VANGUARDFX · MATERIAL SYNC PRODUCER

MSP Comprehensive User Guide

From installation to professional production — the complete reference for the audio-reactive material, light, and geometry animation engine for Autodesk 3ds Max.

Version 1.0.3 STABLE

Bake to tyCache | 28 TyFlow Palettes | Volume Grid | 28 FX Modes | 35+ Auto Patterns | 8 Render Engines | Max 2024–2027

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Getting Started

Installation, license activation, and your first audio-reactive project — everything you need to reach a working setup.

Chapter 1 · Installation

PART 1 · GETTING STARTED

VanguardFX MSP (Material Sync Producer) is a professional tool for creating audio-reactive animations in Autodesk 3ds Max. This chapter takes you from zero to a verified first launch using the official installer, with a manual method documented as a fallback for advanced users.

System Requirements

Component	Requirement
3ds Max	Autodesk 3ds Max **2024, 2025, 2026, or 2027** (64-bit). The v1.0.3 installer ships a build matched to each version's Python runtime.
Python	Bundled with 3ds Max (3.10 for 2024 · 3.11 for 2025/2026 · 3.13 for 2027). No separate install needed.
Render engine	V-Ray, Corona, FStorm, Arnold, Redshift, Octane, Maxwell, or standard Scanline.
Optional	tyFlow Pro (particle integration) · Chaos Vantage (real-time playback).
OS	Windows 10 or 11 (64-bit).

Method A — Official Installer (recommended)

The installer detects every 3ds Max version present on your machine and copies the correct, license-protected build into each one automatically.

1. Run `VanguardFX_Setup_v1.0.3.exe` as **Administrator**.
2. Accept the End-User License Agreement.
3. On the components page, the installer shows only the Max versions it actually detected. Leave the detected versions checked (the standalone **DSP** app is always installed).
4. Finish the wizard. The installer places the integration files into each version's `...\ENU\scripts\VanguardFX\` folder and the startup script into its `...\ENU\scripts\Startup\` folder.
5. Launch 3ds Max. A **VanguardFX** menu appears in the main menu bar.

> Important — open each Max version once first 3ds Max only creates its user-scripts folder after the application has been launched **at least once**. If you install a Max version but never open it, the installer cannot detect it and will skip integration for that version. **Open every Max version once, close it, then run the installer.**

The VanguardFX Menu

After installation, the **VanguardFX** menu in 3ds Max gives one-click access to the whole suite:

Menu item	Action
DSP	Launches the standalone audio analyzer that produces CSV data.
LSP	Launches the Light controller module.
MSP	Launches the Material / Geometry controller (this guide).
TyFlow Samples	Opens the bundled samples folder.
License Status	Shows your activation state, plan, expiry, and Hardware ID.
Help & About	Version info and support links.

Method B — Manual Installation (advanced / fallback)

1. Obtain the release files: `MSP.py` and, for tyFlow users, `Vanguard_TyFlow_v1_0_2.cs`.
2. Locate (or create) the install folder for your Max version, e.g. `C:\Users\<USER>\AppData\Local\Autodesk\3dsMax\2025 - 64bit\ENU\scripts\VanguardFX\`
3. **Clear the old cache (critical):** delete the `__pycache__` folder inside `VanguardFX`.
4. Copy `MSP.py` into the folder (overwrite if present).
5. Restart 3ds Max so it loads the new script.

> Critical — always delete __pycache__ After overwriting any module you **must** delete `__pycache__`. Otherwise Python keeps running the old compiled `.pyc` and your update will not appear. This is the single most commonly forgotten step.

First Launch & Verification

1. Launch MSP from the **VanguardFX** menu (or, manually, Scripting → Run Script… → `MSP.py`).
2. A splash screen with animated equalizer bars appears for ~3 seconds.
3. The main window opens. In the Max *Listener*, verify the banner: `VanguardFX | MATERIAL | v1.0.3 STABLE`.

> Tip — wrong version in the banner? If the banner does not show `v1.0.3 STABLE`, the cache is stale. Close Max completely, delete `__pycache__` inside the `VanguardFX` folder, and relaunch.

Creating a Permanent Toolbar Button

1. Customize → Customize User Interface → **Toolbars** tab.
2. Find **MSP Launch** in the *VanguardFX / scripts* category and drag it onto any toolbar.
3. You can now launch MSP with one click.

Chapter 2 · License & Activation NEW

PART 1 · GETTING STARTED

VanguardFX uses a simple, hardware-bound licensing system. This chapter explains the plans, how to activate, and how to resolve the most common activation problems.

License Plans

Plan	Duration	Notes
Trial	7 days	Free, single user. Lets you evaluate every feature. No patch updates.
30-Day	30 days	Patch updates included.
1-Year	365 days	All updates released within the year included.
2-Year	730 days	All updates within two years included; renew afterwards to continue.

How binding works Each license key is tied to a single **Hardware ID (HWID)** — a fingerprint of the computer it is activated on. One key activates one machine. Moving a license to a different computer requires manual approval (see "Transferring a license" below).

