

Reactive Bones V1 - User Guide

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Reactive Bones is a lightweight secondary-motion and collision system for Unity. It can simulate existing bone chains such as tails, hair, ears, straps, cables, and tentacles, or generate new reactive bones and skin weights directly from a mesh with the **Reactive Rig Painter**.

The V1 authoring workflow is intentionally editor-driven. Most users should not need to write code.

A key V1 rule is that each authoring tool has one job:

- **Setup Wizard** creates Reactive Bone chains from existing bones.
- **Rig Painter** creates new bones, skin weights, Reactive Bone chains, and armature links.

- **Smart Collision Manager** owns collision authoring and synchronization for both workflows.
- **Runtime Debugger** verifies the final runtime result.

This separation keeps collision setup consistent whether a chain came from an existing armature or from a generated rig.

Where the tools are

Open the tools from:

Tools > STL Dynamics > Reactive Bones

Available windows:

- **Setup Wizard** - configure Reactive Bones on an existing armature or bone chain.
- **Rig Painter** - paint reactive regions on a mesh, generate bones and weights, and bake Reactive Bone chains.
- **Smart Collision Manager** - generate, synchronize, tune, edit, and convert collision volumes and world-collision settings.
- **Runtime Debugger** - inspect chain state, culling, contacts, and solver cost in Play Mode.
- **Create Standard Profile Set** - creates one profile asset for every included starting preset.

You can also create profile assets from:

Assets > Create > STL Dynamics > Reactive Bones > Profile

and Rig Painter recipe assets from:

Assets > Create > STL Dynamics > Reactive Bones > Rig Painter Recipe

Which workflow should I use?

My model already has bones for the moving part

Examples: a tail rig, ponytail bones, cloth-strip bones, antenna bones, ears, tentacles, straps, or hanging cables.

Use the **Setup Wizard**.

1. Select the first bone that should react.
2. Open **Setup Wizard**.
3. Assign or create a Physics Profile.
4. Let the wizard split branching hierarchies when appropriate.
5. Configure a virtual endpoint if the last visible bone needs a simulated tip.
6. Click **Create Reactive Bone Chain**.
7. Test the motion.
8. If collision is needed, open **Smart Collision Manager** and build/synchronize it there.

The Setup Wizard intentionally does not create or manage colliders.

See [Existing Armatures and Setup Wizard](#).

My mesh does not have suitable reactive bones

Examples: an unrigged tail mesh, a patch of soft tissue, hair cards, feathers, a static prop, or a skinned character region that needs extra generated bones.

Use the **Reactive Rig Painter**.

1. Select the Mesh Renderer or Skinned Mesh Renderer.
2. Create a paint recipe.
3. Add a Hair, Tail, or Jiggle layer.
4. Paint the region in the Scene view.
5. Choose or auto-detect the root and tip.
6. Click **Generate Bones, Weights and Reactive Chains**.
7. Test the generated rig and motion.
8. If collision is needed, open **Smart Collision Manager**.

The Rig Painter intentionally does not create, assign, or synchronize collision. Collision is a separate finishing pass.

See [Reactive Rig Painter](#).

Five-minute existing-tail setup

1. Select the first tail bone.
 2. Open `Tools > STL Dynamics > Reactive Bones > Setup Wizard`.
 3. Leave **Component Host** on the selected object unless you have a reason to store the component elsewhere.
 4. Create a profile using **Animal Tail** as the starting preset.
 5. Keep **Split all hierarchy branches into independent roots** enabled when the wizard finds multiple outgoing branches.
 6. Keep **Virtual Endpoint > Extend Last Segment** for a normal chain tip.
 7. Click **Create Reactive Bone Chain**.
 8. Enter Play Mode and confirm the tail reacts correctly.
 9. If the tail needs body/environment collision, open `Tools > STL Dynamics > Reactive Bones > Smart Collision Manager`.
 10. Set **Character / Part**, author only the collision you need, synchronize connected chains if required, and validate in the **Runtime Debugger**.
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Five-minute painted-mesh setup

1. Open `Tools > STL Dynamics > Reactive Bones > Rig Painter`.
2. Assign the renderer you want to modify.
3. If Unity reports that Read/Write is disabled, use **Enable Read/Write and Reimport**.
4. Create a new recipe.
5. Pick a layer type:
 - **Hair** for flexible strands and hanging regions.
 - **Tail** for directional appendages and longer chains.
 - **Jiggle** for compact soft-body motion.
6. Paint the affected vertices in the Scene view.
7. Use **Auto Root / Tip** or the Pick Root/Pick Tip brush tools.

