Physical Materials Reference

Assets applied to physically simulated primitives directly or via materials used to configure and control physical properties used by the simulation.

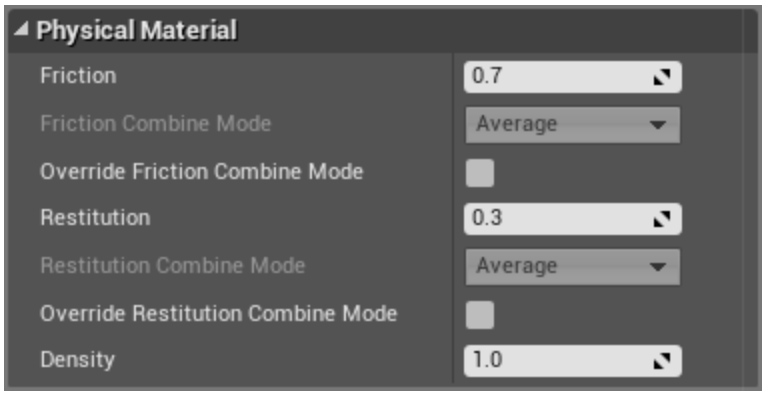
Physical Materials are used to define the response of a physical object when interacting dynamically with the world. Physical Materials are fairly easy to use. Creating one will give you a set of default values, identical to the default physical material that is applied to all physics objects. Examples of this would be a character's dead body (ragdoll), a movable crate, and so on.

Properties

Below are the properties for Physical Materials separated by major category.

Physical Material

This category contains the core properties of the Physics Material: Friction, Restitution, and Density.



Property	Description
Friction	This is the friction value of the surface, which controls how easily things can slide on this surface.
Friction Combine Mode	This property enables you to adjust how Physical Material frictions are combined. This is set to Average by default, but can be overriden using the **Override Friction Combine Mode** property. • **Average**: Uses the average value of the touching materials: (a+b)/2 • **Min**: Uses the smaller value of the touching materials: min(a,b) • **Multiply**: Multiplies the values of the touching materials: a*b • **Max**: Uses the larger value of the touching materials: max(a,b)
Override Friction Combine Mode	By default, the Friction Combine Mode is set to **Average**, by enabling this property you can change how Frictions are combined between touching Physical Materials.
Restitution	This is how "bouncy" the surface is, or how much energy it retains when it collides with another surface.
Restitution Combine Mode	This property enables you to adjust how Physical Material restitutions are combined. This is set to Average by default, but can be overriden using the **Override Restitution Combine Mode** property.

Property	Description
	• **Average**: Uses the average value of the touching materials: (a+b)/2 • **Min**: Uses the smaller value of the touching materials: min(a,b) • **Multiply**: Multiplies the values of the touching materials: a*b • **Max**: Uses the larger value of the touching materials: max(a,b)
Override Restitution Combine Mode	By default, the Restitution Combine Mode is set to **Average**, by enabling this property you can change how Restitutions are combined between touching Physical Materials.
Density	Used with the shape of the object to calculate its mass properties. The higher the number, the heavier the object. Measured as **g** per cubic **cm**.

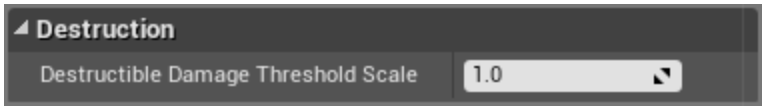
Advanced

This category contains a property to change how scale affects the mass of the Actor with the Physical Material applied to it.

Property	Description
Raise Mass To Power	Used to adjust the way that mass increases as objects get larger. This is applied to the mass as calculated based on a "solid" object. In actuality, larger objects do not tend to be solid, and become more like "shells" (e.g. a car is not a solid piece of metal). Values are clamped to 1 or less.

Destruction

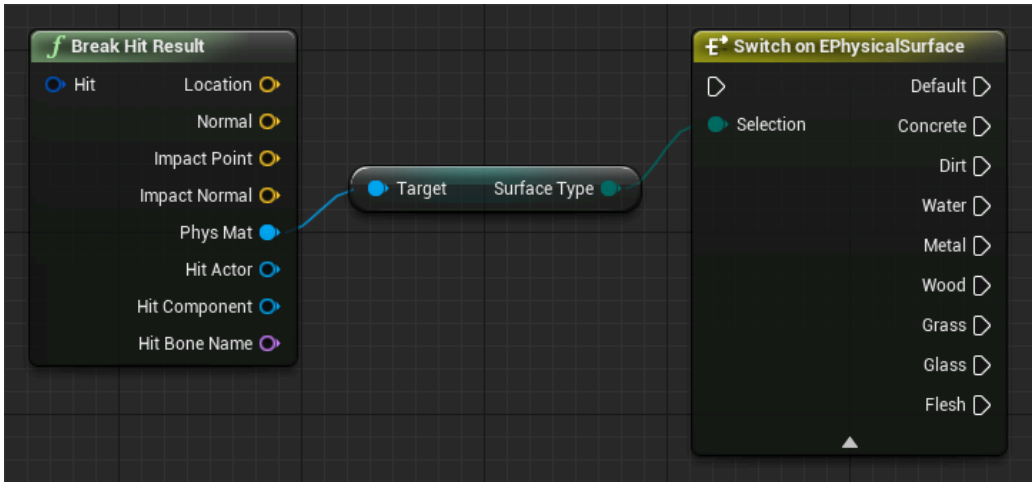
Properties that are specific to the Destruction system in Unreal Engine 4.



Property	Description
Destructible Damage Threshold Scale	How much to scale the damage threshold by on any destructible this Physics Material is applied to.

Physical Properties

Gameplay related properties for the Physical Material.

Property	Description
Surface Type	Surface Types are set in the `DefaultEngine.ini` file for your project. They define an enum to be used in the engine for defining any number of things, from what sound plays as a character walks across a surface, to the type of decal an explosion should leave on different surfaces. You can use ProjectSetting/Physics/Physical Surfaces This data can be pulled in code or Blueprint: 

Property	Description
	By default, without editing the source code, you are limited to 30 Surface Types, labeled SurfaceType1 through SurfaceType30.

Vehicles

These properties are specific to Vehicles in Unreal Engine 4. While they may say they deal with Tires, they only do so when applied to a Vehicle (as Tire Data Types, and Wheel Blueprints, don't directly reference a Physical Material).

Property	Description
Tire Friction Scale	Overall tire friction scalar when this Physical Material is applied to a Vehicle. This value is multiplied against the Vehicle's Wheels' specific Friction Scale values.
Tire Friction Scales	Tire friction scales for specific Wheels when this Physical Material is applied to a Vehicle. These values are multiplied against the Vehicle's Wheels' specific Friction Scale values.