Activating Your License

1. Open **License Status** from the VanguardFX menu (or the License button inside MSP).
2. The dialog shows your current state and your **Hardware ID**. Copy the HWID.
3. Open the VanguardFX license bot on Telegram: `https://t.me/Vanguard_MyLicense_Bot`.
4. Follow the bot's prompts — choose your plan, complete payment (crypto, bank transfer, or card where available), and send your HWID when asked.
5. The bot issues a **license key** bound to that HWID.
6. Paste the key back into the License dialog and confirm. The status updates to your active plan and expiry date.

Tip — start with the Trial You do not need to pay to evaluate MSP. Start the 7-day Trial from the License dialog, test it on your real scenes, and purchase only when you are satisfied.

Checking Status & Expiry

The License Status dialog always shows: your plan, days remaining, expiry date, and the bound HWID. Check it any time — there is no need to reactivate while the license is valid on the same machine.

Transferring a License to a New Computer

Because keys are HWID-bound, a new PC needs a transfer. Contact support through the license bot, provide your existing key and the **new** machine's HWID, and request a transfer. After approval the key is re-bound to the new HWID and the old machine is released.

Activation Troubleshooting

Symptom	Resolution
"Hardware ID mismatch" / license invalid	The key is bound to a different machine. Request a transfer, or verify you copied the HWID from *this* computer.
Key entered but status still shows Trial/expired	Re-open the License dialog and re-paste with no leading/trailing spaces. Restart Max if it does not refresh.
License Status menu item does nothing	The license dialog file is missing from the VanguardFX folder. Re-run the installer.
Expired after a valid period	Your plan term ended. Renew through the license bot to receive an extended key.
Reinstalled Windows / changed hardware	Major hardware changes alter the HWID. Request a transfer to the new HWID.

Your license file is preserved on uninstall Uninstalling VanguardFX does **not** delete your license file (`license.lic`), so you can reinstall later without losing activation. To remove it manually it lives under `%LOCALAPPDATA%\VanguardFX\license.lic` .

Chapter 3 · Your First Project — Simple Lights

PART 1 · GETTING STARTED

The smallest scenario that covers every core concept: eight lights dancing to music. Work through it once and the rest of the guide will make immediate sense.

Step 1 — Create the Lights

1. Create panel → **Lights** → choose a type (e.g. Standard → Omni).
2. In the Top viewport, create 8 lights in a row. Name them `Light_01 … Light_08`.

> Tip — fast creation Make one light, then **Shift+drag with the Copy option** (not Instance), or use the Array tool.

Step 2 — Select and SCAN

1. Select all 8 lights in the viewport.
2. In MSP, click **SCAN SELECTED** above the table.
3. The central table fills with 8 rows: name, type, colour and band index for each light.

Step 3 — Load a CSV

A CSV holds pre-processed FFT audio data, typically produced by the DSP module.

1. Click **LOAD CSV** at the top-left of the left panel.
2. Browse to your CSV. The Listener confirms, e.g. `CSV loaded: 5704 frames × 128 bands | song.csv`.

Step 4 — Enable FX Modes

1. Check **Light Intensity**.
2. Check **Dynamic Color**.

Step 5 — CSV Preview

1. Click **CSV PREVIEW**.
2. The timeline plays — lights pulse and change colour to the audio.

> Tip — nothing happening? Make sure the viewport is **Shaded/Realistic** (not Wireframe), the lights are visible, and both *Light Intensity* and *Dynamic Color* are enabled.

Step 6 — Bake the Animation

1. Stop the preview (**STOP PREVIEW**).
2. Click **BAKE CSV**.
3. A progress bar records each CSV frame onto the timeline.
4. When done, scrub the timeline or render — the animation is now permanent.

Note — bake times Baking ~5000 frames onto 8 lights takes ~30 seconds. For 256 lights, expect 3–5 minutes.

02

The Interface

Panels, buttons and controls — a complete map of the MSP window so you always know where to click.

Chapter 4 · User Interface Tour

PART 2 · THE INTERFACE

The main MSP window is about 1800×1400 px and splits into four areas.

Overall Layout

Area	Location	Purpose
Left Panel	Vertical, left	CSV load, SCAN, engine selector, audio controls
Central Table	Center	Scanned objects, band index, colour, type
Right Panel	Vertical, right	FX checkboxes, global parameters, colour settings
STUDIO Row	Bottom	BUILD GRID, PRESET, RESET, PERFORMANCE, CLEANUP

Left Panel — Input Controls

INPUT: LOAD CSV · TEST MIC (live mic source) · STOP MIC · Audio Device dropdown.
SCENE: SCAN SELECTED · ADD ALL LIGHTS · CLEAR TABLE.
RENDER ENGINE: tells MSP which material property to drive first — see Appendix C.

> Tip — engine selection is just a hint Engine selection is purely an optimization hint. **All FX modes work with every engine.**

The Central Table

Column	Description
#	Row index
Name	Object name in 3ds Max
Type	Light / Geometry / Spline
Band	Which FFT band drives this object (0–127)
Color	Base colour — click to change
Material	Auto-detected material class
Sub-mat	Sub-material index if multi-material

> Note — the Band column The Band column is auto-assigned (1,2,3…). Change it with the SORT modes (e.g. assign by distance from origin).

