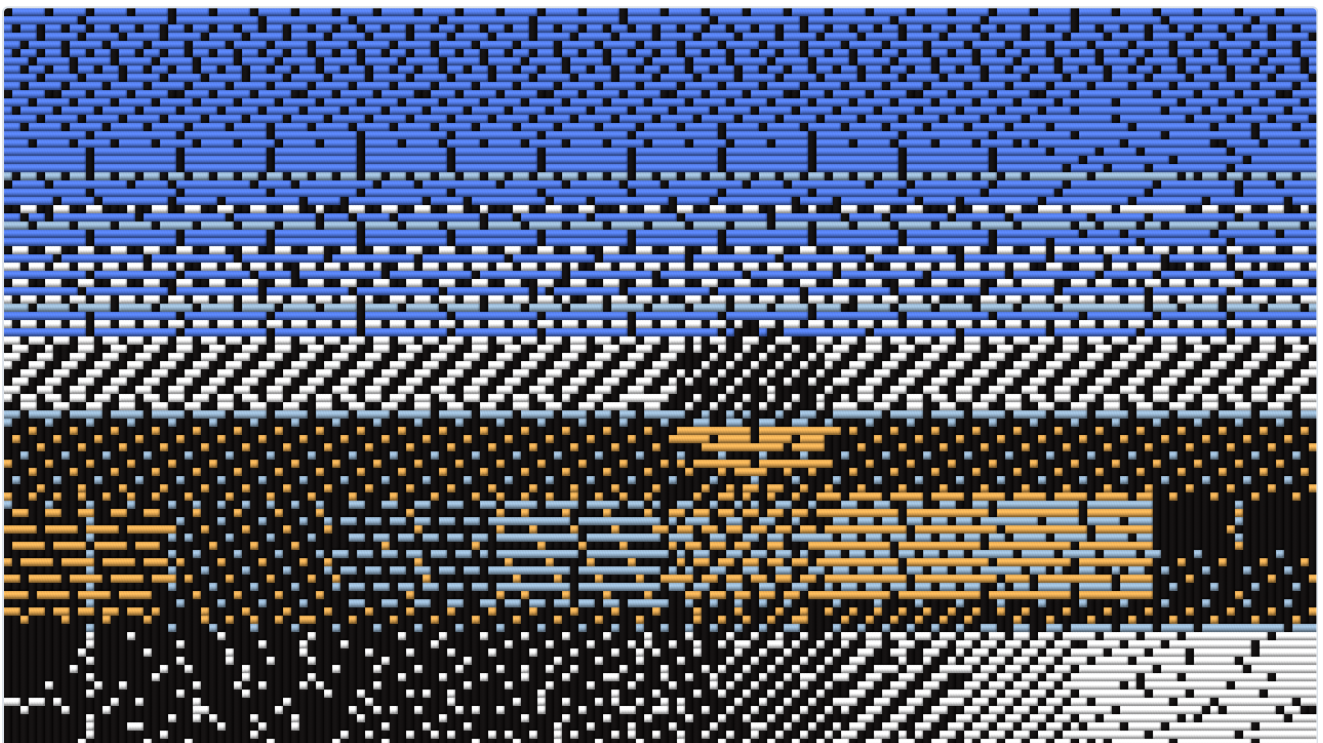


Jacquard user guide

Jacquard is **the clip woven on a jacquard loom, for Resolume Arena and Avenue**, as an FFGL effect. It is not a woven texture laid over the picture. The plugin weaves the clip itself, pick by pick, under the three constraints a real loom works under: one warp colour, one weft colour a pick from the shuttles loaded, and no thread floating past more than **Max Float** crossings. Tone is carried by the weave structure. The look falls out of the constraints: colour in horizontal bands, the diagonal of a twill in the midtones, ties sprinkled through the solids, and a picture from across the room that is thread up close.



The fleet's test card through the plugin at its defaults, rendered by the offline harness rather than captured from Resolume: 160 ends, square crossings, floats of at most ten, a black warp and six shuttles dyed from the picture.

