3DS MAX · 2024 – 2027

VanguardFX Liquid

Professional Tutorial

One shot, start to finish — and the working method behind it

VERSION 3.99 · VANGUARDFX.PRO

— How to read this

This is not a list of features. It is one shot — a wave that breaks over a rock and throws spray — built the way it would be built on a deadline, with the reasoning kept in.

The method matters more than the shot. Every section is a phase, and the phases are in this order for a reason: **each one is cheap to redo and the next one is not.** Getting them out of order is the single most expensive mistake in fluid work, and it is the mistake almost everybody makes twice.

PHASE	WHAT YOU ARE DECIDING
1 Block it out	Timing and motion, at a resolution that runs in seconds.
2 Commit the motion	Raise resolution once the motion is right — not before.
3 Cache it	Stop re-simulating. Everything downstream is now free.
4 Whitewater	Foam and spray, onto the cache, without touching the water.
5 Surface	The renderable mesh.
6 Shade and render	Materials, and the frames themselves.

PHASE 1

1 Block it out

The goal here is not water that looks good. It is water that moves right, as fast as you can iterate on it.

1 Start from a preset, not from defaults

In `PRESETS`, press `SHOT: BREAKING WAVE (press, then render frame 60)`.

The
SHOT
buttons go further than the material buttons: they set the domain, resolution and step budget *and* the mesh, foam and viewport, so the scene is already coherent. You are starting from something that works and changing it, instead of assembling one from nothing.

2 Drop the resolution to block-out level

Set `Resolution (longest axis)` to about half what the preset chose.

> **WHY**
> Doubling resolution multiplies cell count by eight. At block-out you are judging *timing* — when the crest tips, how long the trough holds — and timing reads perfectly at low resolution. Detail you add now is detail you will throw away.

3 Add the rock

Select it, then `ADD SELECTED OBJECTS` in `COLLISION`. Tick `COLLISION ENABLED`.

If the water steps down the rock's slope in visible stairs, that is the collision resolution, not a bug: a diagonal built from cubes is a staircase. Raise `Solid detail (1 = fluid grid, 4 = 4x finer)`. Leave it at 1 during block-out.

4 Iterate on motion only

Play, watch, adjust, press `FILL && RESET`, play again. Change gravity, wave height, direction, and `FLIP ratio (0 calm - 1 splashy)`.

Do not touch foam. Do not build a mesh. Do not open the shader section.

> **The discipline that saves the day.** Everything after this phase is built *on top of* the motion. Change the motion later and the foam, the cache and the mesh are all invalidated at once. Stay here until the movement is right — it is the cheapest place you will ever be.

PHASE 2

2 Commit the motion

1 Set the world scale before you set the resolution

If this is a sea rather than a tank, set `WORLD SCALE: 1 unit = N cm` now, or press `MAKE THIS AN OCEAN (set world scale from the domain)`.

> **WHY IT COMES FIRST**
> Gravity ships as −981 — centimetres per second squared — so a unit is a centimetre and a 200-unit box is two metres of water, whatever size you drew it. World scale changes the *physics*, so it changes the motion, so it belongs with the motion. Set it after you have committed and you are back in phase 1.

2 Raise resolution in one step, and watch the memory

Go to your final number in a single move, and read the VRAM line as you do. Tick `VRAM GUARD (stop before the card fills)` and set `Keep free (MB)` to leave the renderer room.

3 Raise substeps only if you see the symptom

Fast, thin water passing through a collider means the step is too long for the speed. Raise the substep maximum. Do not raise it pre-emptively — it is paid on every frame.

PHASE 3

3 Cache it — the moment the work gets cheap

From here on you should never simulate the water again.

1 **Write the sequence**

In `EXPORT`, set `Sequence from frame` and press `EXPORT .VAN (layered re-sim cache)` for the range.

.van

is the plugin's own format and it is *re-simulable* — it carries the grid it was made on, which is what lets whitewater be baked onto it later without the original scene.

2 **Play it back instead of solving**

In `CACHE PLAYBACK`, press `LOAD .VAN SEQUENCE` and tick `PLAY FROM CACHE (scrub any way)`.

> **WHAT THIS BUYS YOU**
> Scrubbing in *both* directions, frame-exact, instantly. A live simulation can only ever go forwards, because frame 40 exists only because frame 39 happened. A cache has no such rule.

For very heavy shots, skip the viewport entirely. `RUN OFFLINE SIM (Sequence from - to)` runs the whole range with no viewport drawing at all and writes straight to disk. Set `Write: 0 van 1 prt 2 both` first. This is the route for hundred-million-particle scenes, where drawing the frame costs more than solving it.