Right Panel — FX & Colour

FX MODES: 28 checkboxes, each with a 0–200% strength slider (see Chapter 6 for categories).
COLOUR: 33 ready palettes + User-Defined (Start/End), Rainbow Flow overlay, Flow Speed, Phase Shift.
GLOBAL PARAMETERS: 23 scene-wide controls — Sensitivity, Gain, Smoothing, Decay, Attack, Master Limit, RGB Boost, and 16 more.

STUDIO Row (Bottom)

Button	Purpose
BUILD GRID	Rapidly create grids (8×8, 16×16, ...) and other templates
DIAGNOSTIC	System info, FPS, memory
SORT STUDIO	Change band-to-object assignment
SAVE PRESET	Save full app state (.mspreset)
LOAD PRESET	Restore from a preset file
RESET FX	Clear stuck transient state
PERFORMANCE	Reduce heartbeat rate for heavy scenes
DEEP CLEANUP	In-place equivalent of restarting Max

03

TyFlow Integration

Drive particle animation directly from audio — 49 live parameters, 100 shapes, 28 palettes, and tyCache baking.

Chapter 5 · TyFlow Deep Integration

PART 3 · TYFLOW INTEGRATION

> Independent product tyFlow and 3ds Max are third-party products. VanguardFX is independent and not affiliated with them — see the Trademarks & Legal page.

MSP can send 49 live parameters to a tyFlow C# Script Operator, driving particle animation directly from audio. The tyFlow bridge script is `Vanguard_TyFlow_v1_0_2.cs`.

Initial Setup — MSP → TyFlow

1. In 3ds Max, create a tyFlow object (PFlow → tyFlow).
2. Inside Particle Flow, add a **Script Operator**.
3. Paste the contents of `Vanguard_TyFlow_v1_0_2.cs` into the Script Editor (Ctrl+A → Delete → Paste).
4. Click **Compile** (green). If errors: keep only `using System.IO;`, remove any Unicode chars, set threaded mode false.
5. In MSP load a CSV, click **TYFLOW SYNC**, then **PICK CSV** in the Sync window.
6. In tyFlow, right-click the Script Operator → **Reset Sim**. The Listener shows `# VANGUARD TYFLOW v1.0.2 -- SIM START #`.

The 49 Parameters

Group	Parameters
1 · Original (15)	Gain, HighBoost, ShapeMode (0–99), YAmplitude, ZScale, SmoothWeight, NoiseAmplitude, InterpMix, TimeOffset, ExtraScale, ManualDelay, YSyncMode, ClassicMode, RaiseMode, TamOffset.
2 · Transform (15)	PosOffset X/Y/Z, ScaleMultiplier, BoxWidth/Depth, CircleRadius, LineSpread, WaveSpeed/Freq, Attack/Release, MatIDOffset/Step, BassEmphasis.
3 · Motion / Visual / Live	Spin/SpinAxis/SpinAccel, OscillateAmount/Speed/Axis, LookCenter, ColorMode (0–11), Response, Boost Threshold/Mix, GroundLock, RandomPhase, MaxParticles, Rotation/MatID gates, LineWidth, AudioZMax, LiveMode.

Motion FX in Depth

Parameter	Behaviour
Spin (deg/frame)	Rotates particles around SpinAxis each step. Try 1.0–5.0; negatives reverse.
SpinAxis (0=X,1=Y, 2=Z)	Axis the spin happens around. With LookCenter you can spin around world-Y while still facing center.
OscillateAmount (deg)	Sinusoidal wobble layered on spin. 15–45° = "looking around"; 90°+ tumbles.
LookCenter (0/1)	When 1, each particle's local Y points to world origin — makes circular/spherical layouts look intentional.
SpinAccel (0–1)	Bass-driven extra spin. Spin=2 + SpinAccel=1 = ambient rotation that pumps on each kick.
RandomPhase (0–1)	Per-particle phase scatter. 0 = robotic lockstep; 1 = organic flocking that stays frame-stable.

Tip — cinematic preset Spin 1.5 · SpinAxis 2 (Z) · OscillateAmount 20 · OscillateAxis 0 (X) · RandomPhase 0.5 · SpinAccel 0.7 — a slow Z-spin with gentle pitch wobble that accelerates on bass.

The 100 Shapes

Range	Category	Examples
0–9	Basic 2D	Line, Circle, Square, Triangle
10–29	3D Solids	Sphere, Cube, Torus, Cylinder, Cone
30–49	Math Surfaces	Klein, Mobius, Helix, Spiral
50–69	Fractal	Mandelbulb, Julia, Sierpinski
70–89	Wave Forms	Sine Carpet, Ripple Field, Wave Tower
90–99	Special	Witch, Cardioid, Lissajous

The 12 ColorModes

ID	Name	Description
0	Sort	Colour by band index
1	Sort Reverse	Reversed order
2	Rotate	Rotates over time
3	Rotate Reverse	Reversed rotation
4	Audio	Follows audio intensity
5–11	Patterns	Alternating & block patterns

TyFlow Palette — paint colours via Multi/Sub material NEW

The TyFlow Palette panel tints particles through a Multi/Sub-Object material. It now ships with **28 ready palettes** — the 8 originals plus 20 new:

Sunset · Nebula · Candy Pop · Vaporwave · Aurora · Lava · Frost · Sakura · Peacock · Citrus · Emerald · Bubblegum · Tropical · Phoenix · Midnight · Berry · Toxic · Pastel Dream · Gold Rush · Disco (+ 8 originals)

Pick one and click **APPLY PALETTE TO TYFLOW**. Colours are written per-particle via Material ID, so they survive a tyCache bake.

