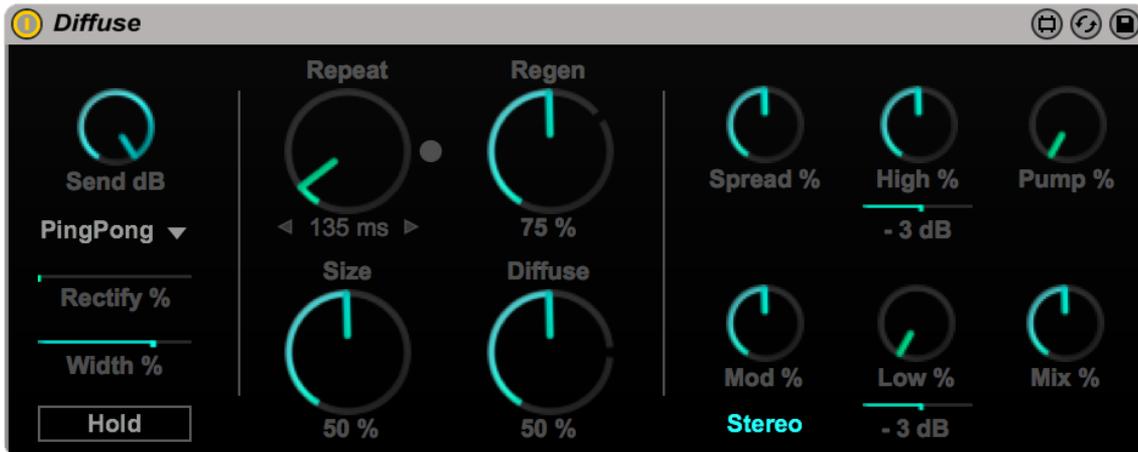
32 bit or 64 bit VST 2.4 or VST 3 host

Minimum Intel i5 CPU and 4GB RAM or more recommended

Note: **Diffuse** may work well on other configurations, but the above details are the recommended (and supported) specifications.

Background Information

Diffuse began life in 2014 as a specialized Max For Live device, written largely using **Gen** technology from Cycling '74.



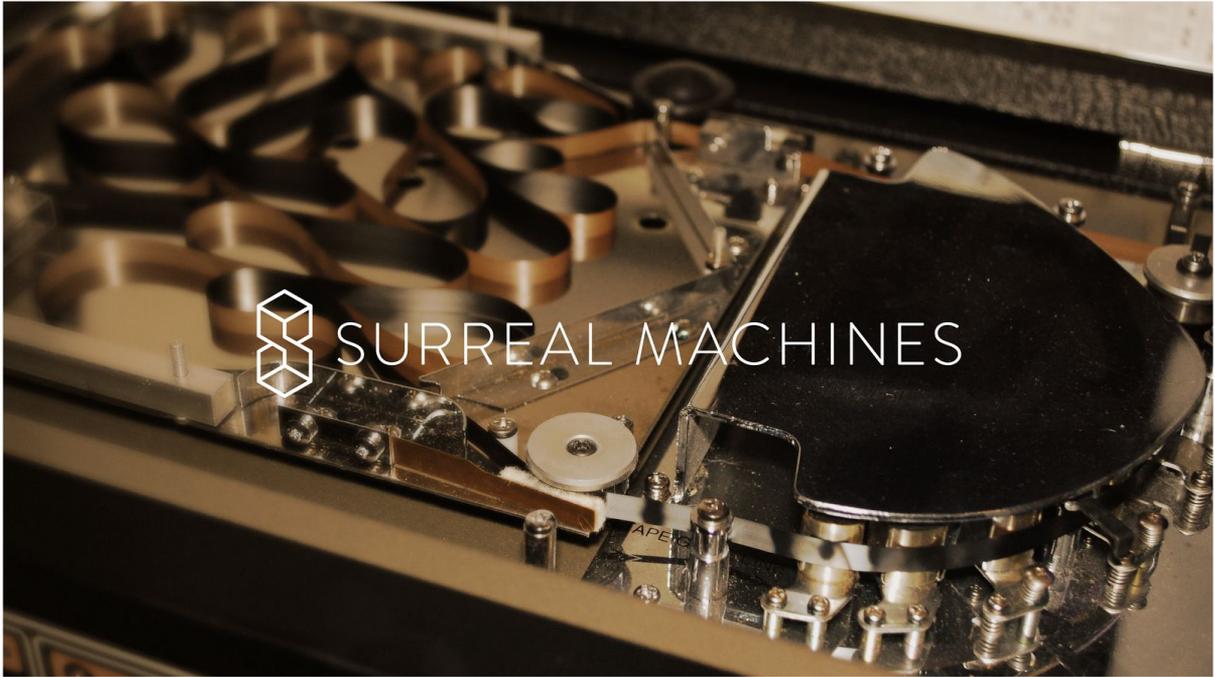
Diffuse was part of a 'pack' called Dub Machines along with another delay device called Magnetic. The Dub Machines pack was created by **Matt Jackson** and **Pete Dowling** who came together to form Surreal Machines specifically to make the release with Ableton.

Dub Machines became statistically the most popular pack in the Ableton store, and was heralded for it's authenticity on the one hand but exciting new take on manipulation of classic sound worlds on the other. It became widely used by many artists across the globe, popping up in all sorts of musical genres.

Cycling '74's **Gen** technology allows for automatic export to C++ code. Whilst the new **Modnetic** plugin was rewritten from the ground up in handwritten C++ code, the current **Diffuse** plugin was rewritten slightly in **Gen**, but the core of the plugin DSP is the result of this code export system.

We were joined by our colleague **Alex Harker** who made enhancements for the plugin formats and enabled the new interface system. Finally **Eric Carl** got on board and breathed new life into the user interface and interaction concept.

We hope you enjoy using it as much as we did making it!



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