PHASE 4

4 Whitewater, onto the cache

This is where the shot stops looking like a simulation. It is also where most people fight the software, because the dials interact.

1 Use the preset first

In `WHITEWATER FOAM / SPRAY / BUBBLES`, choose a `Foam preset` and press `APPLY FOAM PRESET`.

> **WHY**
> The preset sets the whole *relationship* in one press. Foam, splash, bubble and mist are not independent — they compete for the same particle budget and are born from the same events. Tuning them one dial at a time is how you end up with spray and no lace.

2 Get the threshold right for the scale

The whitewater threshold is how violent water must be before it foams. The shipped default suits a splash. For an ocean the panel itself recommends **30–50**; leave it high and only breaking crests foam, so the sea reads bare.

3 Keep foam spawn above splash spawn

If splash is higher, nearly everything is born as spray. Foam cohesion only binds foam, so there is nothing to bind, and you get haze where you wanted lace. The panel says so in words when it happens — look for `[FOAM]`.

4 Bake it into the cache

Press `BAKE WHITEWATER INTO THE .VAN SEQUENCE`.

The foam is written into the frames themselves, so it survives the session, scrubbing and rendering. It rewrites the frames it reads, so it asks first.

> **THE WORKFLOW THIS UNLOCKS**
> Because the .van carries its own grid, the bake can build what it needs from the cache alone. You can load a sequence tomorrow, bake different foam onto it, and never re-simulate the water — then export the result with `EXPORT LAYERS SEQUENCE (foam/spray/bub)`.

PHASE 5

5 The surface

1. **Build it**

   `BUILD SURFACE MESH`, with `Method: 0 blobby 1 smooth (ocean/lava)` — smooth for a wave, blobby for droplets.

2. **Set the level before the detail**

   `Surface level (lower = fatter)` decides where the skin sits. Too high and thin sheets — exactly the ones a breaking wave is made of — disappear. Too low and everything swells. Fix this first; then raise `Mesh detail (x solver grid)` until the silhouette holds.

3. **Check nothing was lost**

   Read the `mesh:` line. It reports triangles wanted against triangles kept. If any were lost the card ran out of room — lower `Mesh detail`. It will never clip in silence.

> **Rendering without the box.** The mesh and the whitewater render together and the domain is excluded, unless you tick `RENDER THE DOMAIN BOX TOO (off = mesh + whitewater only)`.

PHASE 6

6 Shade, and hand it off

Materials

In `SHADER PRESETS (V-Ray / Corona)`, set `Engine: 0 V-Ray 1 Corona` and press `BUILD WATER MATERIAL`. The material is matched to what is actually being simulated, so it is a starting point that already fits.

Particle size and shape

`PARTICLE SHADER (size / shape per class)` controls how each class reads at render. `RENDER dot size x (viewport unchanged)` is the important one: it changes the render without disturbing the viewport you have been judging by. `Size variation (0 = all identical)` off is the fastest way to make spray look artificial — identical droplets do not occur in nature.

Handing pieces to another package

BUTTON	GIVES YOU
`EXPORT DOMAIN MESH (.obj)`	The water surface as geometry.
`EXPORT FOAM MESH (.obj)`	The foam shell on its own.
`EXPORT .PRT (Krakatoa / tyFlow)`	Particles for another renderer.
`EXPORT LAYERS PRT (foam/spray/bub)`	Each whitewater class separately, for separate shading.
`EXPORT VELOCITY DOMAIN (.prt)`	Velocities, for motion blur downstream.

> **A LIGHT SIM RENDERED HEAVY**
> `POINT REPLICATE (export-time upres)` multiplies each exported particle into a small scattered cluster. Set `Replicate x (0 = off)` and a radius, and a simulation you could iterate on becomes one you can render — without ever solving the dense version.

7 When a shot goes wrong at 2 a.m.

Read before you change. The status lines are written from what the solver measured, not from what the sliders claim.

SYMPTOM	FIRST THING TO READ
Water drains away over hundreds of frames	The particle ledger in the diagnostic — it separates band culls from open-wall deletions and purges inside solids.
Foam vanished	The `[FOAM]` doctor lines, then `foam bins:`.
Mesh has a flat edge	The `mesh:` line — triangles lost.
Cache will not play	The `cache:` line names the exact file it tried.
Big tank moves like a small one	`world:` — the scale line.
Max closed itself	The diagnostic prints in capitals if the graphics driver reset.

When you need a person: press `WRITE DIAGNOSTIC LOG (.txt to send)` and attach the file at **vanguardfx.pro/support**. It contains a section headed literally **“DOCTOR (what is wrong, in words)”**.