Live Mic to TyFlow

1. In the Sync window, enable **SEND MIC TO TYFLOW**.
2. In main MSP, start **TEST MIC**.
3. Reset/Play the tyFlow sim — particles now follow the live mic.

> Warning — live mic is CPU-heavy If FPS drops, switch to CSV mode (always faster). v1.x rate-limits writes to 20 Hz with atomic I/O, but raw live audio is still demanding.

Bake to tyCache — render with the plugin closed NEW

Bake the live audio reaction (colour + intensity + rotation + motion) into a standalone tyCache that plays back with no plugin and no bridge files — ideal for render farms and clean hand-off.

1. Analyse the full track and confirm the particles react when you scrub.
2. In the TyFlow Palette panel, click **BAKE TO tyCACHE**. MSP sets the scene frame range to the full track, flushes the bridge, finds your tyFlow + its Multi/Sub material, and opens a short checklist.
3. In tyFlow: Open Editor → tyFlow ▸ Export ▸ tyCache. Enable **ALL FOUR channels** — Position, Rotation, Scale, and Material ID.
4. **Material ID is what bakes the colours** — without it, colour is lost. Pick a `.tyc` path and export the whole range.
5. Create a tyCache loader, point it at the `.tyc`, and assign the **same** Multi/Sub material. Baked Material IDs map to the same slots, so colours are identical.

> Tip — the info window is the result, not an error The info window that appears after the button lists your frame range and material. The actual cache write happens in tyFlow's own exporter (the version-safe way).

Alembic Export for Vantage

1. Click **EXPORT TYFLOW → ALEMBIC** in main MSP.
2. Choose a destination — an `.abc` file is generated.
3. Load it in Chaos Vantage and render.

04

Effects & Patterns

28 FX modes and 35+ rhythmic patterns — the creative core of MSP. Combine them freely.

Chapter 6 · FX Modes Reference

PART 4 · EFFECTS & PATTERNS

28 FX modes animate different properties of scanned objects. Each has its own 0–200% strength slider and they stack — combine several for rich, layered motion.

Material Effects (7)

Mode	What it does
Light Intensity (mat_mult)	Drives the material multiplier/intensity from audio. The most common, almost-always-on FX.
Dynamic Color (mat_color)	Picks a palette colour from the audio level. Pair with Light Intensity for pulse + colour.
Hue Shift (mat_hue)	Shifts only hue (not brightness/saturation) — subtle colour drift on a steady base.
Strobe Flash (mat_opac)	Binary on/off over a threshold, like a real strobe. EDM drops, tension peaks.
Chrome Pulse (mat_rough)	Modulates roughness/glossiness so reflective materials breathe with the beat.
Heat Map (mat_metal)	Writes a fire palette (black→red→orange→yellow→white) independent of Dynamic Color.
Wire Color (wire_col)	Changes the viewport wireframe colour — preview in non-shaded views.

Position / Scale Effects (5)

Mode	What it does
Move X / Y / Z	Audio drives object position along that world axis.
Scale Uniform	Audio drives all three scale axes equally.
Scale Z	Audio drives only Z — bar-chart style.
Scale XY	Audio drives X and Y, keeping height constant.

Motion Effects (14)

Mode	What it does
Orbit	Circular motion around the object center.
Jitter	Audio-proportional random position noise.
Bounce	Up/down Z motion — pairs with kick drums.
Pulse	Uniform beat-sync scale pulse.
Glitch	Abrupt random position jumps — glitch art.
Wobble	Sine roll/pitch rotation from audio.
Breathe	Slow continuous scale, independent of audio.
Age Rotate	Rotation accumulates each frame, never resets.
Scale Cycle	Sinusoidal scale with audio modulation.
Color Cycle	Continuous hue rotation; audio sets rate.
Position Noise	Perlin noise on position — smooth, organic.
Twist	Audio-driven rotation around Z.
Shear	Shear transform on the scale matrix.

Deformation Effects (4)

> Warning — geometry only Deformation effects work only on geometry, not lights.

Mode	What it does
Bend	Bends the object along Z.
Taper	Tapers one end.
Stretch	Stretches one axis with auto compensation.
Squash	Inverse of Stretch — flattens.

Advanced Effects (5)

Mode	What it does
Vortex	Spiral around Z; audio reduces radius (pulls inward).
Magnet	Attracts toward a point (or repels with negative strength).
Shockwave	Radial push from origin at audio-driven speed — great for impacts.
Ripple	Concentric Z displacement by radial distance — stone in water.
Liquid Flow	Three-phase sine for smooth, non-repeating organic motion.

Chapter 7 · Auto FX Patterns

PART 4 · EFFECTS & PATTERNS

Auto FX Patterns are rhythmic modulation curves applied on top of FX modes — they multiply each band's intensity by a pattern function. Open **AUTO FX PATTERNS** in the STUDIO row.

