

Smart Collision Manager

Critical rest-pose rule

Synchronization assigns the complete connected collider set to each connected chain. If a reactive rig touches or intersects a body collider in its normal animated pose, exclude that specific collider on the affected ReactiveBoneChain > Collision > Excluded Reactive Colliders list. Otherwise the rig begins embedded and may push, jitter, or deform immediately. The per-chain exclusion remains intact when this manager synchronizes the set again.

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All V1 collision authoring is centralized in this window. Open it from:

Tools > STL Dynamics > Reactive Bones > Smart Collision Manager

The **Setup Wizard** and **Rig Painter** do not create or synchronize collision. Build the chain/rig first, confirm its motion, then finish collision here.

When **Character / Part** is selected, the manager analyzes the connected character and loads the connected chains' current collision settings first. This prevents opening the manager from silently starting from unrelated generic values.

Reactive Bones supports three related collision concepts:

1. **Connected/local Reactive Bone Colliders** - a fixed collision family belonging to one character or modular character.
2. **World-visible Reactive Bone Colliders** - analytic volumes discoverable by chains on independent objects and prefab instances.
3. **Ordinary Unity Colliders** - queried directly through Unity Physics; no Rigidbody or conversion is required.

Understanding that distinction is the key to building collision setups that work without becoming expensive.

1. Connected Character Collision Set

Set **Character / Part** to any Transform belonging to the character, including a linked hair or clothing armature.

The analysis reports:

- primary scope;
- total Reactive Bone Colliders;
- automatic and locked automatic colliders;
- world-visible Reactive Bone Colliders;
- Unity Colliders in connected scopes;
- Reactive Bone Chains;
- connected armature links;
- runtime collision group.

If the chain-to-collider pair count becomes large, the window warns you. A full finger/toe/body collision rig is only useful when reactive parts actually need that coverage.

Synchronize All Connected Chains

Assigns the same connected Reactive Bone Collider set to every chain across the main and linked armatures.

Create / update runtime collision group

Adds/updates `ReactiveBoneCollisionGroup`, which repeats the binding when the prefab or modular character is enabled and can refresh after children are attached/removed.

Select Collision Set

Selects all connected Reactive Bone Colliders for inspection.

Remove All Auto Colliders

Removes automatically generated colliders across the connected scope while leaving manually authored volumes intact.

2. Chain Radius and World / Prefab Collision

This section applies collision settings to every connected chain for the selected character/part.

Chain Collision Radius

Chain Collision Radius scales the particle collision radius on every connected Reactive Bone chain.

Use it as the character-wide contact-thickness control before compensating with oversized collider volumes.

World collision then lets independent objects interact without merging their local collision groups.

Apply World Collision to Connected Chains

After choosing the settings below, use **Apply World Collision to Connected Chains** to write them to the connected chain set.

External Sources

Choose any combination of:

- **Reactive Bone Colliders**
- **Unity Colliders**

Reactive Collider Layers

Filters world-visible Reactive Bone Colliders by GameObject layer.

Publish connected Reactive Bone colliders to the world

When enabled, the connected analytic volumes are also discoverable by chains outside the local character collision group.

Use this when two independent prefab instances should physically interact through Reactive Bones.

Unity Collider Layers

Filters direct Unity Physics queries.

This is one of the most important production-performance settings. Do not leave this on every layer unless the chain genuinely needs every scene collider.

Unity Triggers

Controls whether trigger colliders are ignored or considered.

Unity Collider Friction

Controls tangential motion removed on Unity-collider contact.

Candidates Per Particle

Maximum Unity Collider candidates cached for collision queries. The default is 32. Increase it only if the runtime inspector reports the Unity collider candidate buffer is saturating in unusually dense physics scenes.

Ignore Unity colliders on each simulated segment

Prevents obvious self-collision against Unity Colliders placed directly on the simulated bone, parent, or direct child helper.

3. Automatic Bone Colliders

Automatic generation has three sources. This is the only automatic-collider authoring path in V1.

If **Synchronize connected chains after changes** is enabled, generation/replanning also refreshes the connected chain binding after the collider set changes.

Bone Hierarchy

Plans colliders from a Transform hierarchy.

Good for existing tails, hair bones, cloth strips, cables, and custom skeleton branches.

Skinned Mesh Bones

Uses the renderer's actual bone palette and can bridge helper Transforms while budgeting coverage by discovered branch.

Good for character/body collision authoring.

Generated Reactive Rigs

Replans every Rig Painter-generated armature in the connected set.

This is the intended way to refresh generated hair/tail collision after rebuilding a Rig Painter rig. Rig Painter itself does not generate colliders.

4. Smart generation settings

Radius / Bone Length

Collider radius is based on local bone spacing rather than the full merged capsule length.

Minimum World Radius / Maximum World Radius

Absolute clamps on generated thickness.

Friction

Per-volume tangential damping on Reactive Bone contact.

Merge Bones Closer Than

Very short adjacent bones are grouped into shared branch coverage.

Max Capsules / Branch

Target capsule budget for a mostly straight branch. Sharp bends and essential anchors can still create additional shapes.

Priority spheres at branch junctions

Creates stable local coverage around joints where several branches meet.