8. Set a Physics Profile, or leave it empty and Reactive Bones will create an appropriate default profile during the first bake.
9. Click **Generate Bones, Weights and Reactive Chains** and choose a separate `.asset` path for the generated mesh.
10. Confirm the renderer and original armature have not moved or rotated.
11. Add collision separately through **Smart Collision Manager** only if the generated region needs it.

The source mesh and paint recipe are preserved. Generated output can be rebuilt or restored later.

Core concepts

Reactive Bone Chain

A chain is the runtime simulation component. It owns one primary root and can also own additional independent roots that share one profile and configuration.

Physics Profile

Profiles are reusable ScriptableObjects containing motion, constraints, timing, radius, and root-to-tip response curves. Multiple chains can share the same profile.

Virtual Endpoint

A virtual endpoint gives the solver a final tip beyond the last real bone. This is useful when the visible hierarchy stops one bone earlier than the desired motion.

Smart Collision Manager

The Smart Collision Manager is the single V1 collision-authoring workflow.

Use it to:

- analyze a character or linked modular part;

- synchronize the connected Reactive Bone Collider set;
- create/update the runtime collision group;
- set **Chain Collision Radius** for connected chains;
- configure world Reactive Collider and Unity Collider sources/layers;
- generate/replan sparse automatic colliders;
- preserve locked automatic edits;
- generate core Humanoid collision;
- create manual Sphere/Capsule/Box/Plane volumes;
- convert selected Unity Colliders when an analytic Reactive Bone volume is specifically needed.

Neither Setup Wizard nor Rig Painter should be used to manage collision.

Connected collision set

A connected collision set is the fixed collection of Reactive Bone Colliders shared by chains belonging to one character or modular character. **Reactive Bone Collision Group** can keep this relationship synchronized at runtime.

World collision

World collision is separate from a connected collision set. It allows a chain to discover:

- world-visible Reactive Bone Colliders on independent objects or prefab instances;
- ordinary Unity Colliders through Unity Physics.

Generated rig

The Rig Painter creates a non-destructive generated mesh, generated bone hierarchy, Reactive Bone chains, and metadata. The original source mesh remains available for restoration and rebaking.

The generated-rig baker also protects the source renderer and original skeleton transform state. Existing local position, rotation, and scale are snapshotted during generation and restored if authoring causes drift. Bind poses are built from

the actual generated-bone transforms plus the original anchor bind relationship so imported FBX/armature pre-rotations are not fed back into the character unexpectedly.

If a character starts in bind pose and a bake would leave the generated renderer out of bind pose, the bake is rolled back instead of leaving the model moved or rotated.

Recommended reading order

1. [Existing Armatures and Setup Wizard](#)
2. [Reactive Rig Painter](#)
3. [Smart Collision Manager](#)
4. [Profiles, Chain Tuning, and Wind](#)
5. [Optimization and Runtime Debugging](#)
6. [Troubleshooting](#)

Critical body-collision rule

Synchronization intentionally gives connected chains the same analytic collider set. The chain inspector then filters reaction per chain:

- If a reactive rig touches or intersects a body collider in its normal pose, add that collider to Excluded Reactive Colliders on the affected chain.
- If the entire chain should ignore its synchronized local body set, disable React To Connected Colliders.
- These filters survive Smart Collision Manager synchronization and runtime collision-group refreshes.

Do not try to solve an embedded starting contact by adding solver iterations or shrinking unrelated collision volumes. Exclude the invalid rest-pose pair and keep the contacts the rig can actually reach during motion.