Before you rely on this: released at **v0.1.0**, and honestly early. The weaving is measured rather than asserted, by a harness that drives the real plugin class headlessly, at two rasters and on a software renderer: every pick the loom weaves costs exactly what an exhaustive search over every shuttle and every lift pattern finds, on 960 woven picks and 200 arbitrary tables; no warp or weft float runs past Max Float in 48 cloths, counted on the grid and read back from the picture; each of eight weave structures shows exactly its stated weft ratio over 3,600 crossings; a twill's diagonal lands at exactly one end across per pick down; every pick shows one weft colour and it is a shuttle's; from a distance the cloth is nearer the picture than any single colour; the shuttles and the loom's memory survive a resize; and the cloth is opaque over a clip with alpha. Eight deliberately broken models are each shown to fail their check, and all 13 controls are shown to change the picture. **Each pick is optimal given the picks above it; the cloth as a whole is not** (see How it works). It has **never been loaded into Resolume on macOS** — the one host it has run in there is the fleet's own test host, `oxbow`, for 120 frames. On Windows it has: the DLL `release.yml` built from this source loads in Resolume Arena 7.27.1 on software rendering (win-lab, Mesa llvmpipe, no GPU), registers as `SW Jacquard / JQ01 / effect`, all 19 host controls match what the plugin declares, it renders, Arena's log stays clean, and all 14 valued controls move the picture (35 to 66 levels against a noise floor of 0): 9 of the fleet Arena gate's 9 checks, one run. The gate's picture is a still, so it says nothing about how the cloth moves; software rendering says nothing about a GPU or about speed. MSVC compiled it first time. Try it on a spare layer before you put it in a show.

This codebase was created with AI assistance, directed and reviewed by a human author.

Installing

Every download carries one effect, **SW Jacquard**. Drop it into Resolume's effects folder and restart Resolume:

```
macOS    ~/Documents/Resolume Arena/Extra Effects/  
Windows  %USERPROFILE%\Documents\Resolume Arena\Extra Effects\
```

Avenue uses the same layout under its own folder name. The effect then appears in the effects browser as **SW Jacquard**.

The macOS download is a universal build (Apple silicon and Intel), as a `.dmg` or a `.zip`. It is Developer ID-signed and notarised (the downloaded `.dmg` and the bundle inside the `.zip` both read `Notarized Developer ID`), so the bundle simply loads. The Windows download is an x64 installer or a `.zip`. It is not code-signed, so the installer trips SmartScreen once: **More info** → **Run anyway**.

How a loom makes a picture

At every crossing of a woven cloth one of two threads is on top: the **warp**, running down (each warp thread is an *end*), or the **weft**, running across (each row is a *pick*). A jacquard head lifts every end on its own, so any pattern of crossings can be woven — but three constraints make a woven picture look woven, and the plugin keeps all three:

the constraint	what comes out
one warp colour , and one weft colour a pick , from the shuttles loaded	colour arrives in horizontal bands . Where the picture wants two hues side by side, the shuttles alternate from pick to pick and mix at a distance
no float longer than Max Float , warp or weft, on either face of the cloth	a solid area is one unbroken float and must be tied : ties are sprinkled through every solid, in satin order where nothing else decides
tone is carried by weave structure	a satin shows more weft than a twill, a twill more than a plain weave: the twill's diagonal in the midtones, a satin's smooth face near the ends of the range, and the tone posterised into regions of one structure

So the plugin is an optimiser under constraints. Each pick's shuttle and its lift pattern are chosen by a programme that is **exactly** optimal under both float limits, and the error each crossing is left with is carried down to the next pick.

Start here

Put SW Jacquard on a layer or a clip with **colour that fills the frame** — the bundled skulls (NoHopeJustFear_44) are the best of the demo loops. Out of the box you get 160 ends across, square crossings, floats of at most ten, a near-black warp, six shuttles dyed from the clip, structure chosen by tone, and every thread shaded.