Wave Patterns

Pattern	Formula	Use
Sine	sin(i×freq+phase)	Smooth motion
Cosine	cos(i×freq+phase)	90° offset
Square	sign(sin(i×freq))	Digital on/off
Saw	(i×freq) mod 1	Linear buildup
Triangle	|((i×freq) mod 1 − 0.5)|	Symmetric build/decay

Pulse Patterns

Pattern	Description	Use
Strobe	Every Nth object pulses	EDM drops
Heartbeat	Two pulses back-to-back	Cinematic tension
Fire	Random flicker	Flame effects
Spark	Random brief flashes	Glitch, sparks

Spatial · Multi-band · Math Patterns

Group	Patterns
Spatial	Tornado, Twinkle, Smooth Step, Crescent, Fireworks
Multi-band	Dual Sine, Tri Pulse, Chase, Wave Train
Advanced Math	Perlin, Mandelbrot, Lissajous, Cardioid

Applying & Combining

1. Click AUTO FX PATTERNS and pick a pattern.
2. Adjust **Strength** (100% normal, 200% exaggerated).
3. Adjust **Speed** for frame-time patterns (1.0 natural).
4. Adjust **Phase Shift** for a starting offset.
5. Keep the window open — changes apply live.

Patterns multiply onto active FX modes: *Light Intensity* + *Sine* = sinusoidal pulse; *Move X* + *Saw* = linear X drift; *Scale Cycle* + *Heartbeat* = heartbeat scale.

05

Production

Performance tuning, deep troubleshooting, grid building, and the full render workflow.

Chapter 8 · Performance & Optimization

PART 5 · PRODUCTION

Heavy scenes (256+ objects, tyFlow particles, Vantage) can drop FPS. MSP has tools to keep things playable.

Performance Mode & Auto-throttle

MSP detects tyFlow in the scene and throttles the heartbeat to 20 Hz automatically, so the 40 Hz dispatch no longer competes with tyFlow's solver — giving tyFlow room to hold 30+ FPS.

Recovery Tools

Tool	What it does
RESET FX STATE	Clears stuck transient state and resets internal caches — the fastest recovery when effects look "stuck".
DEEP CLEANUP	In-place equivalent of restarting Max: clears caches, restarts timers, frees memory. Your scene is preserved — only transient state is purged.

Presets & Prebuild

Feature	What it does
SAVE / LOAD PRESET	A `.mspreset` stores the engine, table rows, CSV path, all FX + strengths, global params, colour, and the 49 tyFlow values.
PREBUILD	Pre-computes all FX values on a worker thread so CSV preview/bake run 3–5× faster.

> Warning — PREBUILD memory PREBUILD uses ~2 KB per frame per band. For 5000 frames × 128 bands that is ~1.2 GB. If RAM-limited, skip it.

Performance Checklist

- 256+ objects → enable **Performance Mode** (heartbeat 40 → 20 Hz, dispatch load roughly halved, sync stays tight).
- PREBUILD before BAKE (3–5× faster).
- Run DEEP CLEANUP every few hours.
- Need only Light Intensity? Disable Dynamic Color.
- Turn off the spectrum widget when unused.
- In tyFlow scenes, leave auto-throttle on.

Chapter 9 · Troubleshooting

PART 5 · PRODUCTION

The most complete problem-solving reference in this guide. Find your symptom, apply the fix. If your issue is not here, see Appendix E (FAQ) and Appendix F (Error & Message Reference).

Installation & Launch Problems

Symptom	Cause & fix
Installer skips a Max version (no VanguardFX menu in it)	That version's user-scripts folder did not exist at install time. Open that Max version once, close it, then re-run the installer.
"DSP not found" when clicking the DSP menu item	The standalone DSP app was not installed, or its file is missing from `C:\Program Files\VanguardFX\`. Re-run the installer and keep the DSP component checked.
VanguardFX menu missing after install	Max was open during install. Restart Max so it loads the startup script.
MSP window never opens / splash then nothing	Stale cache. Close Max, delete `__pycache__` in the VanguardFX folder, relaunch.
Banner shows the wrong version	Old `.pyc` is running. Close Max, delete `__pycache__`, relaunch (see Ch.1).

Low FPS

Likely cause	Solution
Heavy scene	Enable PERFORMANCE Mode
Cumulative buildup	Run DEEP CLEANUP
Stuck transient state	Run RESET FX STATE
Spectrum widget on	Disable it
Multiple MSP instances	Close all but one
tyFlow in scene	v1.x auto-throttles; verify in the Listener

Changes Not Applying

1. Verify CSV PREVIEW or TEST MIC is active.
2. Viewport must be Shaded/Realistic (not Wireframe).
3. Confirm the material supports the property (e.g. Heat Map needs a colour property).
4. Press RESET FX STATE.

Old Version Still Running After Deploy

1. Close 3ds Max completely (not just MSP).
2. Delete `__pycache__` inside VanguardFX.

3. Reopen Max and run MSP.

Motion FX Sliders Have No Effect (tyFlow)

1. Verify the tyFlow Script Operator runs v1.0.2 (the Listener shows `VANGUARD TYFLOW v1.0.2` on sim start).
2. Click DEBUG BRIDGE in the TyFlow Sync window to confirm the connection.
3. Try RotationMode = 1 (force per-frame rotation update).
4. Reset Sim in tyFlow.

