



# HAVOK Physics



## Product Overview

Havok Physics is the fastest, most robust physics engine for games. Havok Physics is a C++ SDK built to be integrated into proprietary game engines offering cross-platform deterministic rigid body simulation, constraints, and queries.

Powering the biggest game franchises in the world for decades has continuously pushed Havok Physics to remain the fastest, most robust, best-in-class physics engine in the world.

Leverage Havok Physics in your game to create richer, more dynamic worlds and player experiences.

## Examples of games powered by Havok Physics



## Performance

**More dynamics:** Simulate more objects on screen without increasing your physics budget. Use collision quality settings, LOD shapes, and geometry processing to further improve performance for your specific use cases.

**Predictable performance across all supported platforms:** Havok Physics is optimized for all supported platforms. Low variance between frame times helps you achieve predictable performance and smooth frame rates across all your release targets.

**High-performance queries:** Most games drive gameplay based on queries against the physics representation of the game world. Havok Physics offers high-performance ray casts, shape casts and more, allowing you to inform gameplay and other engine sub-systems at minimal performance cost.

**Geometry Processing:** Havok Physics comes with mesh processing utilities allowing you to simplify complex input geometry to build meshes more suitable for physics simulation and gameplay. Merge and voxelize a set of input meshes, removing unwanted layers of geometry underneath the object surface. For example, remove layers below your landscape mesh created by kitbashing.

## Robustness

**Most robust constraint solver:** Havok Physics' default iterative constraint solver gives you robust, stiff constraint resolution for your ragdoll and general constraint setups.

**Direct solver:** Use Havok Physics' direct solver for constraints where the highest accuracy is required. This non-iterative solver enables gameplay critical physics driven setups like ragdolls or physics puzzles.

**Graceful recovery from invalid states:** Havok Physics provides many utilities to recover from entangled bodies and constraints gracefully. For example, intersecting bodies de-penetrate without high impulses or remain as-is until external forces slowly push them apart.

**Battle-hardened technology:** Havok Physics has powered the biggest game franchises in world for decades. Leverage battle-tested technology that has continuously pushed the boundaries and can handle edge cases of all game genres.



## Control

**Customize collision responses:** A range of collision modifiers allow you to customize collision response for individual physics bodies. For example, simulate a soft surface, by overriding the penetration behavior for a pair of colliding bodies.

**LOD Shapes:** Use different shape representations depending on which body pairs collide. For example, represent an object using a convex hull for landscape collisions and a compound shape for collisions with smaller objects. Use different representations based on operations. For example, use a highly detailed mesh for ray casts, but a convex hull for collisions.

**Physics property modification:** Change objects at runtime and based on collisions. Mutable shapes allow you to change the size of an object dynamically at runtime without resulting in penetration with other static or dynamic bodies. Override the mass and inertia tensor for colliding body pairs.

**Havok Physics Particles:** Havok Physics Particles are rigid bodies trading collision fidelity for ultra-high-performance. Use Physics Particles to simulate non-gameplay critical objects like debris, sparks, bullet casings. Physics particles collide with the static environment, each other, and are influenced by simulated Havok rigid bodies.