Then:

1. **Mix → 0 and back**. Compare the clip with the cloth. Each pick is one colour; the tone is in how much of the weft shows.
2. **Zoom → 8x**. The picture becomes cloth: every crossing is its top thread, a lit cylinder that dips under at the end of each float, with the black warp running down between the wefts.
3. **Structure → Twill**, then **Satin**, then **Plain**. Twill puts a diagonal through every tone; Satin gives smooth faces; Plain has no structure to vary at all, so the picture is carried by each pick's shuttle alone — on a grey clip it is gone (see Structure, below).
4. **Shuttles → 2**. Two weft colours for the whole cloth: a pick can be only one of them, so the picture is carried almost entirely by structure. **→ 8** gives the shuttles room for every hue.
5. **Palette → Heritage Dyes**, then **Bright**. Fixed dye sets instead of colours taken from the clip.

6. **Ends** → **48**. Coarse cloth, thick threads. **Max Float** → **2** ties every float within two crossings, which forces a near-checkerboard.

Black grounds stay black because the warp is near-black: where the clip is black the warp shows. Every float still has to be tied, so a black ground crossed by a bright pick carries that pick's colour as a line of specks, and on footage they often line up into short vertical dashes (see Known limits).

Every slider is declared to the host as 0 to 1. The value each position stands for is given with each control below. Ends, Picks, Max Float and Shuttles are whole numbers, and Resolume shows them as such.

The Loom group

Ends (16 to 320, default 160). The number of warp threads across the frame. Each crossing weaves the mean colour of the clip's pixels in its rectangle, in linear light. Fewer ends is a coarser cloth with thicker threads.

Picks (0 = Auto, or 1 to 320; default Auto). The number of picks down the frame. On Auto there are as many picks as make each crossing **Thread Aspect** times as tall as it is wide, so 160 ends on a 16:9 frame weave 90 picks. With Picks set, Thread Aspect does nothing.

Thread Aspect (0.5 to 2, logarithmic, default 1, slider 0.5). A pick's height over an end's width, used only with Picks on Auto. Above 1 the crossings are tall and a twill's diagonal is steep (63.4° at 2); below 1 they are wide and the diagonal is shallow (26.6° at 0.5).

Max Float (2 to 16 crossings, default 10). The longest a thread may pass over or under the threads crossing it before it must be tied. It applies to both threads and both faces: no run of more than Max Float warp-up crossings along a pick (the weft floating behind), none of weft-up (the weft floating on the face), and the same down every end. A low Max Float forces ties everywhere and makes the cloth near-checkerboard; a high one lets solids run smooth, with one tie in Max Float + 1 at least. The limit is enforced inside every pick: an end that has already run Max Float picks on one side is forbidden that side in the next pick, so every pick is exact under both limits at once.

The Threads group

Warp Colour (default a near-black, 0.08 / 0.07 / 0.07). The colour of every end. Resolume shows it as a colour picker. The dark default is what keeps a VJ clip's black ground black: where the picture is black the warp shows. A pale warp turns a black ground into a mesh of specks.

Shuttles (2 to 8, default 6). How many weft colours are loaded. Each pick takes exactly one of them, chosen with its lift pattern. More shuttles means more hues; fewer means the tone is carried by structure.

Palette (default Clip). Where the shuttles' colours come from:

Clip	dyed from the clip every frame by k-means in linear light, seeded from the last frame's colours, so the shuttles follow the clip without jumping
Heritage Dyes	natural dyes, as a weaver's card reads them: iron black, undyed cream, madder, indigo, weld, weld over indigo, walnut, madder rose (the first Shuttles of them)
Mono	evenly spaced greys from black to white
Bright	a woven label's brights: black, white, red, blue, yellow, green, magenta, cyan (the first Shuttles of them)

The fixed dye values are ours, picked by eye from what the dyes are known to give, not measured.

Structure (default Auto by Tone). Which weave structures the loom may use. Each has an exact weft ratio — how much of the weft shows:

mode	structures	
Auto by Tone	warp solid, warp satin (1/5), 2/1 twill (1/3), 2/2 twill (1/2), 1/2 twill (2/3), weft satin (4/5), weft solid	the default: satins near the ends of the range, twills in the midtones, solids at the ends
Twill	3/1 (1/4), 2/2 (1/2), 1/3 (3/4)	a diagonal through every tone
Satin	warp satin (1/5), weft satin (4/5)	smooth faces, the tone carried mostly by the shuttles
Plain	plain (1/2)	nothing to vary: every crossing is the same weave

Each crossing takes the structure in its mode whose mix of its pick's shuttle and the warp is nearest the target colour, so tone is posterised into regions of one structure. **Plain carries the picture in the shuttles alone**, and a pick is one shuttle across the whole width, so all that is left is each pick's average: on a grey clip whose rows all average alike, the picture is gone. The release video shows exactly that. It is the constraint, not a fault.