TyFlow C# Compile Errors

Error	Cause	Solution
CS0105 duplicate using	Extra using statements	Keep only `using System.IO;`
CS0266 long→int	Large literal without cast	v1.0.2 already has the cast
Unicode character	Em-dash / smart quotes / emoji	Re-paste from the `.cs` (ASCII only)

Colour Problems

Symptom	Fix
Dynamic Color does nothing	The material has no readable colour property for the selected engine — check Appendix C and pick the matching engine.
tyCache lost its colours after bake	Material ID channel was not exported. Re-bake with all four channels (Position, Rotation, Scale, **Material ID**) enabled.
Palette looks washed out	RGB Boost or Master Limit too low — raise them in Global Parameters.

Audio / CSV Problems

Symptom	Fix
CSV loads but objects barely move	Raise Sensitivity / Gain; confirm the correct Band is assigned to each object.
TEST MIC silent or laggy	Choose the right Audio Device in the dropdown; live mic is CPU-heavy — prefer CSV.
CSV rejected / wrong frame count	Check the CSV format in Appendix E: `frame, band_0 … band_127`, float values.

When in Doubt — the 3-Step Reset

> Universal recovery 1) RESET FX STATE → 2) DEEP CLEANUP → 3) if still wrong, close Max, delete `__pycache__`, relaunch. This sequence resolves the large majority of transient issues.

Chapter 10 · BUILD GRID & Volume Grid

PART 5 · PRODUCTION

BUILD GRID creates dozens or hundreds of objects in a chosen arrangement with one click. Open **BUILD GRID** in the STUDIO row.

30+ Templates

Template	Description
Grid 8×8	64 objects
Grid 16×16	256 — recommended baseline
Grid 32×32	1024 — FPS will drop
Circle / Concentric Rings	Adjustable radius / nested circles
Spiral	Outward spiral from center
Hexagon	Hexagonal close-packing
Pyramid	Multi-tier pyramid
Sphere / Cube Surface	Distributed on a sphere / six faces
DNA Helix	Two crossing helices
Star	Multi-point star
Random Cluster	Random clusters

Common Parameters

- **Count** — number of objects.
- **Spacing** — gap between objects.
- **Object Type** — Omni / Spot / Mesh / Geometry.
- **Auto-SCAN** — scan immediately after building.
- **Auto-assign band** — assign bands automatically.

Volume Grid — fill the inside of a mesh NEW

Fill the interior of any picked mesh with a reactive 3-D grid of objects. The inside-test uses RayMeshGridIntersect for accurate, leak-free filling, and a Gap % control keeps cells from overlapping.

1. Click **PICK SOURCE** and choose your mesh (sphere, teapot, text, anything closed).
2. Set Resolution, Cap (max cells) and Gap %.
3. Click **FILL VOLUME WITH GRID** — objects are placed only inside the volume and added to the table.
4. Use **DELETE GRID** to remove them cleanly.

> Tip — even fill on large meshes If the Cap is reached before the mesh is full, raise the Cap or lower the Resolution so cells spread evenly through the whole volume rather than stopping partway.

Chapter 11 · Production Rendering Workflow

PART 5 · PRODUCTION

End-to-end: use MSP to produce a final rendered animation.

Steps

1. **Prepare the scene:** camera, background, ambient lighting; configure your render engine.
2. **MSP setup:** open MSP, set Render Engine to match, SCAN objects, LOAD the CSV, enable FX + Colour.
3. **Preview & fine-tune:** CSV PREVIEW, adjust sensitivity/gain/smoothing and FX strengths, stop when happy.
4. **PREBUILD (recommended):** pre-compute values (1–3 min for 5000×256).
5. **BAKE:** set the animation range, click BAKE CSV (Esc aborts), then scrub to confirm.
6. **Render:** choose PNG sequence or EXR, set Time Output to Range, render.

> Tip — particle shots For tyFlow particle shots, bake to tyCache (Ch.5) instead of keyframes — the cache renders on a farm with no plugin. For emission/light tests, Chaos Vantage gives real-time playback.

Creative Presets

Preset	Recipe
Fire on the Floor	Heat Map ON · Pulse ON · Vortex ON (low) → fire-like dancing lights with gentle spiral.
Underwater	Dynamic Color (Ocean) · Liquid Flow · Ripple (low) · Breathe → slow liquid motion in blue-green.
EDM Drop	Light Intensity (high) · Dynamic Color (Cyberpunk) · Strobe Flash · Shockwave · Heartbeat → pulsing lights with shockwave bursts.
Cinematic Reveal	Vortex (high) · Light Intensity (low→high) · Dynamic Color (Sunset) · Smooth Step → objects spiral outward, brightening as they go.

Fast-Render Tips

- Vantage real-time for emission/light tests.
- EXR multi-pass for After Effects compositing.
- V-Ray: irradiance map single-frame (lights animate, geometry doesn't).

A–H

Appendices

Reference tables, FAQ, an error-message decoder, a glossary, and the v1.0.3 change summary.