Spheres on leaf bones

Covers branch endpoints.

Preserve locked automatic collider edits

When you manually tune an automatically generated collider, lock it before replanning. The planner then preserves that shape instead of replacing it.

Remove stale unlocked colliders before replanning

Recommended for normal generation passes. Old unlocked shapes are removed and replaced by the current plan.

5. Advanced Smart Placement

Minimum Branch Length

Skips branches that are too short to justify generated coverage.

Collider Spacing

Desired spacing measured relative to collider diameters.

Higher values create sparser coverage.

Maximum Merge Bend

Maximum bend angle that can still be represented by one merged capsule.

Lower values split bent branches more aggressively.

Junction Trim

Shortens capsules near priority spheres so multiple shapes do not stack unnecessarily around branch joints.

Cross-Branch Separation

Prevents neighboring branches from creating competing overlapping coverage. Candidates can shrink or yield when branches are too close.

6. Locking automatic shapes

A generated collider can be manually adjusted and then locked.

Workflow:

1. Generate the automatic set.
2. Move/resize any shapes that need artistic correction.
3. Select those collider objects.
4. Click **Lock Selected Auto Shapes**.
5. Replan freely later with **Preserve locked automatic collider edits** enabled.

Use **Unlock Selected** when you want the planner to own those shapes again.

You can also lock/unlock a generated collider directly from its inspector.

7. Core Humanoid Collision Rig

Assign a Humanoid `Animator`, set **Thickness**, and click:

Generate / Refresh Core Humanoid Colliders

This generates a practical core body collision setup without requiring a manually authored volume on every small finger/toe bone.

The Animator must use Unity's **Humanoid** avatar type.

8. Manual Collider

Select a bone and create a child analytic volume:

- **Sphere**
- **Capsule**
- **Box**
- **Plane**

The child helper can be moved/scaled without changing the actual bone Transform.

Outside vs Inside

Most character/body collision uses **Outside**, which keeps simulated particles outside the volume.

Inside contains particles within the volume.

For a Plane:

- Outside keeps particles on the positive-normal side;
 - Inside keeps them on the negative-normal side.
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9. Direct Unity Collider collision

Reactive Bones can collide directly with ordinary Unity Colliders.

You do **not** need to:

- convert them;
- add a Rigidbody;
- duplicate them as Reactive Bone volumes.

This is ideal for level geometry, props, walls, floors, and environment collision.

When should I convert a Unity Collider?

Use **Convert Selected Unity Colliders** only when you specifically want:

- an editable analytic copy;
- an **Inside** volume;
- Reactive-Bone-specific per-volume settings;
- a volume that participates in the connected analytic collision family.

Converted analytic volumes keep a reference to the Unity collider they represent so the direct Unity path can skip the represented source and avoid solving the same shape twice.

10. Reactive Bone Collider inspector

Each analytic collider exposes:

- shape;
- collision mode;
- enable/disable;
- local center;
- world participation;
- attached-bone ownership;
- attached-bone self-ignore;
- chain-discovery exclusion;

- shape size/direction;
- friction;
- bone radius multiplier;
- debug drawing.

Automatically generated shapes also expose controls to lock the authoring result or convert the shape into a manual collider.

11. Collision Group vs World Collision

These are not the same thing.

Collision Group

Use for one modular character whose body, hair, clothing, and linked armatures should share one fixed internal collider set.

World Collision

Use when unrelated objects or separate prefab instances need to discover each other at runtime.

A hair chain can use both simultaneously: local body colliders from its collision group and nearby world/environment sources through world collision.

Production recommendation

For best performance and clean authoring:

1. Build the chain or generated rig first; do not mix collision authoring into rig setup.
2. Use a sparse local analytic set for body/character collision.

3. Synchronize only connected armatures that genuinely need the same volumes.
4. Use **Chain Collision Radius** for particle contact thickness instead of inflating every volume.
5. Use layer masks aggressively for world and Unity collision.
6. Do not generate a collider on every bone by default.
7. Keep environment collision on Unity Colliders unless you need special analytic behavior.
8. Use the Runtime Debugger and chain inspector to watch collider counts and Unity candidate saturation.

Per-chain collision response

The Smart Collision Manager authors volumes, assigns the connected set, and applies world settings. Reaction filters that differ by chain live in ReactiveBoneChain > Collision:

- React To Connected Colliders disables the whole synchronized local set for that chain.
- Excluded Reactive Colliders ignores only selected analytic volumes while keeping the rest of the body set active.

Synchronization and ReactiveBoneCollisionGroup refreshes replace the assigned set but preserve both filters.

If it intersects at rest, exclude it

Use a per-chain exclusion for every body collider the reactive rig already touches or penetrates in its normal pose. Ignore Attached Bone only handles ownership self-ignore; it does not replace this rest-pose rule for other body volumes.

Automatic-generation lists and removal

Essential Bones always receive a priority sphere before sparse coverage. Excluded Bones / Subtrees are omitted only from automatic collider authoring; they do not exclude simulation bones or filter an existing collider from a chain. Remove This Auto Set removes the current source's automatic set, while Remove All Auto Colliders removes automatic shapes across the connected scope. Manual volumes remain.