The Look group

Thread Shading (0 to 1, default 1). Draws each crossing as its top thread: a lit cylinder, with a dip where a float ends and the thread goes under, a ply twist, a sheen in the thread's own colour, and the other thread in shadow in the gap between two. At 0 each crossing is a flat square of its top thread's colour. The shading fades out below about 4 pixels a crossing (and is fully off at 2), because a cylinder drawn in two pixels can only alias: at the default 160 ends on a 320-pixel-wide frame it does nothing.

Zoom (1 to 8x, logarithmic, about the frame centre, default 1x, slider 0). Enlarges the cloth, nearest crossing, to see the threads. The cloth is woven at its grid, not re-woven for the zoom.

Mix (0 to 1, default 1). The cloth over the clip. At 1 the output is opaque: a cloth has no holes, and the transparent parts of a clip are woven as the black ground their colour is. At 0 it is the clip, with its own alpha.

How it works

Three stages a frame:

1. **Cells** (GPU). One linear-light mean colour per crossing, over the clip's pixels whose centres fall in its rectangle — at most 320×320 crossings — read back to the CPU.
2. **The loom** (CPU). The shuttles are chosen (k-means of the crossings for Clip, or a fixed set). Then the cloth is woven pick by pick, top to bottom, as a loom weaves it. For each pick: the target for each crossing is its mean plus the error carried down from the pick above; each crossing's structure is the one whose mix of warp and shuttle is nearest the target; and a row programme finds the shuttle and the lift pattern of least total cost under both float limits, exactly. The costs are integers: a crossing that follows its structure costs that structure's error, a tie costs a fixed amount plus the error of the thread it shows, less a discount on a satin-ordered lattice of preferred tie positions. The error left over is carried 1/4, 1/2, 1/4 to the next pick.
3. **Render** (GPU). Per output pixel, through Zoom: the crossing, the thread on top, its colour, and Thread Shading's lit cylinder.

Exact per pick, greedy between picks. The harness checks every pick the loom weaves against an exhaustive search over every shuttle and every lift pattern: they cost the same. But a pick cannot see the picks below it, so the cloth as a whole is not a two-dimensional optimum. Two saturated hues side by side weave as an uneven alternation, not two clean halves.

It remembers the last frame. Weaving afresh from scratch every frame would be chaotic: one crossing's change near the top moves shuttles and ties all the way down. So each pick's costs also charge a little for a lift, a shuttle or a structure that differs from the last frame's, and a still clip weaves exactly the same cloth frame after frame (0.00% of pixels change on a held frame). On moving footage the cloth changes about as much as the clip does. Measured through the harness at 960×540 , as the share of pixels changing by more than 8/255 from one frame to the next: the dancers (Galactucity) 10.4% in the clip and 13.2% in the cloth; the skulls 76.9% and 28.3%; the tumbling sphere (Metalive) 18.6% and 13.6%; the slow nebula (SpaceUniverse) 1.9% and 1.5%. On the thin bright lines of Cyberspace the cloth moves more than the clip (7.5% against 16.9%), and one frame in ten re-weaves half the picture. There is no single steadiness figure, and it is not one of the harness's checks.

Performance

Measured by the offline harness on an M4 Max, best of three, `glFinish` both sides, on a machine shared with other work:

	1280 × 720	1920 × 1080	3840 × 2160	of which the CPU loom
defaults, 160 × 90 crossings	2.0 ms (12%)	2.0 ms (12%)	2.1 ms (13%)	1.3 ms
largest, 320 × 180 crossings	5.6 ms (34%)	5.9 ms (35%)	6.9 ms (42%)	4.8 ms

(percentages of a 60 fps frame).

The CPU half — the shuttles' k-means and the row programme for every pick — is most of the cost and does not depend on the output resolution; it rises with the number of crossings. There is one read-back a frame, of at most 1.6 MB. Nothing was timed inside Resolume, where the read-back is a stall the host has to wait for, and nothing was timed on Windows.