Appendix A · 28 FX Modes Reference

APPENDICES

Name	Key	Property
Light Intensity	mat_mult	Material multiplier / Intensity / power
Dynamic Color	mat_color	Material color / emission_color
Hue Shift	mat_hue	Material color (HSV)
Strobe Flash	mat_opac	Material visibility
Chrome Pulse	mat_rough	Material roughness
Heat Map	mat_metal	Material color (fire palette)
Wire Color	wire_col	Material wirecolor
Move X/Y/Z	pos_x/y/z	Motion position
Scale Uniform	scale_uni	Motion scale (xyz)
Scale Z	scale_z	Motion scale.z
Scale XY	scale_xy	Motion scale.xy
Orbit	orbit	Motion position (radial)
Jitter	jitter	Motion position (random)
Bounce	bounce	Motion position.z (sine)
Pulse	pulse	Motion scale (beat)
Glitch	glitch	Motion position (jumps)
Wobble	wobble	Motion rotation (sine)
Breathe	breathe	Motion scale (slow sine)
Age Rotate	age_rot	Motion rotation (cumulative)
Scale Cycle	scale_cycle	Motion scale (sine)
Color Cycle	color_cycle	Color hue rotate
Position Noise	pos_noise	Motion position (Perlin)
Twist	twist	Motion rotation.z
Shear	shear	Motion shear matrix
Bend / Taper / Stretch / Squash	—	Deform geometry
Vortex	vortex	Advanced position (spiral)
Magnet	magnet	Advanced position (attract)
Shockwave	shockwave	Advanced position (radial)
Ripple	ripple	Advanced position.z (concentric)
Liquid Flow	liquid	Advanced position (3-phase sine)

Appendix B · 33 Palette Reference (Color Engine)

APPENDICES

Name	Description
User Defined	Linear Start→End interpolation
HSV	Direct HSV interpolation
Hard Step	Step at 50%
Smooth Sine	Sinusoidal smoothing
Heatmap	Black→red→orange→yellow→white
Cyberpunk	Pink→purple→blue
Inferno	Black→purple→red→yellow
Forest	Dark→light green
Ocean	Dark→light blue
Magma	Brown→orange→yellow
Vaporwave	Pink→blue
Gold Rush	Brown→gold
Ice	Light blue→white
Toxic	Green→yellow
Rainbow	Full spectrum
Sunset	Orange→purple
Matrix	Black→green
Blood	Dark→bright red
Midnight	Dark blue→purple
Desert	Brown→yellow
Ghost	Faint white→pale blue
Synthwave	Pink→neon blue
Coffee	Dark brown→cream
Neon City	Neon pink→blue
Lava	Red→orange
Deep Space	Black→purple
Mint	White→pale green
Candy	Pink→light purple
Ultraviolet	Dark→bright purple
Spectrum	Full visible spectrum
Plasma / Viridis / Cividis / Twilight	matplotlib scientific maps

Note Separate from the TyFlow Palette (28 presets, Chapter 5), which paints particle Material IDs.

Appendix C · Render Engines & Shortcuts

APPENDICES

8 Render Engines

Engine	Material Class	Intensity Prop	Color Prop
V-Ray	VRayLightMtl	multiplier	color
Corona	CoronaLightMtl	Intensity	Color
FStorm	FStormLight	power	color
Arnold	standard_surface	emission	emission_color
Redshift	RedshiftMaterial	Intensity	Color
Octane	OctaneMaterial	power	emission_color
Maxwell	MaxwellMaterial	emission	emission_color
Standard	StandardMaterial	selfIllumAmount	diffuse

Keyboard Shortcuts

Shortcut	Action
Ctrl+O	Load CSV
Ctrl+S	Save Preset
Ctrl+L	Load Preset
Space	Play/Pause in 3ds Max
Esc	Stop bake / preview
F1	Help

Officially Tested

✔ V-Ray
✔ Corona

Experimental

• Arnold
• Redshift
• Octane
• Maxwell
• FStorm
• Standard

Appendix D · CSV Format

APPENDICES

MSP reads CSV files as: `frame, band_0, band_1, …, band_127`. Each value is a float (0–100 or 0–1; normalized internally). Band counts 1–256 are supported; frame count is limited only by RAM.

```
frame,band_0,band_1,band_2, ... ,band_127
0,12.4,8.1,3.0, ... ,0.2
1,15.9,9.7,4.4, ... ,0.1
2,21.0,11.2,6.8, ... ,0.0
```

Tip — generating CSVs The standalone DSP app performs the FFT analysis and exports CSVs in exactly this format. Use it to convert any track into MSP-ready data.

Appendix E · Frequently Asked Questions NEW

APPENDICES

Installation & Versions

Q. Which 3ds Max versions are supported?
A. 2024, 2025, 2026, and 2027 (64-bit). The installer ships a separate build matched to each version's Python runtime and installs only into versions it detects.

Q. The installer didn't add MSP to one of my Max versions. Why?
A. That version had never been opened, so its user-scripts folder didn't exist yet. Open it once, close it, then re-run the installer.

Q. Do I need to install Python separately?
A. No. MSP uses the Python that ships inside 3ds Max.

Q. Can I install on more than one computer?
A. The software installs anywhere, but each license key activates one machine (HWID-bound). Use a transfer to move it (Chapter 2).

Licensing

Q. How do I try before buying?
A. Start the free 7-day Trial from the License dialog — all features are available during the Trial.

Q. I bought a new PC. How do I move my license?
A. Contact support via the license bot with your key and the new machine's HWID and request a transfer (Chapter 2).

Q. Will uninstalling delete my license?
A. No. `license.lic` is preserved so you can reinstall without re-activating on the same machine.

Audio & CSV

Q. Where do CSV files come from?
A. The DSP app analyses audio and exports CSVs. You can also author your own in the format in Appendix D.

Q. Live mic or CSV — which should I use?
A. CSV for production (faster, repeatable). Live mic for quick experimentation only; it is CPU-heavy.

Q. My objects barely move even with a loud track.
A. Raise Sensitivity/Gain, confirm each object has the right Band assigned, and make sure an FX mode is enabled.

Effects & Rendering

Q. Why don't deformation effects affect my lights?
A. Bend/Taper/Stretch/Squash work on geometry only — lights have no mesh to deform.

Q. Do FX modes depend on my render engine?

A. FX modes are designed to work independently of the render engine.Official testing has been completed on

V-Ray and Corona Renderer..

Q. My tyCache lost its colours.

A. Re-export the cache with the Material ID channel enabled (all four channels). Material ID carries colour.

Q. How do I render particle shots on a farm?
A. Bake to tyCache — it plays back with no plugin and no bridge files, so any farm node can render it.

Stability

Q. Effects look stuck or frozen.
A. RESET FX STATE first; if that fails, DEEP CLEANUP; if still wrong, restart Max after deleting `__pycache__`.

Q. My changes to MSP.py don't show up.
A. You're running a cached `.pyc`. Close Max, delete `__pycache__`, relaunch.

Appendix F · Error & Message Reference NEW

APPENDICES

Decode the messages you may see in the Listener, in dialogs, or in the tyFlow editor.

Message	Meaning / action
`VanguardFX | MATERIAL | v1.0.3 STABLE`	Normal — MSP loaded correctly at the current version.
`CSV loaded: N frames × B bands`	Normal — your CSV was parsed; confirms frame and band counts.
`# VANGUARD TYFLOW v1.0.2 -- SIM START #`	Normal — the tyFlow bridge connected and the sim started.
"DSP not found: ..."	The standalone DSP exe is missing from `C:\Program Files\VanguardFX\`. Re-run the installer with the DSP component checked.
"bootstrap not found: ..."	The VanguardFX scripts folder is incomplete for that Max version. Re-run the installer (open that Max version once first).
"License dialog not found"	The license dialog file is missing. Re-run the installer.
"Hardware ID mismatch"	The key belongs to another machine — request a transfer (Chapter 2).
Banner shows an old version	Stale `__pycache__` — delete it and relaunch.
CS0105 / CS0266 / "Unicode character" (tyFlow)	C# compile issues — see Chapter 9 "TyFlow C# Compile Errors".

Appendix G · Glossary NEW

APPENDICES

Term	Meaning
Band	One FFT frequency bin (0–127 by default). Each scanned object can be driven by one band.
Bake	Writing computed animation permanently onto the timeline as keyframes (or into a tyCache).
CSV	The pre-analysed audio data file MSP reads — one row per frame, one column per band.
FFT	Fast Fourier Transform — converts audio into frequency bands MSP can react to.
FX Mode	One of the 28 effects that map audio onto a material or transform property.
HWID	Hardware ID — the machine fingerprint a license key binds to.
Heartbeat	MSP's internal dispatch rate (40 Hz, auto-throttled to 20 Hz in heavy/tyFlow scenes).
Multi/Sub material	A 3ds Max material holding several sub-materials addressed by Material ID — used for tyFlow palette colour.
Preset (.mspreset)	A saved snapshot of the entire MSP state.
tyCache (.tyc)	tyFlow's baked particle cache that renders without the plugin.
Scan	Registering selected scene objects into the MSP table so they can be driven.

Appendix H · What's New in v1.0.3 & Component Versions

APPENDICES

VanguardFX MSP v1.0.3 — Highlights

- **Bake to tyCache** — render audio-reactive particles on a farm with the plugin closed.
- **+20 new TyFlow palettes** (28 total) painted via Material ID, surviving a cache bake.
- **Volume Grid** — accurate inside-mesh fill with leak-free inside-test and Gap % control.
- **Multi-version support** — installs into 3ds Max 2024, 2025, 2026, and 2027.
- tyFlow template-merge fix; reliability and memory-stability improvements; automatic performance throttle in tyFlow scenes.

Component Versions in this Release

Component	Version
VanguardFX MSP (this guide)	v1.0.3 STABLE
VanguardFX product / installer	v1.0.3
tyFlow bridge script (`Vanguard_TyFlow_*.cs`)	v1.0.2 STABLE

Why the tyFlow script keeps its own number The tyFlow C# bridge is a separate component with an independent version (v1.0.2). The Listener confirms it as `VANGUARD TYFLOW v1.0.2` on sim start — match this to the script file you pasted into the Script Operator.

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ABOUT THIS SOFTWARE

VanguardFX MSP (Material Sync Producer) is a professional audio-reactive animation tool for Autodesk 3ds Max 2024–2027. Version 1.0.3 STABLE adds tyCache baking, an expanded TyFlow palette, inside-mesh Volume Grid filling, and multi-version installation.

Author & Status

Author: Navid Kamyanfar — Lead Developer & Designer.
Status: Stable production release for 3ds Max 2024–2027 (64-bit).
Tested: Windows 10/11 · Python 3.10–3.13 · V-Ray, Corona,tyFlowPro · Chaos Vantage.

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