If it looks wrong

The cloth is a flat grey mesh. Structure is Plain on a clip with little colour: a plain weave carries the picture only in the shuttles. Use Auto by Tone, or raise the clip's colour.

The picture is striped across. That is the one-weft-a-pick constraint: a pick is one colour across the whole width. More Shuttles help; so does a clip whose colours change down the frame more than across it.

Two colours side by side come out as alternating lines. Also the constraint: where the picture wants two hues in the same pick, the loom alternates them pick by pick. From a distance they mix.

A black ground has specks or vertical dashes in it. Those are ties: every float must be tied within Max Float crossings, and a pick's ties are its own shuttle's colour. Raise Max Float for fewer ties.

The threads look like flat squares. Thread Shading fades out below about 4 pixels a crossing. Lower Ends, or raise Zoom.

The clip's transparency is gone. The cloth is opaque above Mix 0. Lower Mix to see the clip's own alpha again.

SW Jacquard is not in the effects browser. Check the folder under Installing, and that Resolume was restarted.

The effect does nothing at all. A shader that will not compile looks exactly like that, and the real message is in the log:

```
macOS    ~/Library/Logs/jacquard/jacquard.YYYY-MM-DD.log
Windows  %LOCALAPPDATA%\jacquard\logs\jacquard.YYYY-MM-DD.log
```

It records the GL vendor, renderer and version at load, which shader failed if one did, and any buffer the plugin could not allocate.

Known limits

- **Greedy between picks.** Each pick is exact given the picks above it; the cloth is not a two-dimensional optimum, and two saturated hues side by side weave as an uneven alternation.
 - **One weft a pick.** There is no brocade or lampas mode (a supplementary weft that floats behind where it is not used), which is how a real jacquard gets two colours into one pick.
 - **Ties over black line up.** Over a black ground crossed by a bright pick, the ties the float limit forces often fall in the same ends pick after pick, so they read as a lattice of short vertical dashes with dark picks between, rather than a satin scatter. It is there on a single frame, so it comes from the per-pick weave, not from the frame memory; on the moving demo clips it shows on most black grounds.
 - **Least cost is not fewest ties.** A flat solid ties about 0.17 of its crossings at Max Float 8, more than the one in nine the limit alone needs, because the carried error varies from crossing to crossing.
 - **Steadiness is measured, not guaranteed,** and not a harness check; see How it works.
 - **The cost constants and the shading are chosen, not derived:** the tie cost, the lattice discount, the memory terms, and the thread's light and sheen. The fixed dye sets are picked by eye.
 - **The look is judged by eye,** on Resolume's bundled demo clips through the harness. The harness proves the constraints, the structures and that each control moves the picture; nothing measures how woven it looks, beyond the distance check on the test card.
 - **Never loaded into Resolume on macOS.** Everything numeric was compiled, rendered and measured offline against the real plugin class in a headless CGL context, plus an `oxbow` load.
 - **Never seen on camera footage,** only on Resolume's bundled CG loops.
 - **Only ever run on an Apple M4 Max,** although the macOS build contains an Intel slice. On Windows, see the note at the top of this guide.
 - **No presets** and no OpenFX version.
 - **There is a browser demo** at jacquard-demo.stoatworks-labs.com. It is a port to a web page, not the plugin: the shaders are the plugin's own, run in WebGL2, but the CPU half — the k-means that dyes the shuttles and the loom's row programme — is a hand port to JavaScript that only a reader checks. It was compared with the C++ once and wove the same cloth; the page lists what it does not reproduce.
-

About

The last group, **About**, carries the plugin's name, version, licence and maker, and buttons that open this user guide (stoatworks-labs.com/software/jacquard/guide/), the project page, the source on GitHub and the support page in your browser.

Reporting something

github.com/stoatworks-labs/jacquard/issues. A screenshot, the Loom and Threads settings, and the composition's resolution and frame rate are usually enough. If the effect did nothing, attach the log.

Jacquard · guide updated 2026-09-25 · stoatworks-labs.com/software/jacquard/

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